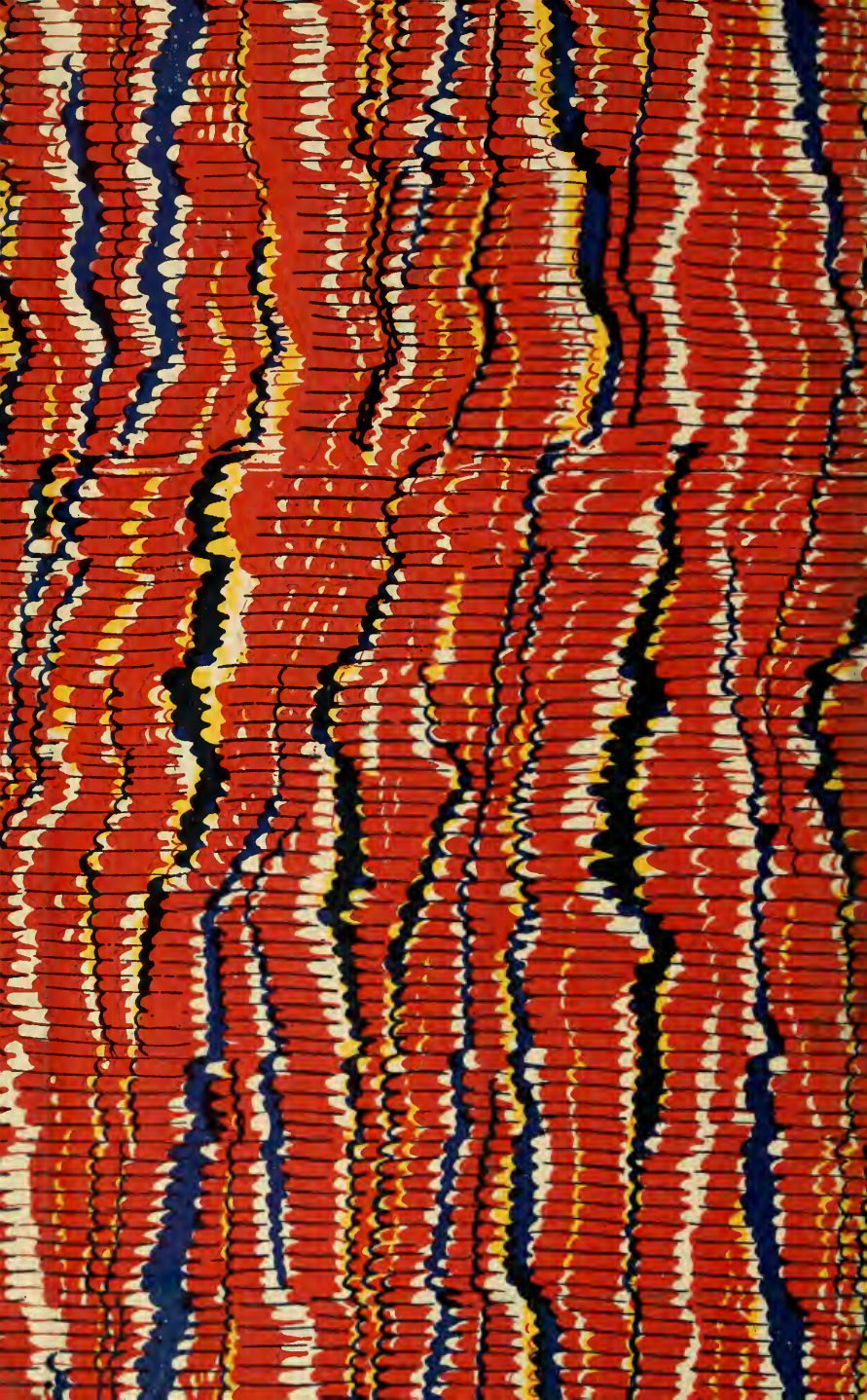

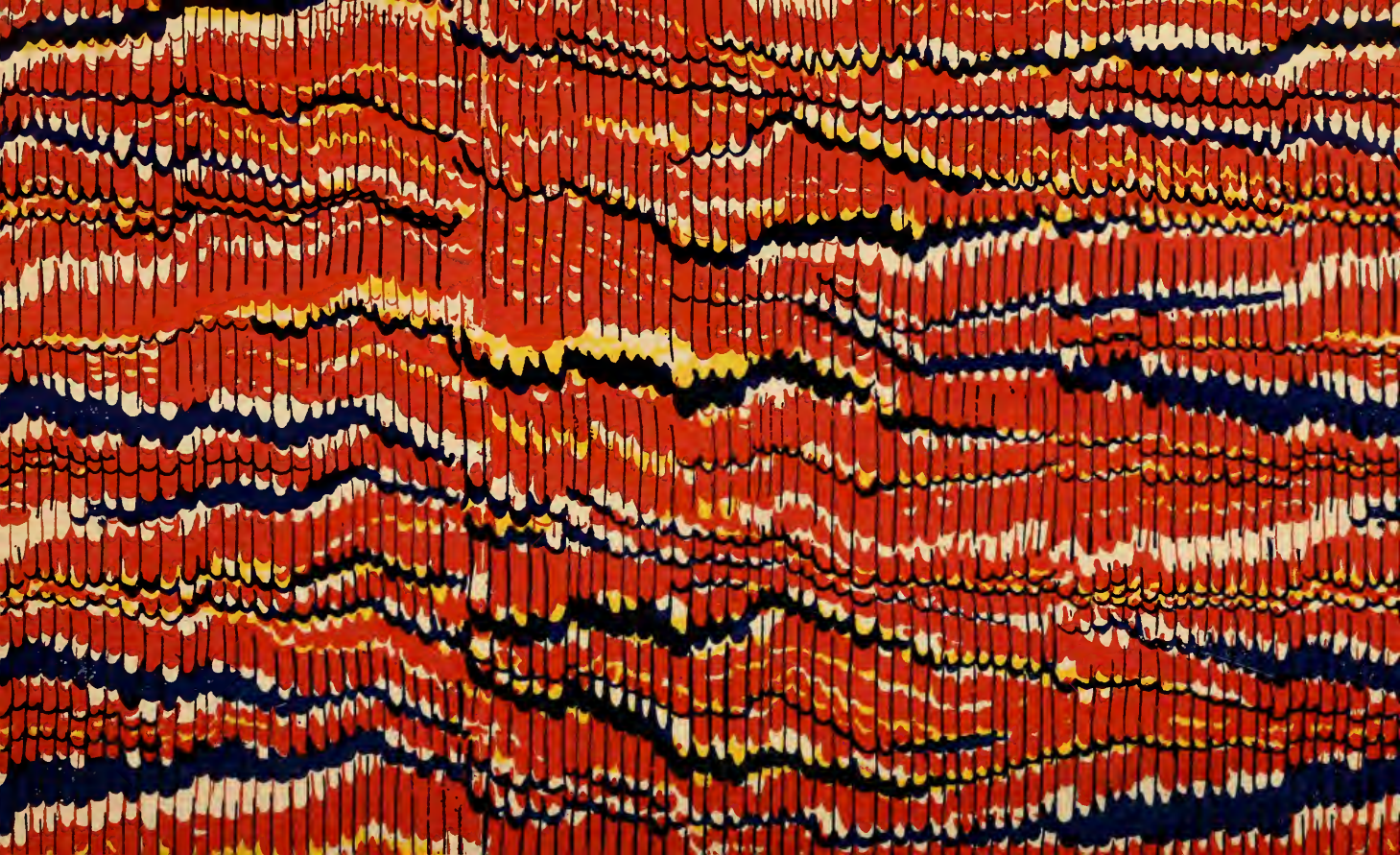

Proceedings

OF

THE SOUTH LONDON

ENTOMOLOGICAL & NATURAL HISTORY

SOCIETY

1919=20

WITH TWO PLATES

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Entomological & Natural History Society

(Established 1872)

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1911 Blenkarn, S. A., F.E.S., Burford Lodge Cottage, West Humble, Dorking. *l, c, odonata.*

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1909 Bright, P. M., F.E.S., Cheriton, Porchester Road, Bournemouth. *l.*

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1909 Buckstone, A. A. W., 307A, Kingston Road, Merton Park, Wimbledon, SW. 19. *l.*

Year of Election.

1915 Bunnett, E. J., M.A., *Vice-President*, 19, Silverdale, Sydenham, S.E. 26. *mi.*

1890 Butler, W. E., F.E.S., Hayling House, Oxford Road, Reading. *l, c.*

1889 Cant, A., F.E.S., 33, Festing Road, Putney, S.W. 15. *l, mi.*

1910 Cardew, Major P. A., East Hill House, Queenstown, Co. Cork. *l.*

1886 Carpenter, J. H., F.E.S., Redcot, Belmont Road, Leatherhead, Surrey. *l.*

1899 Carr, F. B., 46, Handen Road, Lee, S.E. 12. *l.*

1899 Carr, Rev. F. M. B., M.A., L.Th., The Vicarage, Alvanley, Nr. Helsby, Cheshire. *l, n.*

1897 Chapman, T. A., M.D., F.R.S., F.E.S., F.Z.S., Betula, Reigate, Surrey. *l.*

1879 Clode, W. (*Life member.*)

1915 Cockayne, E. A., M.D., F.E.S., 16, Cambridge Square, W. 2. *l.*

1899 Colthrup, C. W., 103, Woodwarde Road, E. Dulwich, S.E. 22. *l, ool, orn.*

1907 Coote, F. D., 25, Pendle Road, Streatham, S.W. 6. *l, b.*

1919 Coppeard, B., 12, King's Avenue, Windmill Lane, Southall. *l.*

1919 Cornish, G. H., 51, Kirkham Street, Plumstead Common, S.E. *l.c.*

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1918 Court, T. H., De Aston Grammar School, Market Rasen, Lincolnshire. *l.*

1902 Cowham, F. W., 118, Minard Road, Hither Green, S.E. 13. *l.*

1920 Cox, F. W., 26, Crown Street, Reading. *l.*

1911 Coxhead, G. W., 36, Linthorpe Road, Stamford Hill, N. 16. *Life Member. c.*

1899 Crabtree, B. H., F.E.S., Holly Bank, Alderley Edge, Cheshire. *l.*

1918 Craufurd, Clifford, Horne Summer Road, E. Molesey. *l.*

1920 Crocker, Capt. W., 41, Salisbury Road, Bexley, Kent. *l.*

1898 Crow, E. J., 26, Tindal Street, North Brixton, S.W. 9. *l.*

1910 Curwen, B. S., 9, Lebanon Park, Twickenham. *l.*

1888 Dawson, W. G., F.E.S., The Manor House, Upper Wick, Worcester. (*Life member.*) *l.*

1900 Day, F. H., F.E.S., 26, Currock Terrace, Carlisle. *l, c.*

1912 Dexter, S., 12, Stiles Way, Beckenham.

Year of Election.

1889 Dennis, A. W., 56, Romney Buildings, Millbank, S.W. 1. *l, mi, b.*

1918 Dixey, F. A., M.A., M.D., F.R.S., Wadham College, Oxford. *Hon. Member.*

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1915 Fagg, T. A., 55, Mt. Pleasant Road, Lewisham, S.E. 13. *l.*

1918 Farquhar, L., 10, Gray's Inn Square, W.C. 1. *l.*

1887 Fletcher, W. H. B., M.A., F.E.S., Aldwick Manor, Bognor, Sussex. (*Life member.*) *l.*

1889 Ford, A., South View, 36, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*

1915 Foster, T. B., Parkview Road, Addiscombe, Croydon. *l.*

1907 Fountaine, Miss M. E., F.E.S., 1727, Wilcox Avenue, Hollywood, Los Angeles, Cal., U.S.A. *l.*

1912 Freeman, C. N., 54-5, Coleman Street, E.C. 2. *l.*

1886 Fremlin, Major H. S., M.R.C.S., L.R.C.P., F.E.S., "Markinch," Nether Street, N. Finchley.

1919 Frisby, G. E., F.E.S., 31, Darnley Road, Gravesend. *hym.*

1912 Frohawk, F. W., M.B.O.U., F.E.S., *Council*, "Uplands," Thundersley, Rayleigh, Essex. *l, orn.*

1915 Fryer, Gordon, L. D. S., 52, London Road, Twickenham. *l.*

1914 Fryer, J. C. F., Board of Agriculture and Fisheries, 4, Whitehall Place, S.W. 1. *l.*

1911 Gahan, C. J., D.Sc., M.A., F.E.S., British Museum (Natural History), South Kensington, S.W. 7. *c.*

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1920 Goodman, O. R., 210, Goswell Road, E.C. 1. *l.*

1908 Green, E. D., 17, Manor Park, Lee, S.E. 13. *l.*

YEAR OF ELECTION.

1918 GREEN, E. E., F.E.S., Ways End, Camberley, Surrey. *hem.*
1920 GROSVENOR, T. H. L., 8, Gloucester Road, Redhill. *l.*

1888 HALL, A. E., F.E.S., F.R.H.S., Cranfield House, Southwell, Notts. *l.*
1884 HALL, T. W., F.E.S., *Council*, 61, West Smithfield, E.C. 1. *l.*
1891 HAMM, A. H., 22, Southfields Road, Oxford. *l.*
1906 HAMMOND, L., Letchmere, Alden Lane, Purley. *l.*
1911 HARRIS, P. F., 15, Crawford Gardens, Cliftonville, Margate. *l.*
1920 HARVEY, S. W., 28, Hillmore Grove, Sydenham, S.E. 26. *mi.*
1903 HARE, E. J., F.E.S., 4, New Square, Lincoln's Inn, W.C. 2. *l.*
1913 HAYNES, E. B., 17, Denmark Avenue, Wimbledon, S.W. 19. *l.*
1888 HILLMAN, T. S., F.E.S., 11, Eastgate Street, Lewes, Sussex. *l.*
1911 HOLDING, A., 95, Kyverdale Road, Stoke Newington, N. 16. *l.*
1889 HORNE, A., F.E.S., "Bonne-na-Coille," Murtle, Aberdeenshire.
1919 HUMPHREYS, J. A., 29, Shirlock Road, Hampstead, N.W. 3. *l.*

1914 JACKSON, W. H., Pengama, 14, Woodcote Valley Road, Purley. *l.*
1886 JÄGER, J., 65, St. Quentin's Avenue, North Kensington, W. 10. *l.*
1918 JOHNSTONE, D. C., Brooklands, Rayleigh, Essex. *l.*

1898 KAYE, W. J., F.E.S., Caracas, Ditton Hill, Surbiton, Surrey. *l, S. American l.*
1900 KEMP, S. W., B.A., F.E.S., Indian Museum, Calcutta. *l, c.*
1910 KIDNER, A. R., The Oaks, Station Road, Sidcup, Kent. *l.*

1914 LEEDS, H. A., 2, Pendcroft Road, Knebworth, Herts. *l.*
1919 LEESON, J. R., M.D., F.L.S., F.E.S., Clifton House, Twickenham, S.W. *l.*
1919 LEMAN, G. C., F.E.S., Wynyard, 152, West Hill, Putney Heath, S.W. 15. *c.*
1919 LEMAN, G. B. C., F.E.S., Wynyard, 152, West Hill, Putney Heath, S.W. 15. *c.*
1920 LINDEMAN, F., 7, Rua Dereita, Sao Paulo, Brazil. *l.*
1896 LUCAS, W. J., B.A., F.E.S., 28, Knight's Park, Kingston-on-Thames. *Brit. o., odonata, n, m, b.*

1892 MAIN, H., B.Sc., F.E.S., Almondale, Buckingham Road, S. Woodford, Essex. *l.*
1889 MANSBRIDGE, W., F.E.S., Dunraven, Church Rd., Wavertree, Liverpool. *l, c, etc.*

Year of Election.

1916 Mason, G. W., 99, Seaford Road, Ealing, W. 5. *l.*

1885 Mera, A. W., 5, Park Villas, Loughton, Essex. *l.*

1881 Miles, W. H., F.E.S., Grosvenor House, Calcutta. Post Box 126. *mi, b.*

1880 Montiero, A. A. de C., F.E.S., 70, Rua do Alecrim, Lisbon.

1889 Moore, H., F.E.S., 12, Lower Road, Rotherhithe, S.E. 16. *l, h, d, e l, e h, e d, mi.*

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1911 Morice, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon, Woking. (*Life Member.*) *h.*

1920 Morrell, H. A., Heathdene, Wordsworth Road, Wallington. *l.*

1912 Neave, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. 4. *l.*

1906 Newman, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*

1918 Nimmey, S. W., F.E.S., 296, High Holborn, W.C. 1. *l.*

1911 Page, H. E., F.E.S., Bertrose, Gellatly Road, New Cross, S.E. 14. *l.*

1915 Pearson, G. B., 5, Upper Bedford Place, Russell Square, W.C. 1. *l.*

1908 Pennington, F., Oxford Mansions, Oxford Circus, W. 1. *l.*

1880 Perkins, V. R., F.E.S., Wotton-under-Edge, Gloucestershire. *l, h, d.*

1887 Porritt, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*

1912 Poulton, Prof. E. B., D.Sc., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)

1897 Prest, E. E. B., 1 and 2, Chiswell Street, E.C. 1. *l.*

1919 Preston, N. C., 32, Danser Road, Fulham, S.W. *l.*

1903 Priske, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. 5. *l, m.*

1919 Quilter, H. G., Fir Cottage, Kiln Road, Prestwood, Great Missenden. *l.*

1902 Rayward, A. L., F.E.S., 91 & 93, Southwark Street, S.E. 1. *l.*

1887 Rice, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. 4. *orn.*

1920 Richardson, A. W., 28, Avenue Road, Southall.

Year of Election.

1902 Riley, N. D., *Council*, 94, Drakefield Road, Upper Tooting, S.W. 17. *l.*

1919 Roberts, J. G., 1, Segary Villas, Hadley Road, New Barnett. *l.*

1910 Robertson, G. S., M.D., *Council*, St. Anne's, 101, Thurlow Park Road, Dulwich, S.E. 21. *l.*

1894 Robinson, Leigh, F.Z.S., 4, Queen's Walk, Ealing, W. 5. *l.*

1911 Robinson, Lady Maud, F.E.S., Worksop Manor, Notts. *l, n.*

1887 Routledge, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle. *l, c.*

1904 Rowland-Brown, H., F.E.S., Oxhey Grove, Harrow Weald. *l.*

1890 Rowntree, J. H., Scalby Nabo, Scarborough, Yorks. *l.*

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1915 Russell, S. G. C., Monkswood, Heathside Park Road, Woking. *l.*

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1910 Scorer, A. G., F.E.S., Hillcrest, Chilworth, Guildford. *l.*

1911 Sennett, Noël S., Lieut. R.N.V.R., F.E.S., 24, De Vere Gardens, Kensington, W. 8. *c.*

1910 Sheldon, W. G., F.E.S., Youlgreave, South Croydon. *l.*

1898 Sich, Alf., F.E.S., Corney House, Chiswick, W. 4. *l.*

1903 Smallman, R. S., F.E.S., Eliot Lodge, Albemarle Road, Beckenham, Kent. *l, c.*

1908 Smith, B. H., B.A., F.E.S., Frant Court, Frant, nr. Tunbridge Wells. *l.*

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1890 Smith, William, 13, St. Mirren Street, Paisley. *l.*

1917 Soames, Rev. H. A., M.A., F.Z.S., "Hazelcroft," Mason's Hill, Bromley, Kent. *l.*

1882 South, R., F.E.S., 4, Mapesbury Court, Shoot-up-Hill, Brondesbury, N.W. 2. *l, c.*

1908 Sperring, C. W., 8, Eastcombe Avenue, Charlton, S.E.7. *l.*

1872 Step, E., F.L.S., *Council*, 158, Dora Road, Wimbledon Park, S.W. 19. *b, m, cr.; Insects, all Orders.*

1916 Stewart, H. M., M.A., M.D., 123, Thurlow Park Road, Dulwich, S.W. 21. *l.*

1910 Stoneham, Lieut. H. F., F.E.S., Stoneleigh, Reigate. *orn, l.*

Year of Election.

1913 Storey, Gilbert, Dept. of Agriculture, Cairo, Egypt. *Econ. Ent.*
1911 Stowell, E. A. C., B.A.
1920 Swift, R., Cilmory, Knoll Road, Bexley. *l.*
1916 Syms, E. E., 22, Woodlands Avenue, Wanstead, N.E. *l.*

1894 Tarbat, Rev. J. E., M.A., Fareham, Hants. *l, ool.*
1913 Tatchell, L., 43, Spratt Hill Road, Wanstead, E. 11. *l.*
1910 Tautz, P. H., Cranleigh, Nower Hill, Pinner. *l.*
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1887 Turner, H. J., F.E.S., *Hon. Editor*, 98, Drakefell Road, New Cross, S.E. 14. *l, c, n, he, b.*

1889 Wainwright, C. J., F.E.S., 139, Hamstead Road, Handsworth, Staffs. *l. d.*
1911 Wakely, L. D., 34, Lancaster Road, Wimbledon Common, S.W. 19. *l.*
1880 Walker, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*
1911 Wells, H. O., Inchiquin, Lynwood Avenue, Epsom. *l.*
1872 West, W., *Hon. Curator*, 343, Green Lanes, Finsbury Park, N. 4. *l, c, he.*
1911 Wheeler, The Rev. G., M.A., F.Z.S., F.E.S., 37, Gloucester Place, W. 1. *l.*
1887 Whiffen, W. H., Holmwood Lodge, Laton Rd., Hastings. *l.*
1914 Williams, B. S., 77, Durham Road, E. Finchley, N. 7. *l.*
1912 Williams, C. B., B.A., F.E.S., Department of Agriculture, Trinidad. *l.*
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1918 Wood, H., Albert Villa, Kennington, near Ashford, Kent. *l.*
1917 Woolacott, H. R., Bedales School, Petersfield, Hants, and Hightilt Farm, Cranbrook, Kent. *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.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1919.

REVENUE ACCOUNT.

Expenditure.	£	s.	d.	*Income.*	£	s.	d.
To Debit balance from 1918	52	12	1	By Subscriptions, 81 at 10/–	£40	10	0
,, One Year's rent	25	0	0	,, ,, 11 ,, 7/6	4	2	6
,, Fire Insurance	0	14	0	,, ,, 5 ,, 5/	1	5	0
,, Attendance one year	2	10	0	,, ,, 1 ,, 6/		6	0
,, Subscription to South-Eastern Union		10	0	,, ,, 6 ,, 2/6		15	0
,, ,, ,, Ray Soc	1	1	0	,, ,, paid in advance ..	6	7	6
	1	11	0	,, Arrears of Subscriptions received	14	2	0
,, Postages, Stationery, and sundries:—				,, Entrance fees, ...	1	15	6
S. Edwards	5	10	0	,, Life Membership Fee	5	5	0
H. J. Turner		19	0		74	8	6
A. E. Tonge	4	17	1	,, Debit Balance	25	16	2
	10	17	1				
,, Entrance fees carried to Suspense a/c	1	15	6				
,, Life Membership fee carried to Suspense a/c	5	5	0				
	7	0	6				
	£100	4	8		£100	4	8

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

(Held in Suspense.)

	£	s.	d.		£	s.	d.
To Balance	57	17	6	By Balance from 1918	50	17	0
				,, Entrance fees, 1919	1	15	6
				,, Life Membership fee, 1919	5	5	0
	£57	17	6		£57	17	6

LIBRARY FUND.

	£	s.	d.		£	s.	d.
,, Binding—Andrews	1	10	6	By Balance from 1918	1	3	5
				,, Fines	0	2	2
				,, Balance (Debit)	0	4	11
	£1	10	6		£1	10	6

PUBLICATION FUND.

	£	s.	d.		£	s.	d.
To Archer's Account printing Transactions.. ..	63	9	0	By Balance, 1918	1	2	7
,, Press Etching Co.—Half Tone Block	0	14	0	,, Sales of Proceedings	6	3	7
,, Balance	45	13	8	,, Donations	102	10	6
	£109	16	8		£109	16	8

BALANCE SHEET.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.
To Debit Balance Revenue Account	25	16	2	By Amount to Credit of Suspense Account	57	17	6
,, Debit Balance Library Fund	0	4	11	,, ,, ,, ,, Publication Fund	45	13	8
,, Balance, being excess of assets over liabilities ..	82	10	1	,, Subscriptions in arrear, say £20 valued at £5 ..	5	0	0
	£108	11	2		£108	11	2

Audited and found correct, this 17*th January* 1920.

T. W. HALL,
F. B. CARR, } *Auditors.*

REPORT OF THE COUNCIL, 1919.

THE Council of the South London Entomological and Natural History Society, in presenting the forty-eighth Annual Report have pleasure in stating that fifteen new Members have been elected during the year, but the Society has to deplore the loss by death of six members, viz., Messrs. Ashdown, Wolley-Dod, A. K. Inge, J. H. Leslie, Sydney Webb and Lord Walsingham; and there have been four resignations, the net increase, therefore, being five, leaving the present Membership at 3 Hon. Members, 6 Life Members, 21 Country, and 132 Ordinary Members, making a total of 162.

The strenuous years of war, now happily passed, could not but have an adverse effect upon the finances of the Society, and in the early months of the past year, the newly-elected Hon. Treasurer reported that to fulfil the Society's obligations, not only had current income been expended, but that the reserves had been drawn upon almost to the extent of exhaustion, and that it would be impossible to continue the Society's publications unless further resources were forthcoming. The matter was taken up by some four of the older members of the Society, who formed themselves into an unofficial committee, and after fully considering the financial position decided as a nucleus for an "Entrance Fee and Life Membership Restoration and Publication Fund," to subscribe among themselves a sum of thirty pounds with a promise that if other members of the Society subscribed a similar amount among them, the committee of four would double the amount of their original subscription, making a total of ninety pounds in all. They stipulated that out of this sum the amount at credit of the Suspense Account (which represents the accumulated receipts from Entrance Fees and Life Membership Compositions), should be permanently invested in the names of the Trustees, as set out in Bye-Law chapter 8, section 7. On the matter being brought before the Council at its meeting on October 9th, 1919, the proposal was readily accepted, and on it being put before the general body of members, at a subsequent

meeting, the amount aimed at was quickly oversubscribed, the grand total of the amount subscribed being £95 12s. 6d. The amount at the credit of the Suspense Account is now in course of investment in 5% War Loan, and as will be seen by the duly audited Balance Sheet printed on pages x., xi., the finances of the Society are again in a thoroughly satisfactory condition. The Council desire to take this opportunity to express their appreciation of the valuable aid rendered by the unofficial committee of four, and to the general body of members through whose timely assistance this satisfactory state of affairs has been brought about.

A Special Exhibition of Orders other than Lepidoptera was held on May 8th with considerable success.

The Annual "Exhibition of Varieties and other Objects of Interest" was held on November 27th, when more than a hundred members and friends were present. Tho aberrations exhibited were more varied than on the previous occasion, and included several gynandromorphs and numerous remarkable forms of British Butterflies.

The Lantern has been used on five occasions during the past year, and Mr. Dennis has kindly officiated as Honorary Lanternist.

Papers have been read before the Society by Dr. Boulenger, F.R.S., and Messrs. F. W. Thorrington, B. W. Adkin, E. J. Bunnett, F. W. Frohawk, C. W. Sperring, and Hy. J. Turner, and are printed in full or as resumés in the body of the Proceedings.

During the year a very useful collection of Micro-Lepidoptera was presented to the Society by Admiral Digby, at the desire of his late brother, the Rev. C. R. Digby, of Oakley, near Basingstoke. The *Pyralidae* and the greater portion of the *Tineina* have already been amalgamated with the Society's series. This donation was the more welcome as the *Tineina* have hitherto been poorly represented in the Society's cabinets, and for such a handsome donation the Council desires to offer its best thanks.

The Hon. Curator reports that specimens of Coleoptera have been presented to the Society's collections by Messrs. Ashby, Bunnett, Quilter, Turner, and himself.

The Hon. Librarian reports that, despite some temporary difficulties in obtaining access to parts of the library, the number of books borrowed by members for study have been approximately double that of the preceding year.

Field Meetings were held at Box Hill, Effingham, and Ockham

Common, Chalfont Road and Wimbledon Common. The Fungus Foray which Dr. Somerville Hastings was to have led at Oxshott, unfortunately had to be abandoned owing to the railway strike. Reports of these meetings will be found in the Proceedings.

Mr. R. Adkin was the Society's delegate at the meeting of the British Association at Bournemouth in September, and the President and the late Mr. W. J. Ashdown were delegates at the meeting of the S.E.U.S.S. held at the Guildhall, London, from June 11th to 14th; their reports will be found in the body of the Proceedings.

The Volume of Proceedings for 1918, published during the past year, consists of xv. and 124 pages with two plates and a diagram.

The additions to the Library (by Exchange unless otherwise stated) are:—

Books.

Wood's "Index Entomologicus," 1839, from R. Adkin. "Aptera," by Andrew Murray, from R. Adkin. Rye's "British Beetles," Stainton's "Manual," Kirby and Spence's "Entomology," and Meyrick's "British Lepidoptera," from the late Rev. C. R. Digby.

Magazines and Periodicals.

"Entomologist," from R. South. "Entomologist's Record," from H. E. Page. "Entomologist's Monthly Magazine," by purchase. "Irish Naturalist," "Entomological News." "Canadian Entomologist." "Entomologisk Tidskrift." "Phillipine Journal of Science." "Bulletin of the Entomological Society of France." "Essex Naturalist." "Bollet. R. Scuola d'Agricol.," Portici, Italy.

Reports and Transactions of Societies.

Hastings and St. Leonards Soc.; United States National Museum: Torquay Natural History Society: Haslemere N.H.S.; Meeting of Delegates of the Corr. Socs. to the Brit. Assn.; United States Herbarium.

Separata, Pamphlets, etc.

"Fossil Plants," by T. D. A. Cockerell, Smithsonian Institute. "Natural Gas," Smithsonian Institute. "Bryozoa of the Panama Canal Zone," U.S.A. Mus. "Fossil *Lithothammicae*," U.S.A. Mus. "Fossil Echinoderms of the Panama Canal Zone," U.S.A. Mus.

"The Salpidæ." "East African Mammals," U.S.A. Mus. "Economic Resources of the U.S.A.," U.S.A. Mus. "The Panama Canal Zone," U.S.A. Mus. "Biology of the *Charidæ* (Pan. Can. Zone)," U.S.A. Mus. "The *Hydromedusæ* (Pan. Can. Zone)," U.S.A. Mus. "Phylogeny of the Orthobiente (contind.)," by Prof. Janet. "28 Separata dealing with Dorset Lepidoptera," from the late Rev. C. R. Digby, and from Nelson M. Richardson, B.Sc. "*Sarrothripus revayana*," ("Ent."), by W. G. Sheldon, from the author. "Distribution of British Anophelines," from the British Mus. "Rats and Mice *v.* Mankind," from the British Mus.

TREASURER'S REPORT.

I am glad to tell you that the financial position of the Society has greatly improved during the past year.

The state of affairs when I commenced my stewardship last January was not encouraging. Subscriptions had dwindled owing to the War, the reserve funds of the Society had been utilised to pay for publication ; and as we are all aware, expenses under this head had enormously increased. Actually the cash balance that was handed over to me by my predecessor at 31st December, 1918, was 10s. 11d., but in twelve months this has been so far improved, by the efforts of the kind friends already referred to in the Council's report and which resulted in a total of £95 12s. 6d. being raised, that I have been able to carry forward to 1920 the very satisfactory sum of £77 10s. 1d. as representing the cash balance in hand, after all liabilities have been met.

Our income from current subscriptions for 1919 was £46 18s. 6d., an increase of £6 10s. 0d. over last year. This is sufficient to meet the ordinary expenses of the Society, which amounted to £42 4s. 7d., but not the cost of printing the "Proceedings."

Publication in 1919 cost us £64 3s. 0d. against £40 8s. 7d. in 1918 ; and it is obvious that we have a long way to go in the matter of increased membership before income from subscriptions and investments will meet all our needs.

Arrears which were valued in the last balance sheet at £20

produced in cash £14 2s. 0d., which is practically the same as in 1918, and I have valued the arrears at the end of 1919 on a very conservative basis at £5 only, a sum which I feel confident will be easily reached.

Fourteen Entrance fees and 1 Life Membership fee have been received, and added to the Suspense Account. The balance to the credit of this account now reaches a total of £57 17s. 6d., and this sum, as stipulated by the donors to the Publication Fund already alluded to, will be invested in the name of the Trustees for the benefit of the Society.

Sales of "Proceedings" show a very gratifying increase, and I believe constitute a record. The receipts under this head being £6 3s. 7d. against 5s. 8d. last year.

In conclusion I should like to thank members for the kind way in which they have assisted me in my new and unfamiliar duties by paying their subscriptions promptly, and to express the hope that they will continue to do so. Possibly it has never occurred to some of them that 75% of a Treasurer's work is due to unpaid subscriptions; and that it takes up far less of his time to tell a member who is not quite sure whether he has paid or not, than to go through the list of members and send out applications to all those who have not paid. It would also help considerably if members whose addresses are incorrectly given in the published membership lists would send in their correct addresses. The audited Balance Sheet is attached.

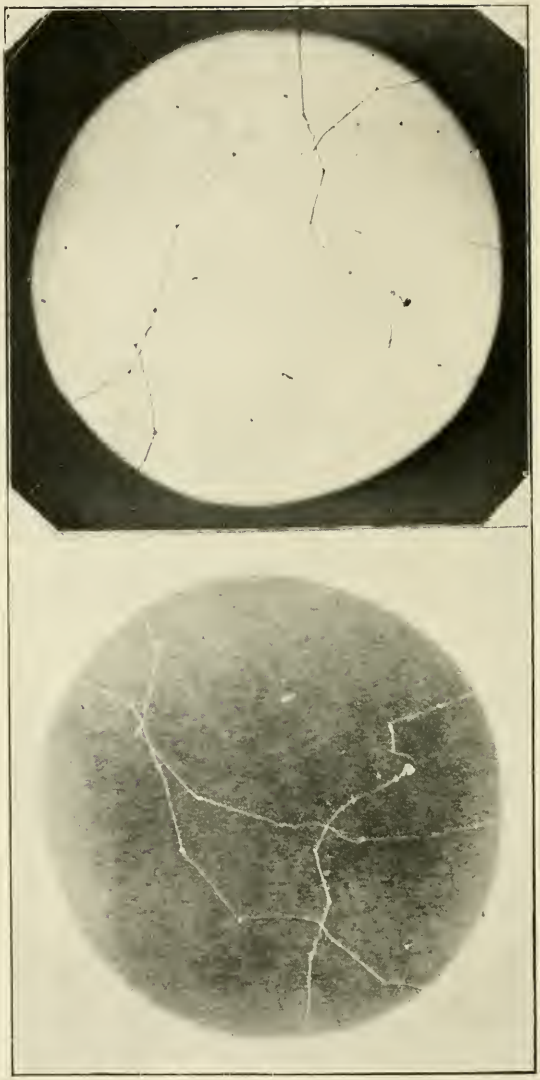


Photo. *E.J.B.*

SILK TRACK OF LARVA OF COLEOPHORA NIGRICELLA. × 30.

The Mode of Progression of the Larva of Coleophora nigricella. (*Plate I.*)

By E. J. Bunnett, M.A., F.E.S. *Read February 13th*, 1919.

Last summer I placed a number of hawthorn leaves, on which were larvæ of this little moth, in a glass-topped box. Sometime afterwards several of the larvæ, no doubt finding their pabulum becoming dry and unpalatable, had journeyed to the lid of the box and could be seen moving along the glass.

Since the greater part of the body of the larva was enclosed in its "case," and only the anterior portion could possibly come into contact with the surface of the glass, it was obvious that motion could not be assisted by means of pro-legs or suction.

In order to discover how they managed to retain a hold or walk about, hanging downwards from the smooth surface of the glass while supporting not only their own weight but also that of their cases, one of them was transferred to a glass slip. This was turned upside down and placed under a low power objective.

The mode of procedure was then apparent.

In order to move along, the larva protrudes its head and the true legs from its case, making with its mouth a little "blob" or mound of a viscid secretion, from which it carries a thread as far as it can reach with its mouth, where another mound is deposited.

The thread connecting two mounds is *free*, sagging a little, and does not adhere to the surface.

The moment this cable is laid it is strong enough to support the entire weight, both of the little creature and of its domicile.

The first two pairs of legs are used for clasping this silken rope and the larva progresses at a surprising rate, always supported by either the first or second pair of legs; for while the second pair continues to hold on to one loop of the cable, the front pair detaches itself from it and clasps the next and newest loop, and so on.

The larva does not hang suspended by a thread from the mouth while in the act of walking in this inverted position, though no doubt it could and would do so in case it were accidentally compelled to lose its hold of the clasping legs.

A remarkable feature of this curious mode of locomotion is that, as in the case of spiders, there is, apparently, more than one kind of secretion capable of being simultaneously emitted, for the little mounds are viscid enough to adhere to the surface with sufficient tenacity to support the successive sections, while on the contrary,

each sectional thread seems not viscid at all, otherwise the thread would not hang free so as to enable a pair of legs to clasp it.

The accompanying photograph was made through a $\frac{2}{3}$ inch objective, from the actual silken trail left on the glass slip (the magnification being 30 diameters).

By careful measurements from the photograph the average "stride" or distance between the mounds appears to be about $\frac{1}{60}$ inch.

I regret that the rate of "walking" was not determined, but under the $\frac{2}{3}$ inch objective the slip had to be moved fairly briskly to keep the little caterpillar in view, and it would be safe to say that the time of a "stride" did not usually exceed three or four seconds, in which case the larva could travel one inch in three or four minutes.

Acidalia marginepunctata, Göze.

By Robert Adkin, F.E.S. *Read April 10th*, 1919.

When we look at lengthy series of the species that we have been accustomed to include in the genus *Acidalia*, as arranged in our cabinets, we at once notice that many of them stand out as abundantly distinct, but that some of the others have a strong superficial resemblance to one another; and that individuals of the same species often vary considerably, making their differentiation even more difficult. It is, therefore, not surprising that there should have been some confusion in their nomenclature, more particularly in regard to some of the more variable and possibly less widely known species. The one under notice is no exception in this respect, for which I fear, as will be seen later on, some of our British authors are not entirely blameless.

Although the species was undoubtedly known to some of the older authors, it was first described by Göze, and named *marginepunctata* by him in 1781 ("Entomologische-Beitrage," iii., 3, p. 385). Borkhausen, 1794, uses Göze's name, *marginepunctata*, quoting that author, and also referring to Roesel's figure, which I shall have occasion to mention again later. (Bork. "Nat. Europ. Schm.," v., p. 250.)

In or about 1800, Hübner produced a very good figure of this species, naming it *immutaria* ("Sammlung Europaischer Schmetterlinge," v., f. 108).

Haworth, in 1810, described it under the name of *incanata*, quoting Hübner's fig. 108, but erroneously referring it also to Linnæus' *incanata*, a species which does not occur in Britain ("Lepidoptera Britannica," p. 350). Stephens, 1828 to 1835, helped further to complicate the matter by using the name *marginepunctata*, n. sp., for specimens that he tells us he had seen in the Dale and Haworth collections ("Cat.," 6709), but this name I have failed to find mentioned in Haworth's work. He repeated Haworth's errors under the name *incanata* ("Cat.," 6722), while in his "Illustrations" he gives under the name of *marginepunctata* a description that cannot possibly apply to that species, and refers to "Cat.," 6709 ("Ill. Haust.," vol. iii., p. 310), but omits any mention of *incanata*. Wood, 1839, under the name *marginepunctata* figures an insect which is certainly not that species, but gives a very fair representation of it as *incanata*; he also figures one of the bone-coloured south coast forms under the name of *contiguaria*, and tells us that

it occurred near Dover at the end of June ("Ind. Ent.," figs. 724, 718-719).

In the meantime Treitschke, 1827, had referred to the species as *immutata*, but among his references further complicated the matter by mentioning Hübner's figure 105, *contigunaria*, a doubtful figure of that species, but not unlike some pale forms of *marginepunctata*. Duponchel, 1830, calls it *immutaria*, but his figure is not a good one, although his references sufficiently indicate the species he intended to portray ("Hist. Nat. Lep.," viii., p. 61, pl. 173, f. 8). Freyer, 1833-6, gives several figures under the name *immutata*, none of which are recognisable, but his text indicates the species they are intended to represent ("Neu. Beit.," i., p. 107, pl. 64, figs. 4 and 5, ii., p. 136, pl. 180, f. 1). Herrich-Schaffer, 1847, gives quite a good figure, to which he applies the name *immutaria* ("Schm. Eur.," pl. 17, f. 101).

Guenée, 1857, seems to have unearthed Roesel's figure ("Ins. Bel.," vol. i., class iii., pl. xi., f. 3, 1746)) and applied to it the name of *promutata*. Roesel's is a fairly good figure, and is, I believe, the earliest one known of this species. Henry Doubleday, in the "Zoologist's Synonymic List," 1859, adopted Guenée's name, and *promutata* became the generally recognised name for the species by British entomologists of that period. Snellen, 1867, also uses this name in his "De Vlinders van Nederland."

Stainton, 1859, still further complicated matters by the use in the "Manual" of Haworth's name *incanata* for this species and *marginepunctata* for some other, apparently *straminata*, Tr., and it was not until the publication of South's "Entomologist" list in 1884, that we in Britain adopted *marginepunctata*, Göze, as the correct name for this insect. But even so, Barrett, 1902, was not content to let matters rest, and in "The Lepidoptera of the British Islands" reverted to Guenée's name, *promutata*, although Meyrick in his "Handbook," published some years earlier, had apparently straightened out the matter.

Joannis, 1891, described under the name of *pastoraria* what appears to be a pale form of this species from Asia Minor ("Bull. Soc. Ent. Fr.," 1891, p. 80).

The synonymy of the species therefore appears to be:—

Marginepunctata, Göze, Bork., South, Meyrick (non Steph, non Wood, non Sta.).

Immutata, Tr., Freyer (non L.).

Immutaria, Hüb., H.-S., Dup.

Incanata, Haw., Step. "Cat.," Wood, Sta. (non L.).

Promutata, Guenée (Roesel), Dbl., Snell., Barrett.

Pastoraria, Joannis.

Contigunaria, Hüb. ?, Wood.

The geographical distribution of the species appears to extend throughout central and southern Europe, Asia Minor and eastward through Turkestan and Mongolia to the borders of China, and to

embrace some portions of northern Africa. In Britain it appears to be generally more common on the coast than inland, being taken freely in the Scilly Isles and along the South Coast generally to Kent on the East Coast, less commonly as one goes north, but it is met with in Lancashire, Durham, Cumberland, and Northumberland. In Scotland it occurs at Ardrossan in the Clyde area, which is, I believe, its northern limit. In Wales it is not uncommon; and in Ireland it has been taken in some numbers about Howth and Malahide in the Dublin district, Kerry in the West, and Cork in the South; also in the Isle of Man and the Scilly Isles.

Variation consists largely in the greater or less amount of the grey dusting of the wings and the intensity of the clouding between the sub-terminal transverse line and the margin, some specimens taken in the Scilly Isles having this character very much intensified. Also, in the whitish or yellowish (bone-coloured) tint of the ground colour, and the intensity or otherwise of the transverse lines. Occasionally aberrational individuals, possessing characters not included in the above lines of variation, occur: to some of these I may refer later. Speaking generally, the lighter forms, either by reason of the whiteness of the ground colour as found in some of the Devon and Cornish specimens, or the absence of grey scaling, are found on the south coast, the darker or most heavily powdered in the north, as at Ardrossan, where some of the darkest forms are met with, but no hard and fast rule can be laid down, as is testified by a specimen from Corfe Castle in the Bankes' collection, which is quite of the bone-coloured, unspeckled form which predominates on the south-east coast. The Irish, Isle of Man, and Scilly specimens are generally of the darker well speckled form.

Throughout the greater part of its range there appears to be only one brood in each year, such continental authors as I have been able to consult giving its time of appearance as May and June or June and July; there is only one brood in the more northerly districts in Britain; but on our south coasts there are undoubtedly two fairly well defined emergences, the first appearing in June and extending to about the middle of July, the second commencing about the middle of August and continuing until well into September. But although the emergences are fairly distinct, not so the broods. For example, ova deposited by moths of the June emergence will hatch in from ten days to a fortnight, and the larvæ all grow evenly for a time; then some of them will grow rapidly and make the August emergence, but others, possibly some 25% of the brood, will grow slowly, hibernate as winter approaches, and the moths from them will not emerge until the following June; so that while a part of this brood become imagines within a couple of months from the time that the eggs are laid, the other part take a full year to complete their life cycle. So is it with the brood from the August emergence; the larvæ all hibernate, and the majority of them that survive the winter produce imagines in June, but a few

usually feed slowly, the moths from them coming out with the August emergence. It is not a difficult species to rear from the egg, the larva feeding naturally on a large number of small plants, such as cinquefoil (*Potentilla reptans*), yarrow (*Achillea millefolia*), and so forth, while in confinement it takes readily to knotgrass (*Polygonum aviculare*), and for the hibernating larvæ a useful adjunct to the dietary is a common little hawkweed-like plant, *Crepis virens* (See " Proc.," 1902, p. 3).

My personal acquaintance with *marginepunctata* dates from 1866, when, in July of that year, I found it commonly on the lamps along the roads at Shanklin, in the Isle of Wight. For many years after that I saw little of it beyond meeting with an odd specimen or two at Box Hill, in Surrey, and on the gas lamps around Blackheath, in Kent; but in 1887 I came across it in great numbers at Eastbourne, and since that time I have had the species more or less continually under my notice. The conversion of the herbage-covered slopes from the cliff to the beach into the western parades had recently been completed (" Proc.," 1896, p. 108), and the rough stone retaining walls along portions of them were much favoured by the species as resting places. It was in such situations that the majority of the specimens were found. For some few years the numbers met with steadily increased, the greatest abundance occurring round about 1896, in which year I see from a note in my diary, that on a walk along the half mile or so of the parade between the " Wish Tower " and Holywell 102 specimens were noted, and it was during this period, when the insect was at its greatest profusion, that the most unusual forms were met with.

Here the forms usually occurring vary between a pale bone-coloured insect, practically without a trace of grey dusting, the usual transverse lines and the submarginal tooth-marks (clouding) of a pale greyish colour, so like Wood's figure 719 that one cannot help believing that he took it from one of these specimens, to a heavily grey-dusted insect fairly well represented by his figure 718, and every conceivable intermediate between the two. One would have expected, on our chalk soil, to have found the ground colour as white as anywhere, but this is not so, it, as a rule, inclining far more to a very pale buff. Barrett calls it cream-colour, but I think the term I have used—bone-colour—more truly expresses it.

Of the aberrations outside the above, perhaps the most remarkable is one met with in 1896, of which three specimens were taken. In this form the ground colour appears to be white, but the wings are so covered with dark brown-grey dusting that the ground colour is seen only as an irregular submarginal line, in the fringes, and on the front of the thorax; it is analogous to the so-called black forms of *Tephrosia biundularia*. Barrett's figure (" Lep. Brit. Is.," vol. viii., pl. 331, f. 4^b) is taken from one of these specimens, and fairly well represents it except in the matter of the ground colour, which is not shown white enough. Another aberration, of which some

half a dozen examples were noted, has a sooty cloud at the base of the forewings and the submarginal tooth-marks unusually prominent, while the ground colour more nearly approaches white than in the ordinary pale forms.

These aberrations were all taken some years ago, and since that time I have seen no specimens calling for special mention; indeed, the species, in this locality, has of late years been much less common than formerly, no doubt owing to the attentions of a small troop of fossilised gardeners, who spend their time from year's end to year's end in "cleaning up" the banks, in other words, rooting up all the little plants that they can find, on which the larvæ would naturally feed. Yet the species still persists; it may be seen on the wing at dusk, later in the evening on the road lamps, and by day one can hardly take a walk along the parades, in its seasons, without finding an example or two at rest on such portions of the rough stone walls as are still free from a covering of ivy, if they take the trouble to look for them.

In the discussion which followed the general concensus of opinion was that the species was a coast insect and found, as a rule, only very sparingly inland. Mr. Mera said that he had met with it very commonly at Ipswich, in Suffolk, but had taken only one specimen in the London area. Mr. Leeds recorded one example from Bexley, and another was mentioned as taken at Erith, both in Kent. Mr. Frohawk also had taken a single specimen at Eltham, Kent. Messrs. Pennington and Bowman both reported it as common at Lewes, in Sussex, where a pale form occurred. Mr. B. W. Adkin said he had met with it not uncommonly in the New Forest, and more abundantly in the Scilly Isles; in the latter locality it was of the well-speckled grey form. Mr. Tonge reported it as somewhat abundant at Midhurst, in Sussex.

Some Insects Injurious to Forestry.

By B. W. Adkin, F.S.I., F.E.S.—*Read May 22nd*, 1919.

Our President, when addressing us last winter, emphasized the importance of economic Entomology, and referred to its influence on Forestry. His address caused me to think that a short paper upon the subject I have chosen might be welcome to the members of our society. I propose to say a few words upon Forestry before dealing with certain of the insects which are injurious thereto.

Forestry is an extensive science. One of its most important branches is Silviculture, which may be interpreted as the cultivation of crops of trees with the object of profit. Silviculture may be compared with agriculture, or the growing of farm crops for profit, but, in my opinion, difficult as is the science of agriculture, that of Silviculture is even more difficult; for whereas an agriculturist may sow and reap a crop in one year, so that in an average life he is able to study the results of perhaps fifty crops of the same species of plant which he has sown, the silviculturist will be lucky if he sees the result of a single crop which he has raised from seed, for most of our trees take at least 60 or 70 years before they reach maturity. Again, most of our common farm crops were grown by the Anglo-Saxons, and have been grown continuously in Britain ever since; whereas most of the woodland crops which are expected to prove most successful from a financial standpoint, consist of trees which have been introduced into Britain but recently. Further, the method of growing crops of trees in high forest without underwood is comparatively new, so that there is but little experience to go upon, while our insular conditions differ considerably from those which prevail in continental regions, so that experience gained upon the continent should be applied here only with great caution.

Silviculture is likely to be a far more important industry in Britain than it has been in the past. The war has proved the necessity of a large stock of growing timber to the welfare of the nation, and the demands upon such stock as there was have been met with difficulty. Many millions of cubic feet of timber have been required, and the coniferous trees have been the chief necessity; their destruction has enabled our mines to be worked, and vast quantities of timber have been exported for the use of our armies in the field. In the past about 95 per cent. of our home-grown timber has been produced by private enterprise, without state assistance, and usually at a heavy financial loss; in the

future it is proposed that the State forests of Britain shall be the mainstay of our native timber supplies, and extensive afforestation schemes are proposed to be carried out under a new Government Department. The success of these schemes depends to a large extent upon immunity from insect and fungoid attack, so that the importance of my subject is apparent.

The woodland crops of the future are likely to consist chiefly of coniferous trees, of which our indigenous species are: *Pinus sylvestris*, the Scots Pine; *Taxus baccata*, the Yew; and *Juniperus communis*, the Juniper. Of these, *Pinus sylvestris* is the only species which can be used for silvicultural purposes. The exotic conifers which are commonest in this country, and can be used for silviculture, are *Pinus laricio*, the Corsican pine, with its many varieties; *Pinus strobus*, the Weymouth pine; *Picea excelsa*, the Common Spruce; *Abies pectinata*, the Common Silver Fir; and *Larix europæa*, the Common Larch; these trees have been long enough in this country to become attacked by many insects and fungi, and it may be remarked that *Pinus strobus* is in danger of extermination by the rust fungus *Peridermium strobi*. None of the trees above named, except, perhaps, the Larch, are likely to prove as valuable for silvicultural purposes as some more recent introductions from the Pacific coast of North America, such as *Pseudotsuga douglasii*, the Douglas Fir; *Picea sitchensis*, the Sitka Spruce; *Abies grandis*, the tall Silver Fir; and *Thuia plicata*, the Giant Arborvitæ. These trees have not been here long enough to enable us to form a true opinion of their value or of their possible enemies.

The insect enemies of Silviculture belong to all orders, their number is legion. The conifers, to which I propose to confine my remarks, are host-plants to over two-hundred species of insects in Britain, though many of such insects do very little harm. Britain is blessed by the absence of some of the worst of the pests which destroy conifers in the forests of Europe, such as *Dendrelimus pini*, L., and *Thaumetopoea pityocampa*, Schiff, while others which occur here, such as *Ocneria dispar*, L., and *Liparis monacha*, L., are not found in sufficient numbers to do serious injury. We have, however, plenty of injurious insects, though most of them are far less showy than those named above.

During my journeys about the woodlands of England in recent years I have seen many cases where coniferous trees have been felled, the trunks of the trees, in due course, converted into pit props, railway sleepers, and the like, and the branches, etc., left lying about for a long time before they were burned. These branches, logs and bark, form excellent breeding places for many insects. *Hylurgus piniperda*, L., the Pine Beetle, finds an ideal spot in which to rear large families; it is far too common an insect for a collector to trouble about, and probably goes unnoticed until someone in charge of the woods discovers that the standing Scots

pines in the immediate neighbourhood acquire an outline quite uncharacteristic of such trees, owing to the young shoots having been bored by the beetles and broken off by the wind, while fine healthy young trees begin to take the appearance of mis-shapen bushes. Along with *Hylurgus piniperda* may often be found *Hylastes palliatus*, Gyll., whose larvæ also feed under the bark, while the beetles attack the bark or the stem and crown of standing trees and do a great deal of damage, in some cases resulting in the death of an already weakened tree.

On the areas referred to, after the trees have been cut down and removed the old stumps remain in the ground. These stumps form favourable breeding places for various species of Coleoptera. If the stumps are examined a year or two after the trees have been felled, say in the month of May, fine fat larvæ and a few pupæ of *Hylobius abietis*, L., may be found just beneath the bark not far from the surface of the ground ; and, under the bark of the smaller roots, in many cases at several feet distance from the trunk, many smaller larvæ may be found which will in due course develop into the elegant little beetle *Hylastes ater*, Payk. There is no lack of these larvæ in the stumps. I have taken out over 70 larvæ of *Hylobius abietis* from a single stump, and have found innumerable larvæ of *Hylastes ater* in the roots of the same tree. Supposing that the crop which was felled contained 400 trees per acre, similarly affected, there might be about 28,000 *Hylobius abietis* and a far larger number of *Hylastes ater* on the one acre alone, and if many acres are felled it may easily be imagined what a tremendous number of these insects would be available. In certain forests in Scotland some entomologists, who have been researching into the ravages of these insects, have found the larvæ of *Hylastes cunicularius*, Er., feeding in large numbers on the roots of *Picea excelsa*, the small roots at some distance from the trunk being specially favoured by them. I mention this as I believe the insect is considered uncommon.

Let us now consider the condition of affairs when a forester plants young conifers upon the ground which was recently cleared of coniferous trees. The young plants are just the food which *Hylobius abietis* and *Hylastes ater* desire. Both beetles are breeding in thousands in the stumps and roots. On emerging the former devour the bark on the stem above the ground and frequently may be found doing so, the latter devour the bark upon the roots beneath the ground, so that little may be seen of them ; but the damage they do is great, as may be seen by the plants I am exhibiting, the bark on the roots of which has been entirely devoured. The joint attack of the two species named will sometimes result in the complete destruction of a crop of young trees, and will always cause considerable damage. The forester usually knows *Hylobius abietis*, and lays traps for him with great effect—probably he catches thousands and breeds hundreds of thousands.

As an example of what a forester can do, I would cite two cases which have come before my notice. One of these, a record from Shropshire, shows that in thirty-nine days, from April 30th to June 6th, 1917, no fewer than 10,386 *Hylobius abietis* were captured; in the other case a forester in Dorsetshire tells me that he captured 10,117 *Hylobius abietis* on ten acres of woodland from May to September, 1918. The numbers mentioned are far from insignificant, and assuming that they represent but a small proportion of the weevils which were present, one feels aghast at the possible destruction which might be wrought by so vast an army.

Neither of the reports mentions *Hylastes;* their more insidious attack was doubtless unnoticed, in one case their larvæ were known to be abundant, probably in the other case they were equally so. Possibly they were likely to do even greater damage, for a careful observer who examined one hundred dying plants in a forest in Scotland found that the damage was caused in 45 cases by *Hylastes* alone, in 27 cases by *Hylastes* and *Hylobius* together, in 15 cases by *Hylobius* alone, and the remainder by bad planting.

In both the cases just mentioned *Otiorrhynchus picipes*, F., was captured or seen in numbers even greater than *Hylobius abietis*. I am unable to say what is the extent of the damage they do, but I have caught them gnawing the bark on trees, and it is said by Gillanders that he found a supposed case of rabbit damage to a quickset hedge was actually the work of this insect. When they occur in such vast numbers their activities are certainly worthy of investigation. *Strophosomus coryli*, F., was also plentiful in one case, and its known liking for the foliage of larch and other trees made its presence undesirable.

There are many other very common species of Coleoptera which are highly injurious to forestry, for instance, the genus *Pissodes* contains some well known enemies of pine trees and *Melolontha vulgaris*, F., in the larval state will make many bare patches in a forest nursery. Even recently discovered species which are considered rare may be of importance. I am told on the best possible authority that *Tetropium gabrieli*, Weise, which is quite a recent addition to the British list, appears to be spreading all over the country, and killing many young larch trees by means of its larvæ, which feed in the soft bast and cambium under the bark. Many other species of Coleoptera might be referred to and far more detail could be given did time permit, but some of the other orders deserve attention.

Among Lepidoptera the species most injurious to young conifers in Britain belong to the genus *Retinia*, which will often destroy leader after leader of *Pinus sylrestris* and quite ruin the growth of the tree; *Coleophora laricella*, Hb., which bores the needles of *Larix europaea*, weakens the tree and makes it predisposed to disease; and *Argyresthia atmoriella*, Bankes, in many cases destroys the leader of *Larix europaea* and thus spoils the growth of the tree.

Of Hymenoptera Sessiliventres, *Sirex gigas*, L., and *Sirex noctilio*, F. (often wrongly identified as *Sirex juvencus*), bore the wood of conifers, but their attack is probably limited to sickly trees and less to be dreaded than that of the sawflies, *e.g.*, *Pteronus pini*, L., and *P. sertifer*, Fourc., on *Pinus sylvestris*, and *Nematus erichsoni*, Htg., and *N. laricis* on *Larix europæa*. About ten or twelve years ago *Nematus erichsoni* caused the death of many trees in the Lake District.

Of Hymenoptera Petiolata, certain species of the genus *Megastigmus* are very destructive to the seeds of conifers.

Among the Rhynchota there are many destructive insects of the family *Aphididæ*. *Pineus pini*, L., and *Pineus strobi*, Htg., on *Pinus*, *Chermes abietis*, Kalt., on *Picea*, and *Chermes viridis*, Ratz., on *Picea* and *Larix*, are among the commonest and most destructive species. The continued destruction of the foliage of *Larix europæa* by Aphides does much to render that species difficult to grow in Britain, rendering it so sickly that it easily falls a prey to disease.

In the time available for a short paper it is impossible to do more than touch lightly upon so large a subject, and I have touched upon conifers only, but no doubt enough has been said to show the importance of Entomology to Forestry. Bearing in mind the likelihood of immediate afforestation upon a scale hitherto unknown in Britain, and the unusually awkward conditions which have been induced by recent fellings, a careful consideration of insect enemies becomes an urgent problem.

The study of insect pests is largely in the hands of the economic entomologist, but the onus is upon the collector and the observer to help him in his work, and to offer their knowledge to his use. The knowledge of the members of this and other scientific societies may prove of immense value in combatting insect attack upon trees, thousands of pounds may be saved and many crops of trees may be made to flourish which would otherwise be lost. No doubt there is much to learn, but a good deal is known already, and the knowledge already possessed, if willingly communicated, may tend to great advantage, and will extend as it is utilised. I cannot appeal too strongly to all collectors and students of Entomology to do all they can to assist the economic entomologist in waging his difficult war against the enemies of forestry.

British Fern Varietles.

By F. W. Thorrington.—*Read September 11th*, 1919.

A glance through the latest edition of Hayward's "Botanist's Pocket Book" shews that within the limits of our Fern flora are 15 genera of *Polypodiaceæ*, the order comprising the great mass of our modern ferns, in a geologic sense. In addition to these there are two genera of *Hymenophyllaceæ*, the "filmy ferns," two of *Ophioglossaceæ*, and one genus of the *Osmundaceæ*, leaving on one side the question of the "fern allies," as having no relevance to this subject. "Hayward" has been especially quoted as being the oracle of the "splitters," and therefore not likely to underestimate our resources, and his estimate of the above divides it roughly into 43 species.

A total of only 43 species, it is true, looks very poor in comparison with some of the tropical islands of similar area to ours; where we frequently find several hundreds of species represented. Strangely enough, however, we find this paucity of species more than counterbalanced by a varietal capacity that, so far, is beyond that of any other part of the globe. In fact, it might almost be stated that a thoroughly up-to-date collection of our varieties, including both wild forms and the strains raised from them, would have nothing to fear as regards beauty of form and texture from the massed battalions of the whole of exotic ferns.

The main types of variation may be enumerated thus:—(1) "cresting," including all forms from merely "bifid" tips, through "furcate," "digitate," "polydactylous," "multifurcate," and "corymbiferous" ends to pinnae and frond tip, until the process culminates in "grandiceps" with huge balls of cresting; (2) dissection of fronds, commencing with variously cut and "incised" pinnæ, and passing through a series of "bipinnate," "tripinnate," "divisilobe," "multilobe," "decomposite," etc., until we reach the gems of the fern world in the "plumosums," where the division is often such that the whole surface of the frond appears covered with a mossy "pile" of hair-like segments. (3) In addition to these two main groups there are a number of subsidiary variants, such as "congesta," with dense, closely packed fronds; branched forms; "tailed" fronds or pinnae; "revolvens," with the fronds almost rolled into a tube; "cornutum" and "truncatum," similar in origin, but "horned" when the midrib projects beyond the square-ended "truncatum"; variegated and "proliferous" or "bulbiferous" types. The two latter are frequently found conjoined with many

of the other variations, bulbils being especially common in the "divisilobe" shield-ferns.

The principal book giving an up-to-date selection of these varieties is "British Ferns," by the late Mr. C. T. Druery. Taking our genera and species alphabetically, we find here of Maidenhair (*Adiantum*) about a dozen variants; and of *Allosorus*, the Parsley Fern, only a tasselled form mentioned, afterwards lost. Then come the *Asplenium*s or "Spleenworts." The best of the Black Maidenhair spleenwort are *acutum*, *grandiceps*, and *microdon : ceterach* has several; *A. marinum*, plumose and branched forms; but little but the normal in the "Wall-rue," *A. ruta-muraria*, or in *A. viride*, *fontanum*, *germanicum*, *lanceolatum*, and *septentrionale*. The Maidenhair Spleenwort, *Asp. trichomanes*, requires separate mention, as here we have many beautifully crested, branched, and plumose forms.

Next is the Lady Fern, *Athyrium filix-fœmina*, whose hundreds of varieties would easily make a noteworthy collection by themselves. The "Moonwort" (*Botrychium*), has several "incised" forms and one tripartite; the Hard Fern (*Blechnum*), has some dozens. The various species of *Cystopteris*, or "Bladder-ferns," with the exception of *fragilis*, give little change, nor do the *Hymenophyllum* or *Gymnogramma*.

The *Lastraeae*, or *Nephrodium*, give us a fine selection. First may be mentioned the Broad Buckler Fern, *N. dilatatum* (I confess I hardly like its more "correct" name, according to Hayward, of *Dryopteris aristata*), which is majestic in its normal form when we have a damp glade, with its glorious shoulder-high fronds as decoration. There are many crested and ramose varieties, and "grandiceps" with heavy bunch terminals. They are also fertile in the extreme.

The "Male Fern" has been divided into three sub-species by Mr. G. B. Wollaston; the first, *N. filix-mas*, so common in our suburban gardens, is partially deciduous only; *propinqua* is a quite deciduous lowland form; while *pseudo-mas* is sub-evergreen, and a very grand plant. The chart of these differences, from a copy of the "British Fern Gazette," was drawn up by Mr. Wollaston many years ago. (Chart exhibited.) Of the many fine "Male Fern" finds, quite unique is *N. pseudo-mas* var. *cristata*, the "King of the Male Ferns," found near St. Austell, evidently before 1850, as the plant was at Kew in that year. Skilled culture of this lovely fern under glass has sometimes resulted in a tree-fern with a two-foot stem uplifting its great cluster of splendidly crested fronds. *Lastraea montana* has given a wealth of beauty, its most noted form, however, being *barnesii*, with its side divisions set on to the midrib at right angles, like the steps of a ladder. There is not much variation in the other *Lastræa*, interesting as they are in the Marsh Fern, *L. thelypteris*, in *L. æmula*, *rigida*, *cristata* (so curiously named), with its connecting sub-species with *dilatata*, known as *spinulosa* and *uliginosa*, and the puzzling fern known as *L. remota*.

The finest of the Royal Fern group is *Osmunda regalis* var. *cristata*, brought unsuspectingly to a Fulham nursery in winter-time, over 50 years ago, by a hawker, who had gathered a batch of common ones. The nurseryman did not realise what treasure he possessed when its fronds appeared in the spring, but Mr. G. B. Wollaston saw it there and promptly offered £25 for the plant. His offer was refused, the nursery owner scenting a bargain; but the plant has been freely propagated since, and no garden need lack a specimen now. It is easily grown in a damp hollow, or an earthenware pan can be sunk in the soil to create a miniature bog for it; the same treatment also makes the Marsh Fern happy.

Polypodium calcareum, or *robertianum*, the Limestone Polypody, and the Beech Fern, *P. phegopteris*, have little variation; but the Oak Fern, *P. dryopteris*, has in quite recent times given a wonderful plumose beauty found in the Lake District, on Whitbarrow Scar, by an elderly fern-lover known as "Owd Tom Christopherson," locally. The many crested and plumose types of the common Polypody, *P. vulgare*, make this fine evergreen group of great importance to gardeners. To botanists perhaps its most interesting form is the Welsh Polypody, *P. v. cambricum*, which was classed as a species by Linnæus, although we now know it to be a quite barren plumose fern. A great many of the beautiful "*vulgare*" sports have been found wild.

It would be hopeless to attempt a description, in a short lecture, of the multitude of fine "Shield Ferns," *Aspidium angulare* being responsible for most of these. Fern fanciers rapidly tend to specialise on these lovely evergreen gems. *Asp. aculeatum*, though its number of "sports" or "mutations" is less, is almost as noteworthy in its results. The "Holly Fern," *A. lonchitis*, has little variation.

Pseudathyrium alpestre, the Mountain Lady Fern, must be recorded, with its two or three wild finds, and then we reach the Brackens, which have given us seven or eight good forms. *Trichomanes radicans*, the "Killarney" filmy-fern, has several; the *Woodsiae* of our mountains have none.

I have left the "Harts-tongue" (*Scolopendrium vulgare*) to the last, as it has been credited with anywhere up to six hundred distinct variations. Many are of great beauty and interest, but the few fronds exhibited must suffice in lieu of an endless descriptive account.

Many phases of the propagation of our ferns are of great botanical importance. It should, therefore, be expected that observant horticulturists would occasionally make discoveries that the research worker proper had missed. This happened when Mr. C. T. Druery first noted the phenomenon known as "Apospory," or the production of prothalli directly on the frond of a fern, instead of from a spore. The paper on this subject was read at a meeting of the Linnæan Society on June 19th, 1884, and can be found in the

"Linnæan Society's Journal—Botany," vol. xxi. Further notes are in vols. xxii. and xxix.-xxx. These observations were carried on by Prof. T. O. Bower ("Annals of Botany," vol. i., p. 300, etc.), and the natural result has been that, in many scientific circles he is credited with the discovery of Apospory. He carefully gives the credit to Mr. Druery, however, as may be seen in several places, particularly in his "Origin of a Land Flora," a book of overwhelming interest to the fern-lover.

Sometimes we find the normal archegonia and antheridia absent from the underside of the fern prothallus, and the "fern-plant" produced thereon from asexual buds, a sort of parthenogenesis, in fact. This is called "Apogamy," and is of great interest in culture for several reasons, but especially when attempts at "crossing" are being made. To find a pure crop of both species where hybrids are reasonably expected is extremely puzzling until it is realised that one or both of the attempted "parents" are apogamous. This is the case with *Nephrodium pseudo-mas* and its varieties, and so, although the "King of the Male Ferns," is quite easy to raise from spores, we are unable to blend its unique beauty with other forms. (As the subject of hybridization has been raised, it may be stated at once that there are several well-authenticated examples of crossing of fern varieties and even species. A specimen is shown of a cross between two forms of the common Polypody, *viz.*, *P. vulgare* var. *cornubiense*, a finely dissected plant × *P. vulgare* var. *multifidum*, a crested variety. The hybrid has the undoubted characters of both parents. A beautiful fern of horticultural origin is *Polypodium schneiderianum*, derived from crossing the same variety of our *P. vulgare* (*cornubiense*) with the great exotic *P. aureum*, and there are a number of other proved instances, as well as many suspected hybrids of wild origin.) To finish with the question of "apogamy," it may occasionally be found actually combined *with* "apospory," in fact the amount of research opened up by this one phase of our fern life is wonderful. Further information may be found in "Linn. Trans.," vol. ii., part xiv. (Prof. Bower); "Jour. Linn. Soc.," vol. xxxiv., no. 227, p. 262-7, a paper by Dr. F. W. Stansfield; and also in "Phil. Trans. Royal Society," vol. 190 (1898), pp. 187-228 (W. H. Lang, M.B., B.Sc.).

In addition to the usual propagation by spores, and these two aberrant processes, we find buds or "bulbils" produced freely on the fronds of many ferns, which are easily raised asexually in this manner. Offsets from the main plant afford another method of increase, including cases of creeping rootstocks. Some prothalli, notably those of *Osmunda regalis*, creep about like a Liverwort, and may cover the surface of a pot with young plants. Finally, a very interesting process is adopted, of especial use when barren plumose varieties are concerned, *i.e.*, by "induced bulbils." In the Harts-tongue, frond bases are carefully pulled away, washed, and laid on clean damp sand in a covered glass jar, away from direct sunlight.

Small white growths finally appear over the surface of the frond-base, and these develop under close culture into young ferns. Shield ferns are similarly raised from old pieces of caudex; the Lady Fern from axils of frond-bases joined to a piece of old caudex; the Sweet Mountain Fern very plentifully from caudex portions; and lastly, the occurrence of dormant frond-base buds in the Male Fern is of very ancient mention in plant-lore.

Several lovely wild variants appear to have a great capacity in the way of mutation, and special "strains" have been developed under culture. Probably the three best instances are (1) *Athyrium* var. *plumosum-axminsterense*, found by Mr. J. Trott, in 1860, near Axminster. This was the parent of Parsons' "*plumosum-elegans*," which in its turn gave rise to the unique "plumose" and "superbum" types raised by Mr. Druery. (2) *Aspidium angulare* var. *decompositum* ab. *splendens*, discovered in 1875 in S. Devon, by Mr. Moly, originated the extraordinary series of "plumosums" associated with the names of Col. Jones and Mr. Fox. (3) A farm labourer named Bevis, in 1876, found in a hedge the fern known as *Aspidium aculeatum* var. *pulcherrimum*, and gave it to Dr. Wills. Until the last few years "*pulcherrimum*" was considered to be quite barren, and slowly propagated by offsets only. The quite recent discovery of solitary sporangia, with no indusial covering, gave Messrs. Druery and Green the chance of more rapidly propagating the fern, and in time a sensation was created by the exhibition at the Royal Horticultural Society's shows of a new group of this species, the glorious "gracillimums" and "plumosums." From these three main groups of "mutants," and from a multitude of lesser examples the student of British fern variation must necessarily believe in the possibility of sudden great advance in Nature, as well as in the slow move forward by innumerable small accretions of "character"; probably, indeed, will tend to be a confirmed "mutationist" for preference.

Many of these "varieties" of our ferns might almost lay claim to be called true "species," so readily can they be bred "true" in quantity, as the trade lists of our fern nurseries easily show. To this may be opposed the question; "Do they maintain themselves in a wild state?" and here, it must be admitted, few instances can be quoted. One telling example is that of a long-tailed form of the Black Maidenhair Spleenwort (*Asplenium adiantum-nigrum* var. *caudifolium*). This was found by Mr. Druery, in 1883, so well established on a stretch of stone dyke on Dartmoor as to have quite displaced the normals, which only survived at either end of the dyke. Its permanence was attested when the British Pteridological Society held its annual meeting at Totnes, in August, 1913, a visit to the moor enabling the members to re-identify this fern "in profusion." Near Faygate, in Sussex, grew many acres of a heavily crested bracken, and similar great masses of named varieties of *Pteris aquilina* have been recorded from the Lake District and else-

where. Will it be seriously asserted that every recognised "species" possesses as good a case?

It has been suggested that the great variety of British ferns is largely due to the sustained searching and propagation carried on here by enthusiasts ever since the "fern-fever" period of about the "sixties" of last century. This is difficult to decide upon, but one piece of evidence for the theory is the case of the so-called "Boston Ferns." These fine forms of *Nephrolepis exaltata*, the exotic "Sword Fern," arose in cultivation in the United States, became very popular there, and were afterwards extensively developed in this country, as well as other species of the same genus. The many crested types of *Pteris cretica* also create the suspicion that demand caused by popularity, resulting in assiduous search for new beauties, may in time do for many exotics what has been so well noted in British ferns.

In concluding, apology must be made for the inevitable monotony of the long list of names, with the hope that the few fronds exhibited will lend life-interest to the matter. If anyone is desirous of further following up this fascinating chapter in biology, one can confidently recommend joining the British Pteridological Society, the annual subscription of 5s. carrying the issues of the "British Fern Gazette" with it. Each addition to our membership helps to safeguard our native fern flora by concentrating effort in the culture of the splendid varietal forms, instead of, as in the case of the "unattached" fern-lover, merely helping the "vandal with sack and trowel" to rob our countryside of its beauty.

[Note.—The lecture was "punctuated" by a number of fronds being exhibited, and especial interest was manifested in the "divisible" and "plumose" Shield-ferns, as is usually the case. A number of questions was raised, such as (1) the problem of "plumose" barren forms being cases of diverted spore-formation energy; (2) why varieties, easily cultivated under glass, die out in Nature; (3) the "economic" uses of ferns. It was replied that many cases of freely-fertile "plumosums" are also known; (2) that the ravages of minute creatures, such as *Podura*, may have much to do in destroying fallen spores, or prothalli also; and much of the variation means less robust "leafage," so that the normals prevail by smothering the new-comer; (3) a few details such as the production of "capillaire" from fern fronds; the eating of fern rhizomas or of young fronds such as bracken, in times of famine; the uses of the fronds as packing material or as litter were instanced, and reference made to the many old beliefs in medicinal virtues of ferns.]

Migration of Birds.

By F. W. Frohawk, M.B.O.U., F.E.S.—*Read October 9th.* 1919.

The phenomena of Bird Migration constitutes the greatest mystery pertaining to the whole animal kingdom, an enigma which attracted the attention of the ancients, yet to a great extent the mysterious sense by which birds find their way hither and thither from one land to another, over vast stretches of ocean, is a problem which modern scientists are as incapable of explaining as were the earliest writers.

The old superstitions and beliefs rogarding the disappearance of several birds in the autumn, such as the swallow, cuckoo, and nightingale, that it was due to hibernation were mere myths. It is not such a great while ago that such ideas prevailed, when it was thought swallows retired to the bottoms of ponds or hid in crevices of rocks to pass the winter months in a state of torpor, and cuckoos turned into hawks. It was also at a remote time believed that the larger birds conveyed the smaller kinds from one country to another, but there is no more truth in such notions than there is in the idea that Bernicle geese were hatched from barnacles, the Cirriped (*Lepas anatifera*). From the careful observations and study given to migration during recent years, much knowledge has been acquired on some points, especially on the routes taken and the destinations of certain species.

The migratory birds may be classed in three groups :—

1. Birds which arrive on our shores in the spring and remain to breed, and depart again in the autumn to their winter resorts further south.

2. Those which arrive here in the autumn, having bred in the northern regions, and spend their winter with us.

3. Birds-of-Passage are those which breed in the arctic, and winter far south ; are only met with in this country for a short time in the spring, and again in the autumn on their long journeys north and south.

The chief cause of migration is undoubtedly that of food supply. Therefore, considering the difficulty which all animals are subjected to at times in finding sufficient sustenance, it is not so surprising that birds, possessing such perfect powers of locomotion, should avail themselves of the facilities afforded them for securing food where it can be more easily obtained ; but whether this is the principal cause of the northern migration which takes place in the spring appears doubtful ; possibly the amount of food would fall short in supplying both parents and young of such a vast assemblage of birds if all remained in the southern hemisphere.

The regions lying north of the British Isles throughout Europe and Asia, including the Arctic, form the breeding grounds of large numbers of migratory species, many of which winter with us; but in the Antarctic regions there are no suitable breeding grounds, except for Penguins and Petrels, consequently South Africa receives no migrants from the far south as it does from the northern countries. Many of our summer migrants, when they leave this country in the autumn on their southward journey, cross the tropics to winter in South Africa, where insect food is freely obtainable,

There are certain facts regarding migration which are both remarkable and perplexing to our minds. What sense is it which guides birds so unerringly for such distances? Many species travel for several thousands of miles, while some of the waders, such as the knot and sanderling, migrate so far south from their northern breeding haunts in the arctic that the journeys undertaken by these birds extend for eight, nine, or even ten thousand miles. The autumnal migratory period for each species occupies about a month. Astonishing as it may appear, it is a well recognised fact that, as a rule, it is the young birds—or birds of the year—which are the first to migrate (but there are exceptions to this rule, such as the cuckoo). After a few days the adult males, having completed their autumnal moult, take their departure, and the adult females follow. In the return spring migration the order is somewhat reversed. The first to arrive are adult males, followed by the adult females, and the birds of the year arrive last. At each season the stragglers *en route* are found to be crippled birds, which arrive last of all.

That many birds lose their way, or, rather, are driven out of their course by violent storms, there can be no doubt, for, from time to time, at a certain season, both American and Asiatic species arrive on the British shores; these are classed as accidental visitors. As regards the North American birds which occasionally arrive here, there are those which breed in the Arctic, and, passing on south to winter quarters, meet with westerly gales and are driven across the north Atlantic, and usually reach the Norwegian coast, when they then make their way southward, and arrive on the eastern shores of Britain, and, following the seaboard, reach the southern and south-western limits of England.

When migrating there is little doubt that birds are capable of flying, and do fly, at a much greater elevation than is generally supposed. There are many authentic instances placed on record. For example: An observer (Mr. J. Tennant) states that at Roorkee, on September 23rd, 1875, while looking at the sun through a telescope, he frequently saw birds, apparently kites, pass over its face, some of which were in focus with the sun itself, and therefore must have been several miles high, while the nearest must have been quite a mile above the earth's surface; but these birds were only soaring on the lookout for prey, and not migrating. A still more interesting observation is that recorded by Mr. W. E. D.

Scott, for on the night of October 19th, 1880, he saw through an astronomical telescope at Princeton, New Jersey, great numbers of birds passing across the face of the moon, mostly the smaller land birds. Several were plainly recognised, such as Finches, Warblers, Woodpeckers and Blackbirds, which were on their autumnal migration. It was estimated these birds must have been travelling at heights varying from one to two miles. Again, on April 16th, 1881, he made further observations at the same place, where he saw swallows passing on their journey northward, which were flying comparatively low. They were few in numbers: only thirteen passed in 45 minutes, whereas on the former occasion the birds averaged 4·5 per minute. Mr. F. M. Chapman, in New Jersey, on the evening of September 3rd, 1887, while watching for nearly three hours, saw 262 birds cross the moon's face. Of these, 233 were computed to be flying at a height of from 1,500 to 15,000 feet, but the lowest birds were flying upward as if they had risen from the immediate neighbourhood, and were making for the right elevation at which to continue their flight. Among the birds were five Carolina Rails, of which three were computed at an elevation between 1,900 and 10,200 feet, one between 2,000 and 11,000, and one between 2,600 and 13,500 feet.

Respecting the speed attained by birds during their migratory flight there appears to be some doubt, but there is every reason to believe that they then travel at their fastest, and the rate accomplished by a large number of species, especially the waders (Plovers, Snipes, Sandpipers), is very great, and the ordinary speed of such birds as Godwits, Golden Plovers, and other allied species, is astonishing. For instance, a Whimbrel, which was timed while leisurely flying along the seashore, travelled at 70 miles an hour. The writer shot a Bar-tailed Godwit while it was flying at a tremendous speed, which was carefully estimated (the conditions being very suitable for the purpose), and found to be just 150 miles an hour. But the most amazing speed recorded is an observation made by Herr Gätke regarding Curlews, Godwits, and Plovers, which he watched through glasses crossing from the mainland of Heligoland to an oyster-bed to the eastward, a distance of 22,000 ft., or rather more than four miles, which they accomplished in one minute, or at the rate of 240 miles an hour. Knowing the accuracy and care of such an experienced observer, we have no reason to doubt his statement. On several occasions Teal have been timed during flight, which has proved to be at the speed of 150 miles an hour, when simply flying from one island to another just one mile apart. Therefore, taking all into account, there is cause for belief that during migration many birds fly at an extraordinary velocity.

There are many routes taken by migratory birds, and many places where observations have been made, but there is no place in Europe where so much has been seen and recorded relating to

migration as the island of Heligoland, which is little more than a bare rock of some 200 acres in extent, and rises about 150 feet above the sea. The sides are perpendicular, and the flat surface is treeless; it is situated about 20 miles off the German coast. About one mile away is Sandy Isle, composed of sandhills and beach at low water, then exposing about 50 acres, which at high water is reduced to about half. This, combined with Heligoland, is the resting-place of myriads of migratory birds, in fact, more species have been recorded from this place than from any other in the whole world. To the celebrated and venerable Herr Gätke ornithologists owe much for the enormous amount of information he amassed during a period of over 50 years' observation on the bird life of Heligoland. The following few brief notes from his diary will convey some idea of the number of migrants that pass across the island:—

October, 1870: Thousands of Great Tits. February, 1876: Tens of thousands of Skylarks. January, 1878: Countless numbers of Fieldfares. December, 1879: Millions of Red-throated Divers. September, 1880: Thousands of Siskins. November, 1880: Thousands of Shore-larks. September, 1881: Immense flights of common Buzzards. October, 1881: Thousands of Snow-buntings. October, 1882: Countless numbers of Hedge Sparrows, thousands of Jays, myriads of Goldcrests. September, 1883: Enormous numbers of Redstarts. On November 8th, 1868, the islanders caught 15,000 Skylarks. Herr Gätke also records: From 10 o'clock on the night of October 28th, 1882, to the next morning, Goldcrests eddied thick as flakes in a heavy snow-fall round the lighthouse, and on the following day they literally swarmed on every square foot of the island, and in October of the following year myriads of Skylarks thronged in the brilliant beams of light for four nights in succession, accompanied by Starlings in almost equal numbers. It has long been known that many birds migrate at night, but not on clear, bright nights as might be supposed; they select for the purpose dark misty nights, especially those when fine rain is falling. It is during such conditions of weather that multitudes of birds swarm round lighthouses and pass on to their destinations.

British Batrachians.

By G. A. Boulenger, LL.D., D.Sc., F.R.S.

Read December 12th, 1919.

I have been asked to tell you something to-night about our Batrachians, a class of Vertebrates connecting the Fishes with the Reptiles. They are poorly represented with us, but the few species have always found favour in the aquarium and the terrarium, and they lend themselves particularly well to observations on the life-histories. Their breeding habits and their metamorphoses can be easily observed in captivity and in a comparatively short time, thus affording an excellent introduction to the study of Natural History, whilst some of them are of constant use in the laboratory for the first exercises in anatomy, as well as for experiments in physiology.

They are popularly known as Newts, Frogs, and Toads.

The first of these belong to the order *Caudata*, or Urodeles, in which the tail persists throughout life, and in which the metamorphoses are more gradual and far less striking than in the order *Ecaudata*, or Anures, embracing the two other types, which are tailless in the perfect state, after having passed through the tadpole condition, which is known to all of you.

There are three species of Newts (*Molge* or *Triton*) in the British Isles, elegant creatures when in the water, which is their element during the breeding season, lasting through spring and early summer. The males then assume ornamental appendages in the form of dorsal and caudal crests, or of membranes bordering the toes, and with them in that condition it is very easy to distinguish the species; the females lack these appendages, and differ much from the males in form, and sometimes also in coloration.

The largest is the Crested Newt (*Molge cristata*), growing to six inches, of a dark grey or brown, often blackish colour above and bright yellow or orange beneath, spotted or marbled with black. The male's crest is very high, deeply serrated, and interrupted over the lumbar region, and a silvery band adorns the side of the tail; the female is distinguished by the absence of these characters and by the presence of a yellow or orange streak along the lower edge of the tail.

Next comes the Common Newt (*M. vulgaris*), up to four inches long, of a paler brown, with dark brown or black markings, and dark streaks along the head, the lateral of which passes through the golden iris of the eye. The male's crest is also high, but unin-

terrupted and festooned instead of serrated, and other sexual and nuptial characters reside in the presence of lobes bordering the toes and of a beautiful pale blue band with black bars on the lower part of the tail; the belly is orange or vermilion red in the middle, with round black spots.

The third, and smallest species, hardly exceeding three inches in length, the Palmated Newt (*M. palmata*), is very near the preceding, but the male in nuptial attire is easily distinguished by the subquadrangular shape of the body, each side limited above by a low dermal fold, by the feebly developed dorsal crest with entire edge, by the presence of a filament at the abruptly truncate extremity of the tail, and by the black web between the toes, the foot being comparable to a duck's, whilst that of the Common Newt resembles a coot's. The belly, in both sexes, is paler than usual in the Common Newt, yellow or pale orange in the middle, never red, and the black spots are smaller, or even absent. .

Although the males of these two Newts are so strikingly different in their water costume, the females at all times, and the males also when the breeding season is over, are not so easy to distinguish from the common species, and it requires a close examination, in which the skull may have to be resorted to, before one can be quite certain of the determination; this close examination will usually reveal in the female a mere rudiment of the filament at the end of the tail, passed on in a reduced form from the other sex like so many secondary sexual characters in the animal kingdom. There is, however, a far safer criterion to resort to in order never to make a mistake, whatever the sex or state of the specimen, and which is very striking in fresh examples: whereas the throat of the Common Newt is always of an opaque white or yellow, very rarely without black spots or dots, that of the Palmated Newt is absolutely devoid of pigment, flesh-coloured and immaculate. I have examined hundreds, perhaps thousands, of specimens without ever finding an exception to this character, until last spring, when, catching Palmated Newts at Han-sur-Lesse, in Belgium, in company with my friend M. G. F. de Witte, I was greatly surprised at finding one, a male, with the throat dotted over with black specks. The specimen is now preserved in the Natural History Museum, and I doubt whether another such will soon be found again. This shows that hardly any single character is ever absolutely constant; exceptions will turn up whenever very large numbers of specimens are carefully examined, and that is why extensive series are required in order to properly understand specific characters, or, rather, combinations of characters, any single one of which may fail. All zoologists know this—the days of the Noah's Ark collection of "species" are over—and yet I am often surprised and shocked when reading systematic descriptions or diagnoses, to find how individual variation is overlooked or deliberately ignored, with the object evidently of emphasising distinctions.

I have been very careful to note individual exceptions in my writings, and I have subjected large series of many species to a close scrutiny. I have now in the press a Monograph of the Lizards, in which the record of such details is carried to a point that has not, I think, been reached before in the case of any large group; in thus dealing with the subject I am encouraged by the opinion of a great French biologist (Alfred Giard), that the detailed and conscientious observations of facts, apparently futile, must lead to conceptions of a high philosophical bearing. I would advise all who have the taste and the leisure to minutely compare large series of specimens of common forms, whether animals or plants, with the latest and best descriptions they can get hold of; they will be surprised to find how many little discoveries they will make.

To return to the Newts: after this digression, a few words as to their distribution, a subject which I also recommend to your attention, as it is desirable to obtain further records of localities for a more exact mapping out of their range in Britain.

The Crested Newt is found in England only as far west as Devonshire, where it appears to be very local and scarce, and in Scotland as far north as Perthshire; it is absent in the west. The Common Newt has apparently the same distribution here, as on the continent; it is quite a mistake to think that it is generally distributed, for, on the contrary, the Palmated Newt, which is local in the south-east of England, occupies a far more extensive territory, being the only species found over the whole of England, Wales, and Scotland. On the continent the Common Newt is more an eastern species, the Palmated Newt being the reverse; it is the same in England. How very curious then to find that, passing over to Ireland, the Common Newt is the only one occurring there. Had I been asked to predict I should have had no hesitation in suggesting the Palmated Newt as the representative of the genus in that island.

I have one more recommendation to make to collectors of Newts. There is a remarkable phenomenon, known as *neoteny*, the abnormal prolongation of the larval state, or the retention of certain attributes of that state, of which we have a classical example in the Axolotl of Mexico, which is the permanent, sexually mature, branchiate, larval form of a Salamander (*Amblystoma tigrinum*). Only some individuals assume the perfect form under certain conditions, and you may see an example of this Salamander at the Zoological Gardens in Regent's Park, the only survivor of a number reared by my son a few years ago. It is less known that there are some localities in the Alps of Italy which possess in comparative abundance Axolotl forms of *Molge alpestris;* elsewhere, branchiate adults of *M. cristata* and *M. vulgaris* have been found as isolated individuals only. Twenty years ago I made an appeal to those who might be so lucky as to come across specimens of any of our Newts in that condition, to preserve them alive and, considering the facility with which these creatures breed in captivity, to attempt to raise a

race of permanent gill-breathers, which would prove an interesting addition to our list of aquarium animals. I now renew the appeal.

Passing on to our Tailless Batrachians (*Ecaudata*), we have four to deal with, one of which is doubtfully indigenous.

The two Toads, the Common (*Bufo vulgaris*), and the Natterjack (*B. calamita*) are easily distinguished in form, in coloration, and in gait as well as in habits. The second differs from the first, which is too familiar to need definition, in the shorter hind limbs, so short that the toad is unable to hop and progresses, when pursued, by running, the body raised from the ground, but stopping every few seconds, *muris instar* as expressed by its discoverer, the illustrious Rösel von Rosenhof; in the presence of a large porous gland on the calf; in the greenish-yellow colour of the eye, instead of reddish-golden or copper colour; in the presence of a yellow line along the spine, never absent in any of the British specimens; and in the large vocal sac of the male, the throat swelling to the size of a walnut in the act of croaking, in which this creature rivals the green Tree-frog, the Common Toad, on the other hand, being deprived of a vocal sac and uttering only a feeble note.

The Common Toad is found all over England and Scotland, but is absent from Ireland; it has never existed on that island, as otherwise its remains would certainly have been found with the bones of so many small animals collected in great numbers in the Pleistocene later deposits and studied with much care. The Natterjack, on the other hand, is local in England, has only been found at one place in Scotland, on the Moray Firth, but occurs plentifully in Ireland around Castlemaine and Valentia harbours, Co. Kerry. Colonies of Natterjacks are usually found in sandy localities only, and come and go in a mysterious fashion. In Thomas Bell's time this Toad occurred in abundance in Gilbert White's garden at Selborne, but, and this is most surprising when we think of its remarkably garrulous nature, it appears to have entirely escaped the notice of the great naturalist, which can only be explained by supposing that it did not exist at or near Selborne in those days. In his edition of White's "Selborne," Bell remarks that the Natterjack, once so common, had abandoned his garden, without any cause ever having ever suggested itself for its disappearance. A similar instance is known from Dorsetshire, where the toad is stated by the Rev. O. P. Cambridge to have been very plentiful on Bloxworth Heath some 70 years ago, whilst it does not appear to have been seen or heard in that vicinity for many years past.

The Common Frog (*Rana temporaria*) is distributed over the whole of the British Isles, though more local in Ireland; it reaches the extreme north of Scotland, where remarkably large specimens (up to nearly four inches without the limbs) are found. Its scientific name, *temporaria*, is due to the dark brown or black spot covering the temple, a character which is, however, not to be trusted, as

it may be absent in some specimens, whilst, on the other hand, it may be present in the other species, the Edible Frog (*R. esculenta*). This second frog used to be common in the Cambridgeshire Fens, and is still found in a few localities in Norfolk; it has certainly been in existence in these places for a great number of years, but whether it is indigenous or introduced from the continent, no one can say. Such as it occurs in this country (var. *lessonæ*) it is easily distinguished from the Common Frog by the presence of a yellow or green stripe along the back, the bright yellow and black marblings on the groin and buttocks, the large, hard, compressed tubercle at the base of the inner toe, and the presence in the male sex of an external vocal sac on each side of the head, protruding, when inflated, through a slit below the ear; this bladder-like vesicle is of the size of a small cherry in full-grown individuals. The croak is very loud, but quite different from that of the Natterjack, consisting of a variety of notes, and, unlike the toad's, is produced in the daytime as well as at night.

The eggs of the Common Frog are very conspicuous in late winter or early spring as large masses of jelly enclosing small black spheres (the ovum proper) in countless numbers, floating on the surface of the water; those of the Edible Frog are never seen, as they sink to the bottom, and they are not laid until June. The eggs of toads are very different, forming long strings, comparable, rigidity apart, to glass tubes, containing small black beads in single or double file. A few years ago, on the occasion of a communication on distant orientation in Batrachians by that highly promising young zoologist, B. F. Cummings, whose recent loss we deplore, I made some remarks on the habits of our Frogs and Toads, which I will here reproduce from the Zoological Society's "Proceedings," by permission of the Society.

"There is great diversity among Tailless Batrachians in the possession, lack, or degree of instinctive foresight in selecting places for the deposition of their eggs. Leaving out the thoroughly aquatic Edible Frog, which has only doubtful claims to be regarded as British, two of our species, the Common Frog and the Natterjack Toad, belong to the category of the least gifted in this respect, whilst the third, the Common Toad, behaves differently, and is besides possessed of an instinct for orientation which appears to be highly developed. The fact that, after the perfect condition is attained, Tailless Batrachians, unlike the Tailed, do not regenerate lost parts, would render the Common Toad further suitable for experiments on migrations, after the amputation of a finger or toe, as a distinctive mark. The Natterjack is, with us, a very local species, but the Common Toad and the Common Frog are ubiquitous and, as young or outside the breeding-season, are often found far from water, to which they have, of course, to resort for oviposition. How the three species behave in connexion with this function I will tell briefly from my own observations.

"The Common Frog exercises little discrimination in the choice of water in which to deposit its eggs, provided it be not brackish, often spawning in temporary winter pools which are sure to dry up before the time at which the larvæ have completed their metamorphosis, or on the edge of a pond where, the level of the water falling after dry weather, the egg-clumps remain stranded. No doubt the frogs are attracted to the shallow, slanting borders in preference to the deeper parts with abrupt banks by the comparative warmth of the water under the sun-rays of late winter or early spring, with the unfortunate result which may be witnessed almost year after year in some places, when, following a spell of dry weather, the borders of ponds are covered with the stranded jelly-like masses of frog-spawn drying away in the sun before the liberation of the larvæ. On my country rambles in the end of March or the beginning of April, I have often rescued the progeny of many frogs by removing such doomed egg-masses from these fatal beaches to deeper water close by, which the mother would have chosen had she been gifted with the instinct possessed by the Common Toad.

"The migrations of the Common Frog towards the water must take place, to a great extent, in the autumn, as many, perhaps the majority of individuals, hibernate buried deep in the mud at the bottom of ponds, sluggish but not dormant as in some higher animals. Some years ago, just before Christmas, after a period of severe frost, which had lasted more than a week, I was walking on the ice of a small and shallow pond in Belgium, when my attention was drawn to a bright red creature, first taken for a gold-fish, moving under the ice, which very nearly extended to the bottom of the pond; this was a Common Frog, and on looking closer, I discovered hundreds of others, less conspicuous owing to their yellowish, brown, or olive colour. Some were very handsome specimens, which I wished to secure. A pick-axe was fetched from a neighbouring farm and a hole made in the ice, through which I could introduce my arm and reach the bottom; but the frogs were so active that they swam away and not one could be caught. I decided to return to the pond after the thaw, which I did, but no more frogs were to be seen; they had evidently retired to their hibernating-quarters in the mud and in holes under water. The reason why they came out when the pond was frozen nearly to the bottom, must be attributed to the reduced oxygen in the water, which made the frogs, breathing as they do under such conditions chiefly by the skin, feel uncomfortable and desire to escape.

"The Common Frog is the earliest breeder among European Batrachians, spawning taking place in the South of England from between the end of January and the end of March, the date depending almost entirely on the temperature and therefore varying considerably from year to year. Should the winter be a mild one, the breeding may be over by the middle of February; recurrence of cold weather after the frogs have begun spawning may cause them

to return to their winter-quarters, with the result that the breeding-season is broken up into two or three periods within a couple of months. When the first appearance of mild weather is much retarded, the spawning takes place for all individuals within a very few days, with an *ensemble* which is not customary for the species in our uncertain climate.

"The Natterjack Toad does not undertake lengthy migrations for the purpose of depositing its eggs. It usually lives in colonies in sandy localities, such as dunes on the sea-coast, sand-quarries, heath-land, etc., which must be in close proximity to at least some sort of shallow pool, even of an intermittent kind. This toad shows not the slightest discrimination in the choice of water, and will not move any distance in search of better conditions if only it can find close by a little water in side ditches or even in cart-ruts of a road, whilst an excellent pond may be available a hundred yards off. The development of the eggs and larvæ, it is true, is much more rapid than that of earlier breeders like the Common Frog and the Common Toad, but nevertheless, in some places, a great many broods are destroyed through want of foresight on the part of the mother. Should, however, the pools or ponds in which the Natterjack is accustomed to breed, and around which it has settled, disappear for good, by the agency of man or otherwise, the whole colony will move off after a time to a more suitable locality. This I have observed in sand-quarries in Belgium and France, some of which are provided with stagnant water whilst others are not; those which have no water or from which the water has disappeared for a year or two, are without Natterjacks at all times of the year, thus showing that this gregarious Batrachian only settles down in such places as will afford a site for spawning within a few yards, whilst half a mile's journey is nothing to a Common Toad. It may also be mentioned that the Natterjack, in common with the Palmated Newt, has no objection to brackish water and is therefore often found in great abundance in close proximity to the sea. The greatest number I have ever seen was on the little Ile de Bast, opposite Roscoff, on which, for the reason that the pools are brackish, neither frogs nor the common toad exist.

"The Natterjack has no such restricted breeding-season as our other Tailless Batrachians. The females do not go to the water until ready to spawn, and the time at which the ova descend into the oviducts varies according to individuals, from between the middle of April to the beginning of July, sometimes even later.

"The Common Toad, on the other hand, is remarkable for the fixity in the time at which it seeks the water for the purpose of reproduction and for the shortness of the period within which all the females get rid of their eggs. Exceptions of later breeders, which have been observed, are so rare they may well be said to confirm the rule. The same may be said of isolated pairs occasionally found in places to which toads are not in the habit of resorting to breed.

"The breeding-season in the South of England, the North of France, and Belgium, falls within the last days of March and the first days of April, and, with the exception of severe frosty weather, which rarely occurs at that season, irrespective of the temperature. Then certain ponds or deep flooded quarries will be found alive with hundreds or thousands of toads which have congregated from the neighbourhood, often from a radius of half a mile or more. Thither all the toads have travelled with remarkable directness, passing other ponds or ditches of which they might avail themselves were it not for the instinct which leads them to select a place offering all guarantees for the successful rearing of their progeny. If a male meets a female *en route*, he vigorously clasps her under the axils and accomplishes the rest of the journey on her back. Much of the travelling takes place at night, but individuals are also met with in the daytime, hopping along towards the meeting-place. If a high road should run not far from the pond which is the rendezvous, numbers of crushed corpses of toads, run over by motor-cars or other vehicles, will be found for a distance of perhaps two or three hundred yards, the crushed toads being more and more numerous as the road nears the pond.

"If pairing toads are taken from the place selected by them for spawning, and removed to a neighbouring garden with a small artificial pond in which, we should think, they might comfortably conclude their breeding-operations, they will often leave and start off in the direction whence they were brought. It does not matter to them whether this be up or down hill.

"Some years ago I made an experiment on the instinct of orientation in this toad. I took a number of pairing individuals out of a pond frequented by the species, which was only a short distance from another in which frogs spawn but to which toads never resort. I turned them loose on a monticule midway between the two ponds, from which neither could be seen, and watched their movements. All, after a little hesitation or after a few hops in the opposite direction, took the right orientation and made their way straight towards the pond whence they had been taken. I experimented on single individuals, on pairs, and groups of individuals, with the same result. In this case, it was evident that the toads were not influenced by hygroscopic sensations, since there was water in both directions. Whether the sounds uttered by their fellows in the pond were a guidance to them, seems to me doubtful, considering the very feeble voice of the Common Toad, the males of which as is well known, are devoid of vocal sacs; if so, it would denote a very acute sense of hearing in toads. I am, however, convinced, from other observations, that even at a greater distance, from which no such sounds could be heard, the toads would have taken the right direction."

In addition to the four members of the order *Ecaudata* with which I have dealt, two more must be mentioned as having

thoroughly established themselves in this country : the green Tree-frog (*Hyla arborea*) and the Midwife Toad (*Alytes obstetricans*) both from the other side of the Channel.

The Tree-frog, remarkable for its bright green colour and climbing habits, has been introduced from France in some parts of the Isle of Wight, where it has multiplied to such an extent as to be a nuisance to many people, who, however much they may admire its graceful shape and attractive coloration, are disturbed at night by its very loud croaking from April to July.

The Midwife Toad, a small nocturnal Batrachian with large eye and cat-like erect pupil, unquestionably the most interesting European representative of the whole class, has established itself, no one knows how, in a former nursery garden in Bedford ; it has been there for many years, and a friend of mine found it still in plenty last summer. Its presence is revealed by its whistling note, which suggests the sound of a small bell, or a chime when uttered, as is usually the case, by a number of individuals, and is produced chiefly in the evening and at night. This so-called Toad, a member of the very distinct family *Discoglossidae*, furnishes an interesting example of parental solicitude, the male taking charge of the eggs, which are large and few and strung together like a rosary, immediately after oviposition on land, not in the water as in most other Batrachians. After extraordinary contortions, which it has been my good fortune to witness on several occasions, the male fastens the string of eggs round its hind limbs and carries them for a period of about six weeks, when he betakes himself to the water for the purpose of releasing his progeny, which escapes from the egg-capsules in the tadpole condition.

Note on the Pupation of Aglais urticæ and Vanessa io.

(Plate II.)

By E. J. Bunnett, M.A., F.E.S.—*Read January 8th*, 1920.

In the summer of 1901 I came across a single brood of larvæ of *V. io*, about five days old, on the summit of a nettle.

Of this brood I bred through 124 imagines, making notes and photographs during the successive stages. The larvæ being all of the same brood, their transformations were nearly contemporaneous. My notes on this occasion state that, when it is all but free from its larval skin, "the pupa hangs on to the larval slough merely by pinching it between its own posterior segments." A few years later I was able to supplement the notes referred to by an observation on the final act in the pupation of *Aglais urticæ*.

At the anal extremity of the pupa of the Nymphalids may be seen a pair of finger-like organs, having their ends more or less curved towards one another. (Pl. ii., Figs. 3, 4).

In the empty pupa case, or in a live pupa shortly after pupation is complete, these "fingers" lie flat upon, and, to some extent, embedded in the last one or two anal segments.

But in the act of pupation, and in the supremely critical moment when the chrysalis body is dependent from the larval skin, these finger-like processes are free and can be erected or lowered at will.

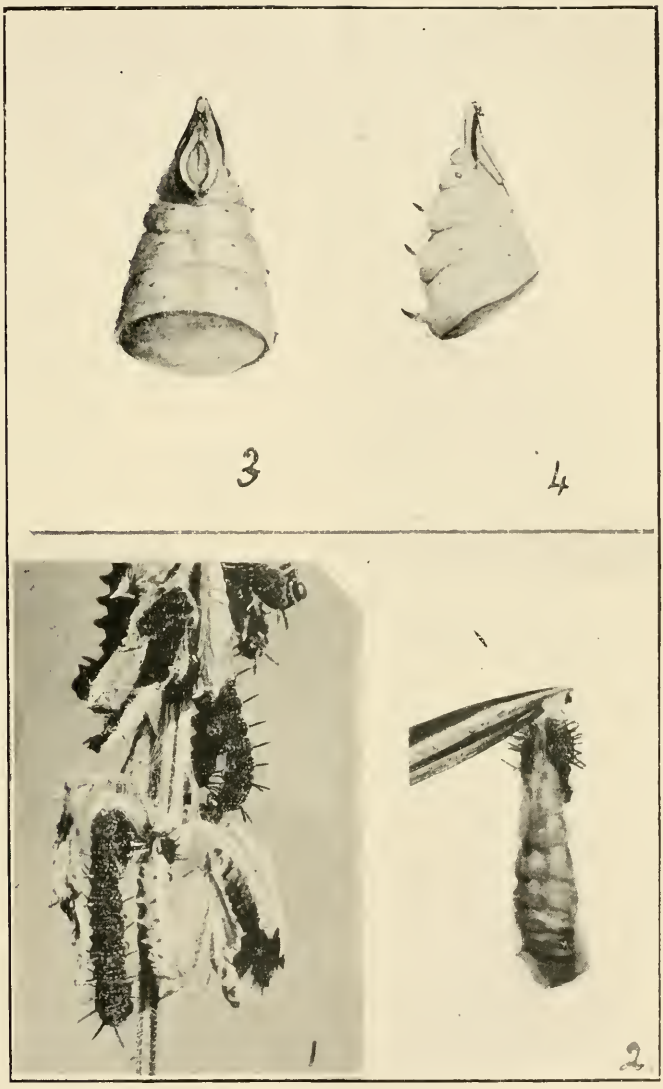
They act as a kind of ratchet. The creature raises the "fingers," thrusts them into or upon the crumpled larval integument, and then the act of closing them down again is sufficient to raise the chrysalis body.

A short succession of such movements produces the desired effect of enabling the anal extremity (cremaster) of the *chrysalis* to reach the silken mat on the leaf-stem, or other support, to which the anal claspers of the *larva* are already hooked.

The mystery of the complete withdrawal of the pupal body from the suspended larval envelope is thus explained. The *fact* of the complete withdrawal is demonstrated in two of the subjoined photographs (of *io* pupa) (Pl. ii., figs. 1-2.), which were taken by me in 1901, as well as by frequent observations of the phenomenal manœuvre, but it was not, as I have said, until later that I witnessed the use made of the external processes.

The two actions, the pinching of the larval skin between the pupal segments and the ratchet motion of the finger-like processes, are performed simultaneously.

This final act of the process of pupation evidently requires prodigious effort and the straining of every muscle in the pupal



1 and 2. PUPÆ OF VANESSA IO. 5 minutes after commencement of pupation.
Photo. *E.J.B.*

3 and 4. ANAL SEGMENTS OF PUPÆ OF VANESSA IO.
(Ventral surface and side view.)
From a Drawing. *E.J.B.*

body. It is "neck or nothing" at this moment, and not infrequently the insect's strength gives out before the cremastral hooks have caught hold of the silken strands, and down it falls, a little mangled heap of creamy jelly with all the life crushed out of it.

Exhausted though the pupa must be, it has yet one further task to perform, and that is to detach the now useless larval skin from its connection with the silken mat.

The soft and sensitive body of the immature pupa finds contact with the larval skin extremely irritating.

It whirls round first in one direction, then in the other, violently contorting its body, and all the time, little by little, it breaks the silken threads that hold the offending skin, and at last succeeds in causing it to fall to the ground. This process frequently occupies several hours, and when, as on some occasions, I have removed with my forceps the offending empty skin, the pupa immediately ceased its gyrations, and was at last able to enjoy well-earned and much needed repose.

A short exposure to the air of the moist surface of the newly transformed pupa is sufficient to harden the gluey surface; the finger-like processes now lie flatly pressed upon the body and on drying become soldered to it, the gluey exterior hardening into the pupal integument from which the imago subsequently emerges.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

Read January 22th, 1920,

By Stanley Edwards, F.L.S., F.Z.S., F.E.S.

LADIES and GENTLEMEN, the Reports of the Hon. Treasurer and the Council, that have been read, have given you, I think, all necessary information respecting the present status of the Society. I will, therefore, proceed to matters not included in those reports.

Unfortunately, we have suffered heavy losses of personnel during the past year, owing to deaths:—

Lord Walsingham, who had been an Honorary Member since 1886, was born in 1843. He specialized in the Micro-lepidoptera, of which he amassed a fine collection, which was presented to the Natural History Museum in 1910, together with his library. The majority of the specimens had been collected by himself, but these were reinforced by those of Zeller, Hofmann, and Christoph. He was one of the Trustees of the British Museum, and High Steward of Cambridge University. He contributed numerous papers on the Tineina to the "Trans. Entom. Soc.," London; and wrote on the *Pterophoridæ* of California and the North American *Tortricidae*. With Col. Swinhoe he was joint-author of the catalogue of Eastern and Australian Heterocera. His fine collection of larvæ on their natural food plants was also presented to the nation. He died of pleurisy.

W. J. Ashdown, who joined the Society in 1895, was born in 1855. Though collecting Coleoptera chiefly, he was interested in most of the other Orders, as shown by the collections bequeathed to

the Society. Until the outbreak of war, he had been in the habit of spending several weeks abroad each year, so that a large number of Swiss and French insects are included. His extensive library reflected the wide range of his interests; he generously left the natural history portion of it to the Society. At the date of his decease, in November, he was a member of the Council and Recorder of Attendances.

Lieut. W. F. Wolley Dod, who had joined the Society but recently, died of enteric, in Macedonia. At the beginning of the war he come to England from Canada, where he was an authority upon the indigenous *Noctuidæ*.

E. K. Inge's membership was even more brief: he had been elected only a month when he contracted double-pneumonia and died three days later. He was a lepidopterist.

Sydney Webb, who died in his 83rd year, became a member in 1888, and continued to take great interest in the Society, although age and distance had prevented him attending our meetings in recent years. Unlike the majority of entomologists, he began his study of insects with the Tineina. Ultimately, there was probably no finer private collection of British Lepidoptera than his, which contained magnificent series of varieties and aberrations, and included the collections of Bond and Gregson.

T. R. Billups, though not a member at the time of his death, was a past-president, having filled the chair in 1882 and again in the years 1888 and 1889. He joined the Society in 1877, and was for many years one of its most active members, frequently serving on the Council. He was a keen collector of Coleoptera, the parasitic Hymenoptera, and *Tenthredinidæ*.

Death has also claimed some notable entomologists outside our Society whose work will be greatly missed by all.

A few of the year's contributions to biological knowledge may be noted:—

Mr. W. R. McConnell, in the "American Journal of Economic Entomology," reports the discovery of another parasite of the Hessian Fly, *viz.*, *Miris* (or *Eupelminus*) *saltator*, a hymenopteron of the family *Encyrtidæ*, which attacks both larval and pupal stages of its host.

Our new President, Mr. K. G. Blair, describes a beetle (*Abax parallelus*) new to Britain. It is closely allied to *Abax ater*, and was found on St. Mary's Island, Scilly, in July, 1913.

Mr. F. V. Theobald ("Entom.," July, 1919) describes several

Aphides new to Britain: *Myzus gei*, from Hythe, Kent; *M. mercurialis*, from Ventnor, I.W.; *M. galiifolium*, from Stouting and Wye, Kent, and Yarmouth, I.W.; and *Aphis abrotaniella*, from Great Salkield, Cumberland.

The Rev. F. D. Morice ("Ent. Mo. Mag.," March, 1919) has described a new British Sawfly, *Allantus perkinsi*, from Devonshire, Surrey, and Lancashire; no doubt previously confused with *A. arcuatus*.

Mr. F. W. Edwards ("Ent. Mo. Mag.," 1919) reports a new British Heteropezine fly, *Leptosyna setipennis*, from Letchworth; and *Gnophomyia tripudians*, from Mildenhall, Suffolk.

Mr. J. W. Allen announces a beetle, *Epuraea distincta*, as new to Britain, from Oxwich Bay, Glamorgan.

Mr. F. Laing reports as new to Britain the *Aphis trifolii*, which Mr. K. G. Blair found on *Aster tripolium* at Shoeburyness.

Mr. R. A. Cooley ("Journ. Economic Entom.") estimates the damage to animal and vegetable products by insect pests, in the United States, at 1,400 million dollars a year. Writers on this subject agree that these losses represent 10 per cent, of the total value of the crops; and Mr. Cooley asks whether, by special emergency efforts and organisation, this huge waste cannot be materially reduced?

Mr. E. W. Sanford, in "The Journal of Experimental Zoology," writes on the physiology of digestion in *Blattidae*, the results of observations on more than 600 cockroaches. To the same journal Messrs. C. R. Stockard and G. N. Papanicolaou contribute further studies on modification of the germ-cells in mammals, and on the effects of alcohol on treated guinea-pigs and their descendants.

In the "Annals of Tropical Medicine and Parasitology" there are interesting articles on "Tsetse-Flies and Fly-belts," "Malaria associated Oedema," and the "Treatment of Leprosy in Nigeria."

Mr. F. W. Edwards has a note in the "Annals and Mag. of Nat. Hist." on the egg-burster of Encephalous Fly-larvæ, in which he says that the young larva of *Bolitophila pseudo-hybrida* has been observed moving its head up and down, cutting or scratching a slit in the eggshell.

Mr. G. J. Arrow describes a remarkable new ball-rolling beetle, *Mnematium cancer*, possibly from the Bihe district of Angola, collected by the late B. G. Nevinson. The insect is a striking example of specialisation by successive atrophy of its members. The

front tarsi have disappeared from all the ball-rolling *Scarabæidæ*: the wings also have gone in *Mnematium*, which seems to be advancing towards a reduction in the legs from six to four.

Mr. Stanley Hirst describes two parasitic mites new to science: *Myocoptes hintoni*, from the squirrel, and *Psoroptes natalensis*, found on cattle at Richmond, Natal.

In an article on the selection of *Helix nemoralis* by the song-thrush, Miss Maud D. Haviland says there seems to be no ground for supposing that the banded shells were taken less frequently than the unbanded.

Messrs. Eltringham and Kaye have pointed out that, amongst the Heliconine butterflies, several that were formerly regarded as distinct species, now turn out to be local races of *Heliconius melpomene*. Probably many other forms which we now call species will be found to be of lower rank. I should imagine that similar results will be discovered with a number of the South American Papilios.

Mr. E. A. Butler describes a Capsid Hemipteron, *Megacoelum beckeri*, as new to Britain; it was captured at Weybridge and Oxshott by Mr. Donisthorpe.

Mr. F. G. Whittle, at Camaughran, near Rannoch, obtained a Tortrix (*Ancylis tineana*) new to Britain.

Messrs. R. E. Turner and James Waterston have described a new parasite (*Prolælus glossinæ*), bred from *Glossina morsitans*, in Nyasaland.

Mr. F. W. Edwards (in "Ann. and Mag. Nat. Hist.") has recorded several fresh instances of Parthenogenesis in the dipterous genera *Tanytarsus* and *Corynoneura*. In the same periodical, Mr. W. H. Leigh-Sharpe reports the discovery of the gregarine parasite *Pleurocystis cuenoti* (diploid stage) in the worm *Helodrilus* (*Allolobophora*) *longus*.

Larvæ of *Caradrina cubicularis*, hitherto found only on wheat stacks and pea-haulm, have been found feeding on flax at Silverburn, near Leven, Scotland.

The Pink Bollworm (*Gelechia gossypiella*) has been introduced to Egypt from India in badly-ginned cotton lint.

At several of our meetings during the year one has been struck by the remarkable varieties of *Dryas paphia* and *Limenitis sibilla*, obtained in the New Forest. Those who worked the Forest in the "eighties" did not obtain the varieties and gynandromorphs that now fall to the fortunate collectors; and one is inclined to ask: Is

this a sudden departure from normal conditions, or has development been going on gradually for years, culminating in the fine forms now shown ?

Now that the war is well ended, one wonders what effect its lessons will have upon our governments; will they realise the necessity for helping Science by more liberally endowing colleges and institutions for research ? There has been some talk of appointing an Economic Entomologist in each county to deal with both noxious and beneficial insects; improving our knowledge of their life-histories, and their effect on agriculture and fruit-growing. These things are as important in this country as in those other parts of the Empire where local governments have already made advances in this direction.

The war has taught us much with regard to the external parasites of man and their influence in the spread of disease, and numerous books have already appeared, embodying the knowledge gained in the war hospitals. When our troops were occupying Thasos, one of the Ægean islands, the Anopheline gnats were very troublesome, as the Greeks*, instead of trying to combat them, accepted the malarial conditions, with consequent lowering of their vitality. Aerodromes had to be built in low-lying, flat country, and the sick rate was very high. In one case a military guard of 84 men was, in a few weeks, reduced to 14; but by draining the marsh and clearing the bushes from around the camp, the place was rendered more habitable. In such a place the presence of olive trees has a marked influence on malaria, the flowers attracting the mosquitoes and affording them food they would otherwise seek from human victims. Mr. L. M. Morris considers that two years of Government activity would eradicate malaria from Thasos.

In not a few instances the control of disease is determined by the solution of the insect problem, and this is notably true of bubonic plague and fleas, typhus and lice, yellow-fever and malaria and mosquitos. The intimate relation between insects and disease, though known to be very real, is less evident in the case of flies and such affections as cholera, typhoid fever, dysentery, and probably tuberculosis, for we know that insects may be carriers of all these diseases.

It has always been somewhat of a puzzle to know what becomes

* The degenerate character of the Greek is said to be largely due to repeated attacks of malaria, which lower the mental, moral and physical conditions of the people.

of the house-fly in winter. Does it hibernate? Dr. Gahan thinks the larvæ feed on snails in the winter; but this cannot be true of all districts, as there are some where flies are plentiful, but there are no snails, so that this theory is limited to certain localities. I should rather suppose that the larvæ spend the winter in the refuse heaps which are found in most gardens.

The very rapid spread of the Gipsy-moth in the United States has somewhat puzzled the naturalists of that country, but probably some light has been cast on it by the experiments of two Austrian investigators, Messrs. Wachtl and Kornauth, who have described some peculiar hairs found on the larvæ of *Psilura monacha* in their first stage. Similar hairs, they state, are present on the first stage larvæ of *Lymantria* (*Porthetria*) *dispar*. Such hairs are furnished with globular enlargements near their base, supposed to be distended by air or gas. These hairs are distinguished as "ærostatic hairs," and the globules as "ærophores." Experiments conducted in the Austrian forests showed that *P. monacha* larvæ were carried long distances by the wind, and by analogy it was assumed that *L. dispar* larvæ, being similarly endowed, would also take aerial voyages. Microscopical examination of a first-stage larva revealed two kinds of hairs arising from each of the tubercles which are found along the body. A few of these hairs are slender, and nearly half the length of the larva, whilst a considerable number of shorter hairs are furnished with globular swellings near their base. Whether these aerophores assist the young larvæ in their distribution by making them more buoyant is not actually known, but experiments in America show that the larvæ can be carried by the wind for a third of a mile, from a point less than six feet above the ground, and that the most favourable time for the dispersion is when the temperature is above 65°, and the wind velocity is over fifteen miles an hour. These experiments appear to offer an explanation of the otherwise unaccountable spread of *L. dispar* to new territory. The larvæ have been known to be carried in this manner to a maximum distance of twenty-six miles.

In connection with the above, it may be recalled that in 1906 the Tachinid fly *Compsilura concinnata* was imported into the United States with a view to controlling the ravages of *L. dispar* and *Nygmia phæorrhea*, those of the brown-tail moth; the introduction was attended by great success.

It was reported in the press, a short time since, that a Dutch queen bee, considered to be immune from the attacks of the "Isle

of Wight disease," was about to be imported. If this introduction should prove successful it would be a great boon to bee-keepers. The disease is supposed to be carried by a parasite, *Nosima apis*; but there appears to be some uncertainty whether *Nosima* is always the agent. More accurate observation is needed as to the effects caused by unsuitable winter feeding, such as the use of variously adulterated syrups and sugars. May not the artificial methods of modern apiculture have some effects in lowering the vitality of the stocks, thus rendering the bees more susceptible to the disease? May not the artificial syrups lack a vitamine that may be peculiar to pure honey?

As the result of observations upon the effect of destructive bacteria and muscardine fungi on the larvæ of *Cnethocampa pityocampa*, the most virulent attacks were found to have been made by species of *Beauveria*. After contact with the culture spores, the larvæ of *C. pityocampa* and the adults and eggs of *Melolontha vulgaris* were mummified in a few days, but the larvæ of *Cossus ligniperda* remained alive for three weeks.

The number of insects that have served, and are serving, as food or medicine for the human race is surprising. The Israelites were enjoined by Moses to eat locusts. John the Baptist for a time lived on them and wild honey; and locusts are still esteemed highly in Africa and Persia, where they are bought and sold as an everyday article of commerce. The Parthians and Nasamones are said to have relished locusts as food; whilst, when fried in butter, they form a staple and favourite dish amongst the modern Moors. Many of the N. American Indians ate large numbers of the Rocky Mountain locust, an insect of considerable economic importance. When the red-man was at his zenith, this locust was innocuous; since his subjugation it has increased and spread to such an extent that it has become a serious pest.

Bushmen eat quantities of the Bugong-moth, *Agrotis infusa*. According to Kunzé, the bodies of these moths abound in oil and taste like nuts. When first eaten they produce violent vomiting, but this effect soon passes, and the eaters thrive on them. The larvæ of *Euploea humata* also are a favourite food. Dr. Howard and Prof. Riley experimented with these insects as food, making a thick milk stew of them; but although it had no unpleasant flavour, it lacked substance. When fried in butter, the larvæ reminded them of shrimps; but they are not likely to be considered a delicacy. Such examples of insects as food might be multiplied.

Ladybirds were formerly in repute as a remedy for colic and measles; and a squashed ladybird inserted in the cavity of a decayed and aching tooth is stated by old authorities to give instant relief. Pliny recommends a decoction of skipjack beetles for ulcers and malignant growths; and *Lampyris noctiluca* is said to be an efficient remedy for stone. The medicinal virtues attributed to the dung-beetles are many and varied; and, according to Schroeder, a preparation of *Byrrhus pilula* is an efficient remedy for hæmorrhoids and certain diseases of the eye. Crickets, in ancient days were administered in disorders of the ears and throat, and in more recent times the ashes of *Gryllus domesticus* have been used in the cure of weak sight and enlarged tonsils. In Sweden, *Tettigonia verrucivora* is much prized by peasants who suffer from warts, the insects being encouraged to bite the excrescence, a black fluid from the insect's mouth during the operation being considered to burn away the wart. The exuviæ of a grasshopper are used in medicine in China and Japan.

Both Dioscorides and Galen recommended roasted cicadas for bladder troubles, whilst for colic the latter writer advised from five to seven cicadas to be eaten with pepper. The *Aphidæ* are used by homœopathists, a tincture being prepared from *Aphis chenopodii* and *A. glauci*, both found on goosefoot.

Females of the Scale-insects (*Coccidæ*) have been used from the earliest times, in medicine and art. *Kermes ilicis*, from the evergreen oak, when acted upon by mordants of tin and other salts, furnishes a blood-red dye. The Arabs received it from Armenia and Persia as *Kermes* or Alkermes, and the Greeks knew it as *Coccus*. At a later date this dye was supplanted by another, prepared from *Dactylopius coccus*, found on the prickly pear. Cochineal, as this dye is called, once formed a staple article of commerce. Pliny says the bed-bug is a neutraliser of the venom of serpents, and that the heads of flies applied fresh to bare places is a remedy for baldness. Another authority says the same end is reached by rubbing the naked head with gnats.

Scale-insects as a family are regarded with great disfavour by economic entomologists; but one species at least, by its general utility does much to retrieve the reputation of its relations. This is the Lac-insect (*Tachardia lacca*), which in a single year has been exported from India to the value of 33,000,000 rupees. Commercial lac is the resinous secretion of the insect. Pela-wax is an important commodity produced by another Scale-insect, *Ericeras pela*. Accord-

ing to ancient Chinese records, its use dates back to the 13th century; for about that time Chinese candles were first made of pela-wax. A remarkably accurate native description of the insect appeared in 1610. It feeds on *Fraxinus chinensis*, *Ligustrum glabrum*, *L. lucidum*, and *Hibiscus syriacus*. Richthofen estimates the value of a year's harvest of pela-wax in Sze-tchouen at 14,000,000 francs.

In the words of a celebrated American entomologist:—"Man is but one of the forms of life struggling for existence, at continued warfare with surrounding forces, but by virtue of his surprising intelligence he has over-run the earth, has accommodated himself to the most unnatural environments; he has dominated all other species, he has turned to his own uses and encouraged or hastened the evolution of species useful to him or of useful qualities in such species; he has wiped out of existence certain inimical forms, and is gaining the control of others. He is the dominant type, and types whose existence or methods of life are opposed to his interests are being pushed to the wall. It is the culmination of a history which has many times repeated itself in past ages. The struggle of other forms of life to accommodate themselves to the conditions brought about by the rapid development of the dominant type is one of the interesting fields of study open to the biologist to-day. It would seem as if, in man's effort to make the face of the earth his own, all the complicated elements of life were arrayed against him, and the great and ultimate result of the labour of the biologist in his study of the relations of the different forms of life, and the laws which govern their development, will be to bring about the absolute control of all other life by man. Thus, it is not only the economic worker who looks for results of a practical kind from his labour—the scientific agriculturist, the horticulturist, the economic zoologist, the medical bacteriologist, who should command the respect of even the practical-minded man—but the biologist in whatever field, whether he is working towards the understanding of broad principles and general laws, or in some narrow corner of research he is accumulating material which will help ultimately to lead to wider understandings—all are working helpfully and practically towards the perfect well-being of the human race."

I should say that for many of the facts included above I am indebted to that admirable book by C. A. Ealand, "Insects and Man."

In conclusion, I desire to thank the Council and Members of the

Society, for the kind way in which they have treated me during my two years as President, and especially Mr. H. J. Turner, my co-secretary, who has helped me on many occasions. In your choice of my successor, Mr. K. G. Blair, you have chosen a Coleopterist who is well known, and I believe he is the first Coleopterist-President in the annals of the Society. I am sure the Society will prosper under his guidance.

ABSTRACT OF PROCEEDINGS.

FEBRUARY, 13*th*, 1919.

The President in the chair.

Mr. Ashdown exhibited some of the Coleoptera referred to in the "Ent. Record," December, 1918, namely, *Mordella aculeata* and *Agrilus sinuatus*, both new to the Surrey County List. Also the streaked ab. *hebræa* of *Anatis ocellata* from Oxshott, apparently the second recorded British specimen.

Mr. Tatchell exhibited an aberration of *Vanessa io*, in which the ocelli on hindwings were replaced by tiny spots, and the black markings on costa coalescent. Bred from a larva taken in the New Forest, July, 1912. Also a specimen of the Fossorial Hymenopteron *Mutilla europæa*, taken in the New Forest in 1912; the species is supposed to be parasitic, and is frequently found in the nests of *Bombus*.

Mr. Hy. J. Turner exhibited a long series of *Loweia* (*Chrysophanus*) *alciphron* from various continental localities, including (1) the type form from Buda Pesth, in which the beautiful violet gloss was present over the dark suffusion of all the wings in the male; this occurs throughout Central Europe from the Baltic to the Alps; further east the violet gloss is still more developed in brilliancy, making the species one of the most brilliantly beautiful insects known: (2) race *gordius*, the form common in the Alps and further south, in which there is but little suffusion and gloss on the upper side of the male; the two sexes approximate in depth of ground colour on all wings; the specimens were larger than the type form in both sexes; (3) race *granadensis* from Spain, smaller than the type in both sexes; (4) ab. *intermedia*, forms which were between the typical form and *gordius* occurring in many places; those exhibited were from Bologna, Italy; (5) ab. *viduata*, examples in which there was a paucity of markings on the upper surface, not as in the type, where the markings are only obscured by the suffusion; (6) race *meliboeus* from S.E. Europe, in which the ground colour is less pure and rich than in *gordius*; it is less in size; (7) ab. *sub-*

fasciata, in which the spots of the submarginal row are emphasised sufficiently to join together into an irregular band; (8) ab. *infulvata*, a form of female occurring in Germany and the Alps, in which the whole of the wings are suffused with a black-brown coloration, only showing the spots somewhat darker, and a few light marginal markings, or none at all. An aberration of the male from Vernayez was exhibited in which all the spots on the underside are considerably enlarged.

Mr. Robert Adkin exhibited captured and bred specimens of *Dioryctria abietella* from Forres. He said that although this was a very generally distributed species wherever the Scots pine (*Pinus sylvestris*) grew, our knowledge of its complete life-history was very imperfect. This was no doubt largely due to confusion between this species and its near ally *D. splendidella*. In 1836 Duponchel published a very full account of a larva under the name of *D. abietella*, but it is quite evident that his larva was that of the other species. *D. abietella* has frequently been bred from second year twigs or ripe cones of *P. sylvestris*, frequently those that have been tenanted by some other larva, such as *Retinia resinella* or *R. buoliana*, and there appears to be good reason to believe that it is only in the spring of the year in which the imago emerges that the larva takes to such positions. It is known that it completes its feeding in them, apparently eating the inner bark, but it is unlikely that its earlier life is passed there, and from such evidence as is available it appears probable that the first part of its existence is passed in the green cones of the pine. There is also some evidence that it leaves them in autumn and hibernates in a cocoon on the ground or among rubbish. He appealed to those who may be working among the Scots pines in the autumn to collect any branches that may have green cones that appear to contain larvæ in them in the hope of settling this much vexed question.

Mr. A. A. W. Buckstone exhibited a long series of *Vanessa io*, bred from larvæ taken near Reigate, Surrey in June last. With one exception, all the two hundred or so butterflies which resulted from these larvæ are of the form in which the blue of the "eyes" on the forewings is more or less broken up into spots and lines, and rather inclines to purple, as compared with the greenish blue of specimens from other localities.

The majority have an extra blue spot on each hindwing = *cyanostista*. Many of the remainder approach *cyanostista* to the extent of possessing the dark patches of scales on which the extra blue spots are seated, but the spots themselves are wanting.

It was noticed that many of these Reigate specimens have dark spots immediately within the outer marginal border of the forewings, but which do not form part of this border, as they appear to do when viewed by the naked eye; for when examined under a lens they are found to be composed of scales similar to those which form the black blotches on the costa, and differ distinctly from the metallic brown scales of the marginal border.

Mr. Buckstone also exhibited drawings by the Rev. C. R. N. Burrows of the genitalia of the dwarf race of *Agriades coridon*, and of the larger race found at the base of the Downs upon which the former race occurs, and read the following note received regarding them :—

"I have examined your *coridon*, and enclose drawings thereof, to which I have added a drawing, all exactly the same scale, of the ordinary ♂ *coridon* of the Kentish hills. (See "Ent. Rec.," 1919, pl. iv., p. 89.)

"You will at once recognise the difference in *size*. To me it is a revelation. I thought I had heard that whatever the size of the imago, the genital organs were always the same size. It is, it appears, not so by any manner of means.

"I have added in figures the nearest measurement I can arrive at of the butterflies themselves. You see the hill-top race is just over half the size of the normal insect. It appears to be much the same with the genitalia.

"Of course, the drawings are but rough, but I think they are worth publication, accompanied by photos of the butterflies themselves. There is just the possibility that you have dropped upon a different species, as yet unknown, but I do not think the genitalia support this idea, nor does there appear to be a Palæarctic species other than *coridon*." (See "Ent. Rec.," 1919, p. 89, pl. iv.)

Mr. Bunnett exhibited details of the life-history of *Coleophora nigricella*, and read a short paper on the mode of progression of the larva bearing its case. He showed photographs of the "tracks" made by the larva on a glass microscopic slide. (See page 32.)

FEBRUARY 27th, 1919.

Mr. Bowman exhibited a specimen of the black form of *Hibernia leucophæaria* in which the fringes were conspicuously white. It was taken in Epping Forest in 1909.

Mr. Hy. J. Turner exhibited a series of *Camptogramma bilineata* from the Island of Cyprus, including the form ab. *testaceolata*,

Stgr., in which the wings are brownish suffused. The ground colour was nowhere of the yellow of the type, but of a rich orange yellow, especially on the lower wings. In all the specimens the duplicated lines were much emphasised into narrow irregular transverse bands differing in number in different specimens, from the greater or lesser suppression of the rippled lines. The fine transverse lines themselves were frequently very dark brown, almost black. For comparison were shown ordinary typical forms from the French Alps, with a set of somewhat dark London forms and examples of (?) ab. *infuscata*, Gump., in which the central transverse band is margined with fuscous more or less uniting to a complete dark band in some specimens, which last form is figured in South's "Moths of Brit. Isles," Ser. 2, pl. 85, fig. 6.

Mr. Hy. J. Turner also exhibited a short series of *Pontia chloridice* from the Island of Cyprus, where it had been rediscovered by his valued correspondent Mr. G. T. Wilson, after not being met with for many years. They were taken in July, 1918, a late date for the species, hence their imperfect condition. The species is distributed from Bulgaria, Turkey, S.E. Russia, Asia Minor, Persia, S. Siberia, and Central Asia. For comparison the two other species of the genus *Pontia* were exhibited, *viz.*, *P. daplidice* and *P. callidice*. The specimens of *P. daplidice* were from the same island. This is a generally distributed species throughout the Palæarctic Region, except in the extreme north and in the British Isles. *P. callidice* is the Alpine species found in the high mountains of the region from the Pyrenees, Alps, to the Western Himalayas, Altai, Pamir, and Thian Chan. The specimens shown were taken in the Engadine by our late member Mr. A. E. Gibbs. These species have always been closely associated together by our authorities, but, strange to say, in Seitz' "Palæarctic Butterflies" they are distributed in three different genera.

The remainder of the evening was devoted to an exhibition of lantern slides, the following members showing:—Messrs. W. J. Lucas, A. E. Tonge, A. W. Dennis, and E. J. Bunnett.

MARCH 13th, 1919.

The decease of Mr. A. K. Ing was announced.

Mr. Ashdown exhibited a very rare book, Borelli's "De Motu Animalium," dated 1685, with some curious plates showing the mechanical principles involved in the flight of birds and the founda-

tion of modern aviation. He said it was one of the oldest works dealing with the subject.

Capt. B. S. Curwen exhibited short series or examples of *Coscinia striata* and ab. *melanoptera* in which the hindwing has the cilia only orange; *Coscinia cribrum* and ab. *candida*, in which the forewings have only a few spots, both forms from Switzerland; *Utetheisa pulchella*, from Gibraltar; *Parasemia plantaginis* with ab. *hospita*, with ground colour of hindwings white, and ab. *matronalis*, with hindwings black, and orange markings confined to the terminal area; and *Orodemnias* (*Apantesis*) *queuselii*, from Zermatt.

Mr. Sperring exhibited an example of *Pieris napi*, in which the underside of the hindwings had unusually pale markings for a British specimen.

Mr. Hy. J. Turner exhibited a series of *Melanargia pherusa* from near Palermo, Sicily, including several specimens of the rare ab. *plesaura*, in which eye-spots on both upper and undersides of the hindwings were either completely wanting, or only represented by very slight traces, together with a short series of the closely-allied *M. syllius* from Hyéres, of which some authors considered *M. pherusa* to be only a local race. Although the two are very similar, the distinctions seem to be definite. In *M. pherusa* the discoidal cell of the forewings is divided by a black tongue-shaped blotch, which in *M. syllius* was nearer the discoidal spot. The eye-spots (upperside) were always less expressed in the hindwings of *M. pherusa*, and in the male unpupilled. The outer margin of the hindwings was always distinctly less marked with black. On the underside of the forewing the discoidal spot is a circle with a tail like a capital Q in *M. pherusa*. The buff colour of the veining is much paler, and much narrower, and not divided by a narrow thread line of light ground, which is almost invariably present in *M. syllius*. The female of *M. pherusa* has larger eye-spots, often pupilled. It will be remembered that the late Mr. J. Platt Barrett on several occasions sought *M. pherusa*, but with scant success. He agreed with M. Oberthür's opinion that there was only one species. As to their genitalia he knew nothing.

Mr. Turner also exhibited a few species of butterflies sent to him in a letter from Palestine by our member Mr. H. W. Andrews. It included *Colias edusa* and *Anthocharis belemia* from near Jaffa, and from the Jordan valley; *Teracolus fausta*, with its ab. *immaculata*, a non-European Pierid of a genus whose dominance is in Africa; *Zizera galba*, a very small Lycænid abundant in many parts of the near east; *Polyommatus icarus* (?), *Chrysophanus thersamon*, a

"copper" very widely spread in the east; and the "skipper" *Gegenes nostrodamus.*

At the time Mr. Andrews wrote he was "in the Jordan valley in a broken chaos of limestone hills very glaring in the sun." He went on to say, "I have been right down to the Jordan, which is bordered by a narrow belt of vegetation for about half a mile on either side, with tamarisks, bamboo-like reeds, and some big trees, poplars, and a kind of larch and shrubs unknown to me. It was in that belt I took the two or three specimens labelled 'Jordan Valley'; the yellow butterfly (*Teracolus fausta*) was common. I also saw a lot in the Jordan Hills we crossed, but I saw none in the Jaffa district." He further says, "As far as my experience goes, Palestine is not prolific in butterflies. Hymenoptera are most abundant, also Orthoptera, and in the neighbourhood of water, Neuroptera. Certain groups of Diptera are also abundant, but Hymenoptera are easily first; bees, wasps, and ants."

Alsophila aescularia was reported common at West Wickham, but only a few had been seen in Epping Forest, where *Apocheima hispidaria* had been fairly common.

Mr. Frohawk asked if the rose-beetle, *Cetonia aurata*, and the musk-beetle, *Aromia moschata*, had been observed of late years in the suburbs of London, where some twenty-five years ago they were much in evidence. It appeared from the remarks of various members that these beetles had very largely disappeared from that neighbourhood, although occasionally observed in a few areas.

MARCH 27th, 1919.

Mr. D. V. Ash, of Surbiton, was elected a member.

Mr. A. A. W. Buckstone exhibited a long and varied series of *Lycia hirtaria* bred by the late Mr. L. H. Archer from a female taken at Wimbledon. The upper wings of many of the males were deep black, and but slightly relieved by yellow markings. The larvæ fed up rapidly, being kept in a hothouse. Last year Mr. Buckstone bred ten examples of this species, which had spent three winters in the pupal state.

Mr. Hy. J. Turner exhibited (1) a series of the beautiful *Zygaena rhadamanthus* from Hyéres, S. France, including the ab. *cingulata*, in which the abdomen has a red girdle; (2) a series of *Abraxas pantaria*, a species closely resembling the British *A. sylvata* (*ulmata*), also from Hyéres.

Mr. Hugh Main exhibited *Badhamia utricularis* (*Mycetozoa*), from Epping Forest, where he had met with it on decaying sticks.

Mr. Bowman exhibited a fine melanic specimen of *Hibernia defoliaria* from Epping Forest, with the cilia pure white.

Mr. Barnett exhibited a bred example of *Hemaris fuciformis* from Horsley with all the wings much narrower than in normal specimens, the marginal borders much wider and somewhat transparent, except on the inner side, which was quite black; the costa of the forewings was more widely dark, the antennæ had the club less developed, and the disc of the wings was covered with scales.

Mr. Priske exhibited shells of *Helix hortensis*, showing the range of marking, and including unbanded white examples.

Mr. Tatchell exhibited an example of *Pyrameis atalanta* with a large blue patch on the disc of the left hindwing above, and a gynandromorphous specimen of *Polyommatus icarus* taken near Shrewsbury in 1916; the R side was male and the L side female.

Lieut. L. A. Box exhibited various species of Hymenoptera, and contributed the following note:—

"1. *Cerceris arenaria*, L., and a Dipteron found in association with it having striking structural and chromatic resemblance.

"2. A female and a male of *Vespa norregica*, Fab.

"3. A series of *Crabro capitosus*, Shuck., reared from ash twigs, as described by me in the "Ent. Mo. Mag." for January last, and which I have since discovered to be of frequent occurrence in Surrey, Kent, and Sussex.

"4. Specimens of *Mellinus arvensis*, L., with Dipterous prey.

"5. The Chalcid *Syntomaspis cyanea*, reared from galls of *Dryophanta divisa* from Co. Kerry. This is a new record for Ireland, and possibly for the British Isles. Also, for comparison, *Syntomaspis littoralis*, common in oak-apple galls from Hayes Common.

"6. The Chalcid, *Diomorus armatus*, Sch., reared from cocoons of *Crabro clavipes*, L., in bramble sticks. The economy of this species has hitherto been unknown, but the two other Continental species of the genus *D. kollari* and *D. calcaratus* have been bred from bramble sticks containing respectively the wasps *Crabro rubricola* and *Stigmus pendulus*."

Polyploca flavicornis was reported as abundant at Wimbledon on March 11th, and *Apocheima hispidaria* was also reported as being in numbers. In Tyrone the larvæ of *Melitæa aurinia* were only just awakening from hibernation on the hill slopes, while those on the lower ground were still quiescent.

APRIL 10th, 1919.

Mr. Leeds exhibited an example of *Colias edusa* from Herne Bay, showing a curious discoloration of the apex of the forewing.

The remainder of the exhibits were of *Acidalia marginepunctata*, brought by members in anticipation of the paper to be read by Mr. R. Adkin.

Mr. Buckstone showed the species from Paignton and Eastbourne.

Mr. Tonge exhibited short series from Sussex, taken at Midhurst, Uckfield, Chichester, Bolney, Eastbourne, Lewes, and Brighton, and single examples from Kent—Deal; Suffolk—Southwold; Hants. —Sandown, I. of W.

Mr. Ashdown exhibited a Swiss specimen (Jura) for comparison.

Mr. Mera exhibited his series, including specimens from many localities on the coast from Suffolk to Cornwall.

Mr. Bowman referred to the Lewes examples in his series as having noticeably paler ground colour.

Mr. B. W. Adkin exhibited a large number of specimens, including a long series from the Scilly Isles, among them being some very beautifully marked forms and several melanic examples; others had a dark basal mark.

Mr. Robert Adkin exhibited long series from the Sussex coast, with specimens from the Isle of Man and other localities, and read a short paper on the synonymy, life-history, and variation of the species. (See page 3.)

Several members remarked on the season. It was considered to be late, although some species were quite up to their usual period of emergence. *Anticlea badiata*, *Pachys strataria* (*prodromaria*), and *Tephrosia bistortata* had been met with. *Celastrina argiolus* was out, and at the end of March *Vanessa io*, *Aglais urticæ*, and *Gonepteryx rhamni* were out of hibernation. *Brephos parthenias* had been abundant at Wimbledon Common at the end of March, and *G. rhamni* was abundant in places. Mr. Frohawk said that frogs were still in their winter quarters, and that larvæ had not yet begun to move. He called attention to a peculiar habit of the green woodpecker which during a shower had attached itself to a tree-trunk, but when the drops of rain came on it, it slipped down the bark and subsequently changed its position by springing off and on again repeatedly. Mr. Step said that vegetation generally was very backward.

APRIL 24th, 1919.

Mr. Newman exhibited a living female of *Xylomiges conspicillaris* bred from a Worcester larva, and also an example of *Cassida viridis* (Col.) found on sorrel.

Mr. Buckstone reported that he had met with a number of females of *Tephrosia bistortata* at Horsley, on trunks of pine and beech, all practically dead with their ovipositors extended ; this was on a day following a very cold night. He stated that the ova of this species were only slightly attached and appeared to be largely kept in position by the down.

Numerous remarks on the season were made by members. Mr. Leeds said that both *Vanessa io* and *Gonepteryx rhamni* were numerous at Horning, where in two evenings the sallows only produced six imagines. The Bittern was again in the Fen. Mr. Newman said that spring larvæ were scarce generally, but *Arctia caja* larvæ were abundant. Of Noctuid larvæ he had found about a dozen, those of *Cosmotriche potatoria* were abundant. *Arctia villica*, *Eutricha quercifolia*, and *Lasiocampa quercus* larvæ were all scarce. In one wood not a larva was to be found, but a dusty hedge near produced numerous caterpillars. Mr. Buckstone had seen a number of *Eugonia polychloros* in Surrey, as well as *Aglais urticæ* and *V. io*. Mr. B. S. Williams had found *Lycia hirtaria* very sparingly, and larvæ generally scarce. The cuckoo was reported on the 19th at Leith Hill.

MAY 8th, 1919.

Lieut. F. H. Wolley Dod, F.E.S., was elected a member.

Annual Exhibition of Orders other than Lepidoptera.

Mr. Frisby exhibited a specimen of *Vespa dorylloides*, Sauss. This particular specimen was from N. China, but it also occurs in India, Burma, Sumatra, and Java. The peculiarity of its habits is that it is nocturnal in its flight, being much distressed when disturbed by daylight, flying awkwardly and colliding with different objects. It lives in dense forest, and comes to light at night. The nest is constructed in a hollow tree and consists of about half a dozen circular tiers of papery material, connected by pillars of the same substance. It stings severely.

Mr. Frisby also exhibited two workers of *Polyrhachis striata*,

Mayr. The genus of ants to which this species belongs is conspicuously armed with spines, sometimes having them very long and curved. These two specimens have also a growth from the top of the head, which appears to be of a fungoid nature. The species is distributed from India to Java and Borneo.

Mr. Ashdown exhibited a large number of Diptera, set to show the wing-markings, and pointed out that the pattern of these markings frequently showed no connection with the lines of the venation. He also showed *Cassida nobilis* from Oxshott.

Dr. Chapman exhibited living bred specimens of *Phymatocera aterrima*, the Solomon Seal Sawfly, referred to by the Rev. F. D. Morice in his presidential address to the Entomological Society in 1911, and by the exhibitor in the "Ent. Mo. Mag.," 1915 and 1917.

It makes a fairly solid cocoon under ground, from which it escapes by gnawing away a portion to make an opening, not by cutting off a lid.

Also a bred living example of *Hoplocampa testudinea*, the apple boring sawfly, which must be fairly common, in view of the apples it destroys whilst they are still small, but is apparently rarely seen. To breed it, the apple must be found as soon as it falls and before the larva leaves it. To escape from its underground cocoon it cuts off a lid.

Mr. Dods exhibited a specimen of the "false scorpion," *Chelifer cancroides*, found among books in a tobacco warehouse.

Mr. R. South exhibited a selection of insects belonging to orders other than Lepidoptera, met with in the New Forest during the month of June, from 1914-1918.

Coleoptera.—*Asemum striatum*, L., two specimens, 1917. *Callidium variabile*, L., a number of specimens in 1915. *Leptura scutellata*, F., common on an old beech tree, 1918. *Clytus mysticus*, L., one or two from hawthorn blossom each year. *Pachyta sexmaculata*, L., two only in 1917. *Anoplodera sexguttata*, F., one or two each year, 1916-1918. *Grammoptera analis*, Panz., one only, 1916. *G. praeusta*, F., one in 1915 and two in 1916. *Rhagium bifasciatum*, F., common each year, variable. *Elater sanguinolentus*, Sch., common each year, a few yellow forms. *E. pomonae*, Stephens, two specimens in 1918. *Corymbites tessellatus*, L., one or two each year. *Lytta vesicatoria*, L., one on Hants coast, 1918. *Pyrochroa coccinea*, L., one on a beechlog, 1918. *Ischnomera sanguinicollis*, F., 1916 and 1917, one each year. *Anthaxia nitidula*, L., one beaten

from oak, 1918. *Phyllopertha horticola*, L., a black var., 1916, on heather. *Tomoxia biguttata*, Gyll., one on beechlog, 1918. *Cleonus nebulosus*, L., one in 1918. *Carabus nitens*, L., a specimen or two on heath at Matley each year.

Neuroptera.—*Osmylus chrysops*, L., a few seen each year, common in 1918. *Sialis fuliginosa*, Pict., several each year. *Nothochrysa fulviceps*, Steph., one at Stanhope, Durham, 1917. *N. capitata*, F., 1916, '17, and '18, one each year. *Hemerobius concinnus*, Steph., sometimes common. *H. quadrifasciatus*, Reut., 1916, one only.

Odonata.—*Gomphus vulgatissima*, L., several seen, only one netted, 1915.

Hymenoptera.—*Mutilla europæa*, L., six specimens in the five years.

Diptera.—*Echinomyia grossa*, L., one specimen in August, 1914. *Tipulidæ*, six species unnamed.

Mr. Robert Adkin exhibited the original edition of Gerarde's "Herbal or General History of Plants," "imprinted in London by John Norton, 1597." He said these old Herbals, published some centuries ago, of which the one exhibited was a very good example, were of great interest, and appeared to have been written as much for the benefit of the physicians as the botanists. Not only was each species figured, described, and given both an English and a Latin name, many of these same names being in general use at the present day, but a great deal of further information was given. Thus, under "The place" we are told of situations where the plant would be likely to be found; under "The time," the months of the year when it would be in blossom; "The names" by which it was known to earlier authors and in other countries; "The temperature" apparently referring to the sensation caused when tasted; and finally, under "The virtues," we are given a list of its medicinal properties, some of them no doubt fantastic, yet we shall all agree that mustard "is mixed with good success with drawing plaisters," even to the present day.

Mr. Stanley Edwards exhibited a number of large species of Exotic Coleoptera, Orthoptera (Mantids and Phasmids), Bees, with Pseudoscorpions, and the curious Spider *Gasterocantha* species.

Mr. L. A. Box exhibited the following species of Hymenoptera. *Nomada roberjectiana*, a rare bee from Leicestershire. *Nomada lathburiana*, local, from Warwickshire. *Crabro interruptus*, a rare wasp from Leicestershire. *Pemphredon morio*, also rare, from

Leicestershire. *Elampus aneus*, an uncommon species of *Tubulifera* bred from bramble stem, from Leicestershire. *Rhyssa persuasoria*, the largest British Ichneumon, a parasite of *Sirex gigas*; local and rather rare. This specimen was caught in June last year at Hook Hill, Surrey, boring into the posts of a verandah. *Andrena clarkella*, showing the rare pale variety. Dug up in the mature state in October last year, the pale var. occurring as a single example with a number of the type. *Andrena cingulata*, a midsummer bee, but the whole series was dug out of the ground in Warwickshire, in October, last year. As Andrenas are supposed to hibernate in the larval state this is particularly interesting.

Mr. H. Moore exhibited several large species of exotic Centipedes, including *Scolopendra subspinipes* and *Polydesmus* sp. from Victoria Island, Burmah; also *Polydesmus cingulata* from Sicily, taken by the late J. Platt-Barrett.

Mr. B. W. Adkin exhibited portions of oak branches showing the ravages of the bark beetle, *Scolytus intricatus*. He also showed the "small stag beetle," *Dorcus parallelopipidus*, which he had found hibernating in large numbers in damaged ash trees.

Mr. West exhibited four drawers of Hemiptera, including the local and rare *Pygolampis bidentata*: also the following Hymenoptera:—*Andrena fulva* from Box Hill, where it was common on April 12th, 1912. *Osmia xanthomelas*, from Darenth Wood. *Eucera longicornis*, taken at Byfleet in 1906, and various species of *Chrysididæ*.

Mr. Leeds exhibited *Æschna cyanea*, taken on April 27th, at Letchworth.

Mr. Priske exhibited a very variable series of the shells of the mollusc, *Helix aspersa*, including two of the rare white form, *exalbida*, from the inland Downs, near Eastbourne.

Mr. Tonge exhibited the predaceous fly, *Asilus crabroniformis*, taken in Cornwall; also a specimen of the bee, *Anthophora acervorum*, from Deal, and remarked upon its habit of chasing other bees.

Mr. Buckstone exhibited a curious chain made of the vertebræ of rattlesnakes from America.

Mr. Bunnett exhibited an example of the Queen Bee with workers for comparison.

MAY 22nd, 1919.

Mr. Ashdown exhibited the beetle, *Ptinus sexpunctatus*, which he occasionally found on his windows; also *Attagenus pellio*, with supplementary spots, and two specimens of *Hylobius abietis*, showing difference in size, which was not necessarily sexual.

Dr. Chapman exhibited two living female specimens of *Trypodendron domesticum*, taken on 21st inst., at Netley Heath. They were burrowing perpendicularly for oviposition, into a large branch of ash from six to twelve inches through, that had fallen last winter. The females alone burrow. Most of them had gone not only through the bark, but some distance into the wood, and in the absence of proper weapons were out of reach. Those shown had only reached the wood, and so were captured more easily. The species is reputed to be found in rotten wood, but like practically all these *Scolytidæ* they really live on wood still containing sap, or more likely on the fungus material it supports; and so there is no rotten wood until the young beetles have left.

Mr. Bunnett exhibited the nut weevils *Balaninus venosus*, *B. turbatus*, and grey varieties of both species, from Keston. Also *Megatoma undata*, a rather rare beetle, from Catford.

Mr. H. J. Turner exhibited a female specimen of *Colias edusa*, from Cyprus, in which there were at the base of each forewing two blob-like dusky patches extending about one-third along the wing. He also showed undersides of *Pontia daplidice*. 1. Having wholly green markings on the hindwing, Catania, March. 2. Green markings edged with yellow, Catania, May. 3. Very yellow markings, Cyprus, May. 4. Markings faint and obsolescent towards inner margin and base, Cyprus, June. 5. Markings green, yellow, and rich orange.

Messrs. R. Adkin and W. West exhibited a number of the insects mentioned in Mr. B. W. Adkin's paper as being injurious to trees.

Mr. Edwards exhibited a large diagram illustrating the structure and life-history of the beetle *Hylesinus piniperda*.

Mr. Main exhibited lantern slides showing details of various insects destructive to timber, including *Prionus coriarius*, *Lucanus cervus*, *Aromia moschata*, *Nematus erichsoni*, etc.

Mr. B. W. Adkin then read his paper on "Insects Injurious to Forestry." (See page 8.)

In the discussion which took place several members referred to the gross negligence of the authorities, during the recent extensive

felling of timber for war purposes, in allowing such enormous masses of débris to lie rotting on the ground, thus forming a convenient harbour for most of those insects which cause the greatest amount of damage to forest trees; and to the absence of any beginning to reafforestation.

MAY 31st, 1919.

FIELD MEETING—BOX HILL.

Conducted by (the late) W. J. Ashdown and Hy. J. Turner.

The meeting was a whole day one and only a small contingent of the twenty-five members and friends who attended came for the afternoon. The day was fine and very pleasant, and although nothing unusual at this date was reported, most of those present obtained useful specimens or made notes of spots for future visits. Mr. A. A. W. Buckstone took a specimen of the *delamerensis* form of *Tephrosia crepuscularia* from a tree-trunk alongside the Roman Road, and found the larvæ of *Triphosa dubitata* and *Scotosia rhamnata* common on buckthorn. The females of *Brenthis euphrosyne* were plentiful, and a few *Pararge megera* were seen. Probably the commonest species noted was *Venilia macularia*. The members were pleased to note that the felling of trees in the neighbourhood was by no means extensive. Tea at the Fort house was much enjoyed after the day's ramble, and most of those present descended the southern face of the hill to the new path recently opened through the luxuriant growth along the escarpment above the Mole, and thence to the station for London. Owing to the much regretted decease of my colleague, who had intended to report this meeting, I have nothing to add as to the Coleoptera and other orders.

Mr. W. J. Lucas has contributed the following notes: —

"Owing perhaps to the continuous fine weather flowers were a little disappointing. The hawthorn was well out and so were the strawberries; but the dominant flowers seemed to be the bugle (*Ajuga reptans*, Linn.), usually of a brilliant blue colour, though pink spikes were found occasionally, and in one place in Juniper Bottom there was a patch of plants of Forget-me-not; the Germander Speedwell (*Veronica chamædrys*, Linn.), the Deadly Nightshade (*Atropa belladonna*, Linn.), several times seen, and sometimes commencing to flower; the orchids, *Cephalanthera pallens*, Rich.,

and *Aceras anthropophora*, Br.; Rock-rose (*Helianthemum chamaecistus*, Mill.), commencing to flower; the Greater Celandine (*Chelidonium majus*, Linn.), and the wood Sanicle (*Sanicula europæa*, Linn.).

"Insects, however, were more in demand, and of these the following were noted:—

"*Orthoptera.*—A large female *Tetrix bipunctatus*, Linn., was taken—dark, with some whitish markings on the hind femora. A considerable number of *Forficula auricularia*, Linn., were obtained by sweeping or beating. They were chiefly females, but there were at least two males; no doubt all had hibernated. Of some the wing-tips bore a small pale spot, so distinctive a mark of var. *conspicua*, here. I saw one young nymph.

"*Ephemeroptera.*—Specimens of the large May-fly, *Ephemera danica*, Müll., were very numerous, their pale abdomens showing up conspicuously as they flew.

"*Odonata.*—Two specimens only were seen—*Agrion puella*, Linn., female, and *Enallagma cyathigerum*, Charp., female, the latter quite teneral. Both were taken in Juniper Bottom.

"*Neuroptera.*—Both sexes of the Alder-fly (*Sialis lutaria*, Linn.) were taken at the Mill Pond, Leatherhead, while we were waiting for the train conveying the rest of the party. The Snake-fly (*Raphidia maculicollis*, Steph.), male and female, were obtained by beating on Box Hill. One *Hemerobius orotypus*, Walleng., was captured, and two Hemerobiid cocoons were found on Box Hill; both produced imagines later. In each case the active pupa left the cocoon before disclosing the imago. One cocoon was elliptical in shape, about 5mm. long and 2·5mm. wide, and was constructed in the axil of a twig on a small branch of dead wood. The material was a very thin lace-work, within a still finer lace-like web. The pupa escaped from one end, and the imago was disclosed about June 6th. The species turned out to be *Hemerobius humuli*, Linn. The other cocoon, though made of a somewhat open lace-work of yellowish silk, was not so transparent as that of *H. humuli*. It was also elliptical, about 7mm. long and 3·5mm. wide, and was spun on a needle of a conifer, probably the Scotch-fir. The imago in this case appeared about June 8th, and promised to be our largest species of the genus—*Hemerobius concinnus*, Steph. The blue-green Lace-wing, *Chrysopa perla*, Linn., was taken, and the Scorpion-fly (*Panorpa germanica*, Linn.)—a male and a female, the latter being teneral.

"*Lepidoptera.*—Butterflies noticed were: Whites (species not

ascertained); *Gonepteryx rhamni*, Linn.; *Euchloë cardamines*, Linn. (many males, no females noticed for certain); *Brenthis euphrosyne*, Linn. (fairly numerous); *Cœnonympha pamphilus*, Linn.; *Celastrina argiolus*, Linn.; perhaps *Chrysophanus phlæas*, Linn.; *Callophrys rubi*, Linn.; *Hesperia malvæ*, Linn.; *Nisoniades tages*, Linn. One narrow-bordered Bee-hawk Moth (*Macroglossa bombyliformis*) was taken at Bugle flowers in Juniper Bottom."

JUNE 12th, 1919.

Mr. J. A. Humphreys, of Hampstead, was elected a member.

Mr. A. W. Mera exhibited a series of melanic *Hibernia defoliaria* with black females, from Epping Forest, bred in 1918-1919, from a melanic female taken in 1917; and living larvæ of *Tephrosia biundularia* ♂ crossed with *T. crepuscularia* ♀, with larvæ of *T. biundularia* for comparison.

Mr. W. West exhibited the rare beetles *Anthocomus terminatus* and *Georyssus pygmæus*, both from Wicken Fen; also a female *Megatoma undata*.

Mr. Ashdown exhibited *Mordellistena abdominalis* ♀, and several specimens of *Tetropium gabrieli*, all taken on the occasion of the Society's Field Meeting at Box Hill, on May 31st.

Mr. Tatchell exhibited several bred *Melitæa cinxia*, one specimen having the central area of the forewing quite destitute of markings, which were concentrated into two parallel transverse lines near the base, and two close to and parallel with the hind margin; also a very white *Papilio machaon*.

Mr. Gadge exhibited a large plant of *Solanum dulcamara*, the Woody Nightshade, grown in a pot in the open. Leaves pale green bordered with cream, or all golden, smaller than normal form. It had been grown in a pot for the last five years, and it flowers and fruits regularly. He also exhibited an abnormal form of a cabbage leaf in which there was an inverted cone about an inch in diameter, on a three to four inch stalk growing from the midrib of the leaf. Subsequently it was found to be a not infrequent occurrence.

Mr. Edwards exhibited, on behalf of Mr. Dods, a fasciated stem of asparagus from Christchurch.

Mr. Sperring exhibited a series of *Pararge ægeria* race *egerides*, from Peterborough, and pointed out the unusual development of a large blotch of colour in the usually vacant space in the marginal chain

of blotches a little below the apex. No one had seen this form before, and it was stated that no continental race had this peculiarity.

In the remarks on the season it was generally noted that the male of *Euchloë cardamines* was very abundant in the London District, but that few or no females had been observed. Mr. West, however, said the female was quite abundant at Wicken. The devastation of the oak by *Tortrix viridana* was everywhere very noticeable. *Callophrys rubi* had been very common this spring. Several members remarked that both *Brenthis euphrosyne* and *B. selene* were now gaining ground in outer London.

JUNE 21st, 1919.

FIELD MEETING—EFFINGHAM AND OCKHAM COMMON.

Conducted by (the late) W. J. Ashdown and Stanley Edwards.

This was also a whole day meeting. The weather was somewhat showery, and only about ten members were present. The morning party tried Hook Wood, near the station, but with little success. It was a somewhat early date for the *Bryophila perla*, which was taken. Tea was obtained quite reasonably at the "Hut" Hotel, Wisley. Mr. W. J. Lucas has supplied the following notes:—

"After Friday's rain the country was very fresh and pleasant, and, with the exception of one or two short showers in the morning, the weather was fine and rather bright. Some *Epinephele jurtina*, Linn., were on the wing, but butterflies were remarkably few; nor, except *Tortrix viridana*, Linn., were moths at all plentiful. Larvæ of *Gonepteryx rhamni*, Linn., were found of various ages, as well as the cocoons of the ichneumon *Anilasta placida*, which are parasites of them. Dragonflies, on the other hand, were numerous, those noted including at least—*Libellula quadrimaculata*, Linn., with a nice var. *præmubila*, Newm.; *Cordulia ænea*, Linn.; *Anax imperator*, Leach; one very teneral *Lestes sponsa*, Hans.; *Pyrrhosoma nymphæa*, Sulz.; *Apion pnelia*, Linn.; and *Enallagma cyathigerum*, Charp. Of the Nemoptera the two common scorpion-flies, *Panorpa communis*, Linn., and *P. germanica*, Linn., were taken. Amongst the Orthoptera a male *Chorthippus parallelus*, Zett., and a very small dark male *Tetrix bipunctatus*, Linn., were captured mature, while very young nymphs of *Meconema thalassinum*, De Geer, were beaten

by Mr. Carr from rhododendrons. Many grasshopper nymphs were jumping about on the ground. Contrary to what was the case at Box Hill, on May 31st, no earwigs seem to have been taken at all. Honeysuckle appeared to be the dominant flower. The white *Rosa arvensis*, Huds., was coming into bloom, while the Enchanter's Nightshade and the Gout-weed (*Ægopodium podagraria*, Linn.), were noticed in blossom. Some ripe strawberries were gathered. At the head of the smaller "Hut-pond" was a bed of Ragged Robin and Spotted Orchid, the blooms of the latter being some of the finest I have seen. *Calla palustris*, Wild., was abundant and luxuriant in one corner of Boldermere, but scarcely any blossoms could be seen."

JUNE 26th, 1919.

Exhibition of Living Objects of Natural History.

Mr. K. G. Blair exhibited living specimens of *Chrysomela distinguenda*, a beetle found with ova and young hairy larvæ on toadflax, on May 5th. On behalf of Mr. Campbell Smith he exhibited *Cetonia aurata*, taken in roses at Swallowfield, Berks, on June 22nd, and on behalf of Mr. G. Wright, *Lytta vesicatoria*, taken on June 16th, at Feltwell, Norfolk. He stated that the life-history of this last is somewhat similar to that of *Meloë*. The young larvæ burrow in the earth and seek the nests of bees, generally *Colletes*. They do not attack the larvæ and eggs first, but eat the pollen food.

Mr. Hugh Main exhibited the beetle *Necrophorus vespillo* and larvæ of the same just hatched. the ova were deposited by the female in the earth *below* a dead cat in a flowerpot full of earth about a week before, not in or on the carcass.

He also showed a batch of 24 ova deposited by *Melolontha vulgaris*. The female buried herself about six inches below the surface of the ground. The eggs were found separated from each other by loose earth in a small cavity in the hard soil.

Mr. W. J. Ashdown exhibited a living specimen of *Hylophila bicolorana*, found on oak in Surrey; also larvæ of *Diaphora mendica*, and a larva of *Drepana binaria* (*hamula*), both species from Surrey.

Mr. Barnett, on behalf of Mr. Coppeard, exhibited a living Viper (*Vipera berus*), from Lincolnshire.

He also showed larvæ of *Cerura furcula*, from Limpsfield, and a lizard (*Zootoca vivipara*).

Mr. Prisk exhibited a large specimen of the Slug, *Limax flavus*, from Ealing, and the spider *Epeira umbratica*.

Mr. Step exhibited larvæ of *Gonepteryx rhamni* from Wisley, and two cocoons of a Dipterous parasite of the species, and pointed out that the pupa of the parasite was enclosed by the skin of the *rhamni* larva.

Mr. Dennis reported from Llanberis that *Brenthis selene* was very abundant "*when* the sun shines," and that he had seen one each of *Argynnis cydippe* (*adippe*), *Callophrys rubi*, and *Cœnonympha pamphilus*. Of the moths *Odezia atrata* (*chærophyllata*) was very common flying in the sunshine, one *Plusia gamma*, one *Spilosoma lubricipeda* and sundry small Geometers were all he identified. Dragonflies were plentiful, and he noticed on more than one occasion a curious habit, in one large species, of clinging to the wet overhanging rocks, their wings being wet with the dripping water. The only beetle he had noticed was *Phyllopertha horticola* in abundance. Of Diptera, the "cleg" was much too obtrusive.

JULY 10*th*, 1919.

Mr. H. Moore exhibited a specimen of *Pyrameis atalanta* taken at Dunedin, Florida, U.S.A., lacking the end white spot of the submarginal series before the orange band of the forewing.

Mr. Sperring exhibited a short series of *Brenthis euphrosyne* from Lincolnshire, which were heavily suffused by the spots running together transversely. One male specimen had a square pale yellowish discal spot on the forewings.

He also showed a fine bred series of *Mimas tiliæ* from Blackheath, including ab. *centripuncta* (eight specimens), ab. *suffusa*, which he stated always had green forewings, one specimen left wing ab. *obsoleta* and right wing ab. *centripunctata*, the spot being minute, one asymmetrical in marking, and one asymmetrical in colour.

Mr. B. S. Williams exhibited a male example of *Pieris rapæ* with the apical blotch obsolete, and another male wanting the discal spot. He also showed a male of the spring brood exactly agreeing with a normal male of the second brood.

Mr. Humphreys exhibited living larvæ of *Lymantria dispar* from Holland, and the larva of the sawfly of the Solomon's Seal, *Phymatocera aterrima*, from Hampstead. He also showed an aberration of *Aglais urticæ* in which the orange coloration was quite suppressed,

it was bred from a found chrysalis; and a *Vanessa io* of a dull leaden greasy coloration.

Dr. Robertson exhibited the following species of New Forest *Eupithecia* taken or bred:—*E. valerianata*, *E. albipunctata*, *E. pimpinellata*, *E. venosata*, *E. jasioneata*, *E. togata*, and *E. irriguata*, with a fine series of *Cleora jubata* (*glabraria*), bred from New Forest larvæ, and pointed out a striking aberration in which the discal and costal markings were completely wanting. This example was bred from the aberrant larva exhibited at the meeting June 22nd, 1916, a larva that was practically devoid of light markings and appeared wholly black.

In the remarks on the season it was generally remarked that there was a scarcity of butterflies.

JULY 12th, 1919.

FIELD MEETING—CHALFONT.

Conductor, Mr. F. B. CARR.

On rising in the morning I found a steady refreshing rain falling with every appearance of continuing for some time, and I felt doubtful whether anyone but our indefatigable President would turn up at Marylebone for the early train. However, five of us went down by it, and arrived at Chalfont about 11. It continued to rain till mid-day, after which the weather was delightful, and Mrs. Robertson was able to take some good snap-shots of some of the party. Other members joined the party in the afternoon. The object of the visit was to take *Abraxas sylvata* (*ulmata*) and *Asthena blomeri*. The former was nearly over, but *blomeri* was abundant and in good condition, and everyone took a good series. A few *Pararge egeria* were taken, and *Mesoleuca albicillata* was fairly common on the tree trunks.

Larvæ taken were *Demas coryli* and *Ennomos quercinaria*. About five o'clock we started to walk through the woods to the oldfashioned village of Chenies, and thence through the pleasant lanes and fields to Chorley Wood, where we were sumptuously entertained by Mr. T. W. Hall, our late Hon. Treasurer, and Mrs. Hall, and thus ended a most enjoyable outing.

JULY 24th, 1919.

Mr. N. C. Preston of Fulham was elected a Member.

Mr. Sperring exhibited aberrations of the following species:—

1. *Brenthis euphrosyne.*—A remarkable assymetrical variety captured in Lincoln, June, 1919, in which the spots had coalesced and formed solid transverse lines.

2. *Pararge ægeria.*—Two underside varieties, bred April, 1919 (Peterborough), one with primrose markings and extended central blotch, similar to those exhibited on June 12th, and with cinereous ground colour, the other an exceedingly dark suffused specimen.

3. *Pararge megera.*—Two, captured Lincoln, June, 1919, with extra large ocelli.

4. *Smerinthus populi.*—An exceedingly dark unicolorous specimen, almost melanic, bred May, 1919, from Bradford, Yorks. Also a series bred, S.E. London, 1917-1918, covering a wide range of variation in coloration and banding.

Mr. W. West exhibited specimens of the beetle *Onthophagus taurus* from Malta and Gibraltar, with *Onthophagus nutans* from Epping Forest, and pointed out that the former had two frontal horns, the latter having only one. The *O. taurus* is very rare in this country, probably an introduced species.

Mr. Main exhibited living specimens of the glowworm from Delamere and the Isle of Wight, and pointed out that the former were only half the size of the latter. He also showed bred examples from the latter locality.

Mr. Ash exhibited a specimen of *Sirex gigas* taken in the Strand.

Mr. Carr exhibited the pupa cases of *Chattendenia w-album* on the undersides of the leaves of the Wych Elm, from Chalfont Road.

AUGUST 14th, 1919.

The death of a member, Lieut. F. H. Wolley-Dod, of enteric fever, at Charnak, in the Dardanelles, on July 24th, was announced.

Mr. Hy. J. Turner exhibited a series of *Epinephele jurtina* race *hispulla*, taken in May, on the plains of Catania, Sicily. All were much larger than the ordinary British forms. The males had from two to five intercellular spots on the underside of the hindwings, the third interspace being invariably vacant, and the second and fifth spots being always the more emphasised and the last to disappear.

The females were extremely rich in coloration both on the upper and undersides. The spots on the underside of the hindwings were only faintly present in two examples. The apical spot of the forewings was bipupillate in two uppersides and in three undersides. In one of the latter on that side only.

He also showed a long series of *Adscita geryon*, from the neighbourhood of Tring, where it had been exceedingly common this year.

Mr. K. G. Blair exhibited two specimens of a black aberration of *Cetonia aurata*, from St. Mary's, Scilly, where it had been met with on thrift, blackberry, wild carrot, etc. The males were noted as being very scarce, while the females were abundant. He was unaware of the species being recorded previously from Scilly.

Mr. A. W. Butcher exhibited *Adopæa flava* (*thaumas*), dark female, taken freshly emerged at Box Hill, August 18th, 1918 and *Aphantopus hyperantus*, undersides showing considerable variation in ground colour and spots. They were from Oxshott, Hythe, Clandon, Byfleet and Hayton Moss, and included ab. *arete* and intermediates. He remarked that in July last he had 41 pupæ of *Cosymbia* (*Ephyra*) *pendularia*. Thirty-five emerged, the remaining pupæ, which are alive, showed no signs of the moth developing, and will probably not do so until next spring. Also that of ten pupæ of *Tephrosia luridata*, three moths emerged last June, the remainder showing no signs of emergence, though they were ascertained to be alive. He had not heard of this species going over a second winter in pupa.

Mr. Bunnett exhibited specimens of *Acronicta leporina* and *Hylophila prasinana* (bred), from Chiselhurst.

In a discussion on the present season it was stated that *Noctuæ* were very scarce, that sugaring in the New Forest was a failure, and elsewhere had produced little result, that the quantity of honeydew was detrimental to larvæ, most of them dying of constipation, that cuckoo-spit was also a cause of death to larvæ. In many parts the white butterflies had been very scarce, and there had also been a scarcity of *Polyommatus icarus*. Mr. Buckstone stated that *Agriades coridon* had been extremely scarce ; no doubt the sharp frost, which occurred in early July, had been very destructive to insects ; by the end of July but few had emerged. Mr. B. S. Williams reported taking *A. coridon* in a salt-marsh among rushes, near Hengistbury Head, Hants.

AUGUST 25th, 1919.

The decease of a member, Mr. J. H. Leslie, of Tooting, was announced.

Mr. B. S. Williams exhibited several series of *Hibernia marginaria* (*progemmaria*), including type forms and the var. *fuscata* (from Finchley and St. Anne's-on-Sea), with intermediate forms of which one specimen had no transverse line on the hindwing.

Mr. Newman exhibited a fine bred specimen of ab. *walkeri* of *Spilosoma menthastri*, from Bexley.

Mr. Hy. J. Turner exhibited a long series of *Hydroecia crinanensis* received from Mr. T. Greer, Co. Tyrone, Ireland. They were captured at honeydew on thistles, *Cnicus palustris*, no *Iris pseudacorus* being found in the locality; none frequented the ragwort growing with the thistles. He also showed a fine pair of the ab. *addenda* of *Epinephele jurtina*, from the same place, where this aberration tends to form a local race in an old cut-out bog.

Mr. Ashdown exhibited the rare beetle, *Opilo mollis*; also *Gracilia minuta*, and stated that one of the specimens was the smallest Longicorn he had ever seen. All were from Surrey, 1919.

Mr. Sperring exhibited *Boarmia repandata*, five beautiful, soft grey specimens from Oyne, Scotland, July, 1919. *Agriades coridon*. —Two males (Cuxton, August, 1919) considerably suffused with black scaling and with extremely heavy dark margins. A male underside (Cuxton, August, 1919); forewings striated, hindwings near ab. *obsoleta*. *Aglais urticæ*.—Fifteen bred specimens from Paisley (July, 1919), showing much variation in depth of colouring and size of markings.

Mr. Johnston exhibited the following aberrations he had taken in the New Forest during a short holiday this season:—1. *Limenitis sibilla*, several specimens with the white markings of the upperside reduced to small irregular blotches, and in two specimens to mere traces, with undersides in which the markings were very divergent from the normal, with much suppression of the white markings. 2. *Dryas paphia*, showing irregular xanthic markings, others showing considerable coalescence and elongation of the usual markings on the upper surface.

Mr. Bennett exhibited a larva of *Acronicta leporina* feeding on oak, from West Wickham.

Mr. Edwards exhibited the following species of S. American Papilios:—*P. protodamas* (*hyperion*), from Brazil; *P. phaon* ab.

ulopos (Brazil), in which the white markings are represented by mere indications; *P philenor* ab. *acauda* (Mexico), in which the tails are wanting.

Mr. Newman reported that *Agriades coridon*, in its usual habitat on the Chiltern Hills, was this year practically extinct, and that although collectors in abundance had frequented the locality in recent seasons, he did not consider the scarcity was due to over-collecting. In his opinion this was due to the attacks of ichneumons, for out of a large number of larvæ of *A. coridon* collected in the spring more than 90% were attacked. His experience of Royston had been much the same; he scarcely saw 50 in the course of a mile. In some parts of the district, however, the species was more abundant than he had ever seen it; quite a hundred pairs could be counted at a time. He remarked that in Kent there had been an abnormal scarcity of *Polyommatus icarus* in both broods, whereas *Plebeius ægon*, which last year had been abnormally common, this year had been absolutely abundant; *Agriades thetis* was now abundant, but the earlier brood had been scarce; *Argynnis aglaia* was in great abundance. All the *Ruralidæ* (*Theclidæ*) had been abundant also, especially *Strymon pruni*. The sawfly of the "black" poplar, which last year had practically stripped his trees of leaves, was this year curiously conspicuous by its complete absence.

Mr. Barnett said that *P. icarus* had been very scarce in Surrey.

Mr. F. M. B. Carr reported that larvæ were very scarce this year.

Mr. Sperring's experience had been contrary to that of many members, he having met with hundreds of *Pieris* since the last meeting.

SEPTEMBER 6th, 1919.

FIELD MEETING—WIMBLEDON.

Conductor, Mr. E. STEP, F.L.S.

The route taken lay between Cæsar's Camp and Farm Bog to Warren Farm, thence through the woods to Beverley Plain, and by Stag Ride and Queensmere to Windmill Road.

Beating did not yield anything like so good results as on the previous visit, which was a month later in the year. Lists of captures have not yet come in, but the insects obtained included larvæ of *Smerinthus ocellatus* on sallow, *Dasychira pudibunda* and *Cabera pusaria*.

A few flowers were still in evidence, among them Purple Loosestrife (*Lythrum salicaria*), Sneezewort (*Achillea ptarmica*), Heather (*Calluna vulgaris*), and Devil's-bit Scabious (*Scabiosa succisa*). The early fungi noted were *Amanita virosa*, *Amanitopsis fulva*, *Psaliota campestris*, *Russula citrina*, *Psathyra clata*, and *Scleroderma verrucosum*.

Tea, to which thirteen sat down, was served at Bollings in the old village.

SEPTEMBER 11th, 1919.

Mr. F. W. Thorrington gave a lecture on "Variation in the British Ferns," and exhibited a large number of aberrant fronds. (See p. 13.)

Mr. W. J. Lucas exhibited drawings of the very local orchid, the Summer Ladies-tresses, and read the following note :—

"*Spiranthes æstivalis*, Rich., from the New Forest. There seems to be some 40 plants in the two localities I know (possibly there is one other). If the species has disappeared from Wyre Forest, and the numbers are decreasing in the New Forest (as appears to be the case), it seems clear that this orchid is on the highway to extinction as a British plant."

Mr. Hy. J. Turner exhibited a fine female specimen of the clear lemon-coloured aberration of *Colias edusa* known as ab. *helicina*, from Cyprus; also three bred specimens of the local and rare Noctuid *Glottula* (*Brithys*) *encaustus*, from Catania, in Sicily. His correspondent had written him as to finding a black larva covered with large white spots, feeding on a plant only growing in the seaside marshes a short distance north of Catania. From Spuler's book ("Schm. Eur.," vol. i., p. 166, and supp. pl. 3, fig. 3), the larva was suspected to be that of *Glottula pancratii*, a species attached to the liliaceous plant, *Pancratium maritimum*, which grows only on the shores of the Mediterranean and Red Seas, and down the E. African coast. In due course the larvæ pupated, and his correspondent forwarded the ten resulting pupæ. Their emergence was not expected until April or May of 1920, but strange to say on July 18th a specimen emerged not of the expected *G. pancratii*, but of the very rare *G. encaustus*. Two others emerged on the 21st and 24th respectively, both of the same species. Whether *G. encaustus* be only a constant local form of *G. pancratii* remains to be proved. It has only been taken in Sicily, Corsica, and the Italian Riviera. The

remaining pupæ are apparently going over. The species is not known to be double-brooded, and these three specimens are probably "precocious" individuals of the normal brood due in April and May next.

SEPTEMBER 25th, 1919.

Mr. H. J. Quilter, of Wood Green Road, was elected a member.

Exhibition of Lantern Slides.

Mr. Lucas exhibited slides showing the Yeast plant, the fungus of the holly leaf, species of the Myxomycetes, and various fungi found at Oxshott and in the New Forest.

Mr. Bunnett exhibited slides of the parasitic plants, *Orobanche* sps., and *Lathræa*; the henbane, *Bupleurum*, *Centaurea calcitrapa*, *Phyteuma spicata* (Coulsdon), and *Veronica spicata*.

Mr. Dennis exhibited slides of *Peltigera canina*, *Hymenophyllum unilaterale*, *Lycopodium selago*, and *L. clavatum*; *Veronica buxbaumii*, *Sedum anglicum*, etc.

Mr. Step, for Mr. W. H. Miles, exhibited the large Atlas Moth (*Attacus edwardsi*), from Arcuttipore, Cachar.

Mr. Turner exhibited several species of *Hesperiidæ* sent to him from Cordoba, in the Argentine, including *Hesperia americana*, together with specimens of *Colias lesbia* var. *heliceoides*, and *Meganostoma cæsonia*, the "dog-face" butterfly from the same place.

Mr. B. S. Williams exhibited a short series of *Boarmia repandata*, bred from wild larvæ taken at Finchley, showing strong melanic tendency, one male being exceptionally dark.

OCTOBER 9th, 1919.

Mr. J. R. Leeson, M.D., J.P., F.L.S., of Twickenham, was elected a member.

Mr. Cornish exhibited a weasel which had been found dead in an empty rabbit-hutch at Plumstead.

Mr. B. S. Curwen exhibited the following species of *Zygæna* from South Italy: *Z. rubicundus*, *Z. erythrus*, *Z. stœchadis*, with ab. *dubia*, and *Z. oxytropis*: two aberrations of *Z. filipendulæ* from Deal cocoons, one of which shows curious yellow scaling on the black

background, with the red spots run into splashes; a specimen of *Z. trifolii* ab. *minoides*, from Swinley Woods; and a cocoon of *Z. meliloti* from the New Forest.

Mr. H. Moore exhibited a beetle, *Monohammus tittilator*, taken in Rotherhithe, probably an immigrant from a ship in the Surrey Docks.

Mr. Hy. J. Turner exhibited a short series of the Nymphalid *Dione vanillæ* var. *maculosa*, the larva of which feeds upon various species of *Passiflora* in the Neotropical Region; the species ranges from the Southern States to Argentina; also the "skipper," *Calpodes ethlius*, a robust species occurring commonly over the same area; the larva feeds upon *Canna*: a pair of the large and beautiful moth, *Basilona imperialis*, whose caterpillar is one of the "horned devils." All three species were taken in the neighbourhood of Cordoba, Argentina.

The President read a Paper he had received from Mr. F. W. Frohawk, "The Migration of Birds." (See page 10.)

OCTOBER 23rd, 1919.

The President introduced the discussion on the "Variation shown in *Aglais urtica*," stating that in Seitz' "Gross-schm." at least 24 names of various forms are used, and that its area of distribution is very extensive, reaching Japan, where a most remarkable form known as *connexa* occurs, and India, where it is met with up to an elevation of 14,000 ft. He pointed out that Hübner, "Verz.," placed it in the genus *Eugonia*, but that, as pointed out by Scudder, "Sys. Revision Gen. of Am. Butt.," Dalman, "Vet. Ac. Hand.," xxxvii., 56, 64, had previously, 1818, established the genus *Aglais* for this species alone.

Mr. Hy. J. Turner then read the following:—

NOTES ON THE "VARIATION IN AGLAIS URTICÆ."

Placing an ordinary specimen of *Aglais urticæ* before us, what are the elementary features which are available for circumstances to work upon? and what are the lines which the variation takes? These appear to me to be (1) the ground colour, which may become darker or lighter; (2) the development of melanism, either by a general darkening of all the component colours of the coloration, or by an extension of the area of the darker markings; (3) joining up

of the spots and blotches, either along the costa or transversely to the wing; (4) reduction in size of spots and blotches; (5) absence of discal spots; (6) variation in size, colour, shape, and presence of marginal spots; (7) size; (8) shape.

Taking these groups in detail as thus outlined, I have made an attempt to fit in the various named forms, so far as I have been able to trace them. This, however, is somewhat of a difficulty, as time has not permitted me to trace the names to their original description, and the characteristic features of some of the forms in different authors do not agree.

Ground Colour.—The intensity of the orange red varies in depth and richness, and by the diminution of the yellow clouding to absence causes it to become more effective as a colour. ab. *discolor*, Heine, has ochreous yellow ground; ab. *herrmanni*, Herrm., has pale ochreous yellow ground; ab. *embryonalis*, Solow., has greyish yellow ground; ab. *consentanea*, Jachont., has a lighter greyish yellow ground; race *ichnusa*, Stgr., has a deep red ground; ab. *turcica*, Stgr., has a uniform bright red, as also has the dwarf *turcicoides*, Stgr.; ab. *salmonicolor*, Rayn., has a salmon-coloured ground; ab. *alba*, Rayn., has a white, or very pale ground.; ab. *ioformis*, Reuss, *io*-coloured; ab. *brunneo-violacea*, Rayn., brown-violet; ab. *clarirufa*, Rayn., bright rufous; ab. *fulva*, Rayn., reddish fulvous; ab. *ignea*, Rayn., fiery red; ab. *latericolor*, Rayn., brick-coloured; ab. *lutea*, Rayn., buff; ab. *rubrochrea*, Rayn., reddish-ochreous; ab. *obscura*, Rayn., dull, dusky red; ab. *polychlorides*, Rayn., colour of *polychloros*; ab. *testudinea*, Rayn., deep rich tortoishell.

Fore-wings.—Ab. *flavotessellata*, Rayn., pale yellow central area, extending from costa to inner margin; ab. *radiatata*, Rayn., with veins in central reddish area much blackened; ab. *strigata*, Rayn., with black horizontal streak between 2nd costal spot and inner marginal spot; ab. *caerulapicata*, Rayn., with pale chalky-blue apex; ab. *fulvomarginata*, Rayn., outer margins edged with fulvous; ab. *griseomarginata*, Rayn., outer margins edged with grey; ab. *fasciata*, Reuss, a light band across the wing.

Melanic Forms.—These may be produced either by a general darkening of the whole colour scheme, or by an increase of the area covered by the black markings. (1) Of the first: ab. *selysii*, Donck., has all markings dulled, no yellow tints, hindwing shaded black; ab. *infuscata*, Rayn., with all the dark markings much intensified. (2) Of the second: ab. *gruettii*, Corcelle; ab. *polaris*,

Stgr., has deeper, enlarged markings, partly united ; ab. *ladakensis*, Moore, is a mountain dark form from the Himalayas ; ab. *magnipuncta*, Rayn., enlarged discal spots ; ab. *magninotata*, Rayn., with large inner marginal spot; ab. *tripunctata*, Rayn., three discal spots.

Union of Spots.—These unions are either longitudinal along the costa, or transverse across the discal area. (1) Ab. *atrebatensis*, Bdv., has enlarged costal spots, 2nd and 3rd united ; ab. *nigricaria*, Hav., has enlarged costal spots, two outer united ; ab. *nigrita*, Fick., is similar, but more advanced, two discal spots and costal united ; ab. *conjuncta*, Neubg., has all three costal spots united ; ab. *osborni*, Donck., has two or three costal spots united and edged yellow ochre ; ab. *ichnusoides*, Selys., 2nd and 3rd united ; ab. *nigricostata*, with narrow black margin to costa. (2) Ab. *connexa*, Btlr., has the costal and inner marginal spots united by a wide black band : ab. *japonica*, Fisch., and ab. *jessoensis*, Weism., are similar ; ab. *polaris*, Stgr., has them partly united ; ab. *nubilata*, Rayn., has them with black, cloudy area between ; ab. *punctijuncta*, Rayn., two discal spots united.

Reduction of Spots.—This may be either in number or in size. Ab. *turcica*, Stgr., has the discal spots very small, or even absent ; ab. *turcicoides*, Stgr., is similar in this respect ; ab. *embryonalis*, Solow., has costal spots reduced ; ab. *consentanea*, Jachont., is similar in this respect ; ab. *parvipuncta*, Rayn., small spots ; ab. *unipuncta*, Rayn., one spot ; ab. *parvinotata*, Rayn., with small inner marginal spot ; ab. *nigridorsata*, Rayn., with black streak running from inner marginal spot to anal anal.

Absence of Discal Spots.—This takes place in ab. *ichnusa*, Stgr., ab. *selysii*, Donck. ; ab. *embryonalis*, Solow. ; ab. *atrebatensis*, Bdv. ; ab. *nigricaria*, Haw. ; and *ichnusoides*, Selys. ; ab. *ioprotoformis*, Reuss, has discal and inner marginal spots absent.

Marginal Spots.—Ab. *violescens*, Slev., has a violet sheen on the blue marginal lunules ; ab. *consentanea*, Jachont., has the blue spots enlarged ; ab. *bolandii*, Lamb., has the blue markings extended to streaks ; ab. *damenbergi*, Neubg., has straw-coloured marginal spots ; ab. *nixa*, Gr.-Gr., has the blue spots obsolescent, with a broad black margin ; ab. *atrebatensis*, Bdv., has the blue spots wanting ; ab. *nigricaria*, Hav., marginal blue spots completely absent ; ab. *parvilunulata*, Rayn., hindwing small black spots ; ab. *magnilunulata*, Rayn., hindwing large blue spots ; ab. *luna*, Reuss, ocalescence of blue crescents at anal angle to form a large blue

crescent; ab. *cuneatiguttata*, Rayn., with wedgeshaped blue lunules; ab. *ichnusa*, Stgr., ab. *caschmirensis*, Kill., and ab. *ladakensis*, are also devoid of blue spots, the latter yellow margins; ab. *chinensis*, Leach, and ab. *thibetana*, Aust., have these spots much enlarged; ab. *luteomarginata*, Lambl., has yellow margins, not black; ab. *parviguttata*, Rayn., with small lunules; ab. *maguiguttata*, Rayn., with large lunules.

Size.—Ab. *urticoides*, F. d. Wald. and ab. *pygmaea*, Heyne, are both dwarf; ab. *turcicoides*, Stgr., is a dwarf of ab. *turcica*, Stgr.; ab. *chinensis*, Leach, and ab. *thibetana*, Aust., are both large forms.

Shape.—Ab. *ladakensis*, Moore, a mountain form, is less angular.

Seasonal Forms.—Ab. *nixa*, Gr.-Gr., is a dry season form, with very dark undersides; ab. *rizana*, Moore, is a wet season form, with sharply defined markings.

The Mountain Forms.—Ab. *ladakensis*, Moore, and ab. *cashmirensis*, both with ill-defined markings.

Hindwings.—Ab. *nigricaria*, Hav., black, yellow marginal traces: ab. *nixa*, Grmm., broad outer margins; ab. *atrebatensis*, Bdv., entirely fuscous; ab. *osborni*, Donck., brown; ab. *adumbrata*, Rayn., black cloud at top of band; ab. *infraradiata*, Rayn., veins much blackened; ab, *angustibalteata*, Rayn., narrow band; ab. *latibalteata*, Rayn., wide band.

Underside.—Ab. *subtus-lactea*, Rayn., pale area creamy; ab. *subtus-rufa*, Rayn., pale area rufous; ab. *ichnusoides*, Rayn., more dusky than usual; ab. *dannenbergi*, Rayn., unicolorous black.

Less Frequent Forms, not Included in this Scheme.—(1) With the discal spots coalescent. (2) Smoky or greasy-looking forms, said to be produced by feeding on withered leaves. (3) With the hindwings blue-rayed. (4) Short band in hindwing. (5) With edges of the markings "woolly" in outline. (6) Dark chocolate suffusion over the ground. (7) Orange ground colour. (8) All colours subdued as if washed out.

Unique or Extremely Rare Aberrations.—(1) Outer half of forewings white. (2) Streaks on disc of forewing. (3) Uniform golden brown. (4) Broad black apex to forewing. (5) Forewings blue-rayed. (6) Black rays in hindwing ivm. (7) Red streaks on hindwing in place of band. (8) Black markings except on costa and apex of forewing nearly obsolete. (9) Buff rays on hindwings. (10) Suppression of black band, blue wedges surrounded by black rim only. (11) Twin discal spot removed to touch the margin. (12) Dark chocolate ground. (13) Various extraordinary forms

produced in the temperature experiments of Standfuss, Merrifield, and others.

References to Original Descriptions.—*Papilio urticæ*, L., "Sys. N.," x. ed., 477 (1758).—Var. *ichnusa*, Bon., "Mem. Ac. Tor.," p. 3, 2 (1824); ab. *ichnusoides*, Selys. L., "Cat. Lep. Belg.," 18 (1837); var. *caschmirensis*, Koll., "Hägl. Kaschm.," 442, pl. 9, 3-4 (1848); var. *urticoides*, F. de W., "Ent. Imp. Ross.," v., 123 (1851); var. *turcica*, Stgr., "Cat.," ii. ed., 16 (1871); var. *polaris*, Stgr., "Cat.," ii., 16 (1871); ab. *gruetii*, Corcelle., "Feuille. jeun. Nat.," ii., 99 (1871); var. *rizana*, Moore, "Proc. Zool. S.," 559 (1872); ab. *atrebatensis*, Bdv., "Rev. and Mg. Zool.," 409, pl. 17, 1 (1873); var. *ladakensis*, Moore, "Ann. and Mag. N.H." (5), i., 227, (1878); ab. *selysi*, Donck., "Feuille jn. Nat., xi., 33 (1880); ab. *osborni*, Donck., "Feuille. jeun. Nat.," xi., 33 (1880); var. *connexa*, Btlr., "Proc. Zool. S.," 851 (1881); ab. *nixa*, Gr. Gr., "Mem. Rom.," iv., 426 (1890); var. *urticoides*, Alph., "Iris.," vii., 303 (1892); var. *chinensis*, Leech., "Butt. Chin.," 258, pl. 25, 1 (1892); ab. *discolor*, Heyne., "Ins. Börse.," xi., 131 (1894); ab. *herrmanni*, Herrm.; ab. *pygmæa*, Heyne. (Ruhl), 778 (1895); ab. *pallida*, Mosley, "Nat. Jrn.," Sup., p. 14 (1896); var. *thibetana*, Aust., "Natur.," 201 (1898); var. *turcicoides*, Stgr., "Cat.," iii. ed., 25 (1901); ab. *violescens*, Slev., "Hor. Ross.," xxxiv., 530 (1901); var. *japonica*, Fisch., "Berl. ent. Z.," S.-B., 6 (1902); var. *jessoensis*, Weism.; ab. *fentoni*; ab. *nigricaria*, Hav., "Ann. Soc. Ent. Belg.," xlviii., 186 (1904); ab. *nigrita*, Fick; ab. *dannenbergi*, Neuberg., "Soc. Ent.," xix., 170 (1904); ab. *conjuncta*, Neuberg., "Soc. Ent.," xix. 170 (1904); ab. *embryonalis*, Solowjew., "Hor. Ross.," xxxviii., 143 (1905); ab. *salmonicolor*, Rayn., "Ent. Rec.," 298 (1906); ab. *consentanea*, Jachontow., "Rev. Russ. d'Ent.," vi., 10 (1906); ab. *luteomarginata*, Lambln., "Rev. Men. Namur.," p. 47 (1906); ab. *caerulapicata*, Rayn., "Ent. Rec.," p. 298 (1906); ab. *bolandii*, Lamb., "Rev. Mens. Namur.," vii., 42 (1907); ab. *alba*, Rayn., "Ent Rec.," 7 (1909); ab. *lunu*, Reuss, "Ent. Rec.," p. 211 (1909).

The following two papers in the "Ent. Rec" are useful as summarising much of the variation:—Raynor, vol. xxi., p. 7, etc.; Reuss, vol. xxi. p. 83., etc.

Mr. Sperring exhibited a large number of *Aglais urticæ*, and read the following notes:

"The insects which I am exhibiting were mainly bred from larvæ collected in a number of localities, *i.e.*, S.E. London, Cambridge, Essex, Lincoln, Tyrone, Inverness, Kincardine, Paisley

and Arran, and show a very considerable difference in coloration.

In the first place, I would like to call attention to the manner in which this insect will vary, even from the same locality. The first two columns of insects shown from S.E. London were bred from larvæ taken from the same spot in the years 1912 and 1917. There is not only an entire difference in coloration, but also in the shape of the wings; those of the 1917 series are perfectly normal, but the 1912 specimens are much more elongate. In one case you have the insect with a red brick coloration, in the other it is strongly suffused with yellow.

The specimens from Cambridge follow very closely the S.E. London specimens, as likewise do those from Essex, the climatic conditions at these distances apart not being of sufficient variation to affect the insects.

The Lincoln specimens call for no particular comment. The series is not sufficiently long to enable one to say much about them, more particularly as they are captured specimens, and the ground colour is likely to have been somewhat affected.

The series of Irish specimens from Tyrone are best looked at in comparison with those from Scotland. They are of a richer coloration, and the first specimen is very similar to the first specimen from Scotland, inclining more to the salmon yellow ground.

The richest coloration is undoubtedly found in the Scottish specimens, which at the same time are much darker, doubtless due to the colder climatic conditions and moisture.

You will note how closely the specimens from Kincardine and Paisley follow in ground colour the salmon-yellow of the specimens from Inverness, which were taken by our late member, Mr. McArthur.

Referring to the underside of the insect, I show three series of these, *i.e.*, from S.E. London, from Arran, and from Paisley respectively.

All the specimens from S.E. London are exclusively light, with a greater or lesser amount of cream ground colour in the hind-wings, between the basal patch and the outer margin.

Specimens from Arran are perfectly uniform in regard to the space referred to, showing no cream ground whatsoever, the whole space being filled up with light chocolate colour.

The Paisley specimens, again, are entirely dissimilar, showing extremely black scaling (several cases are of the variety *polaris*),

but varying in regard to the marginal band to a considerable extent.

One would have expected that inasmuch as Arran and Paisley are so nearly in the same latitude, that specimens from the two localities in question would have been practically identical. Such, however, is not the case.

Apart from variation due to climatic conditions, *i.e.*, Scotch, as compared, for instance, with southern specimens, etc., there is also another phase to be considered, *i.e.*, recurrent variations which crop up, no matter from what locality the insects are obtained, such as, for instance, ab. *salmonicolor*, of distinct pink coloration, and various ab. *discolor*, *i.e.*, dark ochreous yellow.

Apart from these, the insect runs through a whole gamut of coloration, from white to deep rich tortoiseshell, represented by ab. *alba* at one end and ab. *testudinea* at the other. The latter form appears to be more commonly found amongst the Scottish specimens than in the south.

I would like to refer particularly to variety *ichnusa*. While this does occasionally occur from insects bred under normal conditions from wild larvæ, it appears to be, like ab. *ichnusoides*, largely the result of temperature experiments. As showing what can be done in the latter direction, it is on record by T. Reuss that in experimenting with some 100 larvæ from two wild broods, he obtained 65 aberrations, of which 39 are amongst those named by Raynor, as mentioned previously, and which were largely the result of exposing the pupæ to the direct and intensified sun's rays.

As showing to what a considerable extent heat will affect this insect (prior to emergence), I was examining some specimens in the Bond collection this week, in which there were two short series of *urticæ* from the same brood, one lot showing emergence before a thunderstorm and the other after it. One takes it that this difference in coloration, *i.e.*, one series being considerably lighter in colour than the other, would be due to the considerable difference in the temperature in the period before and after the thunderstorm in question.

Chemical Action.—On September 13th, 1917, I exhibited a specimen of this insect suffused with a dull plum colour. This specimen was given me as having been taken wild of the particular coloration in question, and at that time I had no doubt as to its *bonâ-fides*. At a later date, however, I had an opportunity of examining a very considerable collection of *Vanessa urticæ*, taken

at the same time, which showed a most remarkable variety of coloration, and elicited the fact that they had been killed with lump ammonia, and that some of the insects had remained in the killing chamber for varying periods. As a result, I have endeavoured to obtain the same coloration, in which I have been successful. The original specimen exhibited is marked "A," and underneath it you will see three more specimens which have been subjected to pure ammonia by removing the pins and letting the insects float on the ammonia without the wings coming into contact with the liquid.

I thought that it might also be of interest to ascertain what is the result of prolonged exposure to cyanide of potassium ; and now show some ten specimens in exhibit marked "B," which have been placed in cyanide for thirty-one days. Except where the wings were pushed into the damp mixture of plaster and cyanide, there is no extreme change of coloration, only a slight dimming of the same."

Mr. A. W. Mera exhibited a bred series of *A. urticæ* from various English and Scotch counties, those from Eastbourne being somewhat lighter, otherwise there were no striking aberrations, except in the undersides, which showed a wide range of coloration.

Mr. B. S. Curwen exhibited three ab. *polaris* from Bossekop, a dark dwarf from Dover, two showing the discal spots on a cream ground from Colchester ; three *ichnusa* forms from Colchester and Dover, one brown specimen bred from Newport, one suffused underside from Swinley Woods, etc.

Messrs. Tonge, C. H. Williams, Barnett, and Nicholson also exhibited various forms, races, and aberrations of this species.

Mr. R. Adkin exhibited long series from many parts of Great Britain and Ireland, including examples of many of the forms referred to by Messrs. Turner and Sperring, and one from Coventry with pale straw ground colour. He agreed in the main with the latter gentleman's remarks as to the generally richer ground colour of the Scotch as compared with the South English examples.

Mr. H. B. Williams exhibited *Aglais urticæ* : four specimens of a pale ground colour, part of a brood bred from Haslemere larvæ in 1915 ; four specimens with 2nd costal blotch extended to a point reaching the 3rd blotch, part of a brood from Norwich bred in 1913 ; four specimens from Warminster, Salisbury Plain, 1917, including ab. *ichnusa* and a specimen with traces of a dark band across the forewings involving the twin spots ; ab. *parvinotata*, Rayn., from Finchley ; two specimens from the "Webb" coll., one having

no "twin spots," but dark hindwings and very large cuneate blue lunules on all wings; ab. *cuneatiguttata*, Rayn., from Chalfont, 1912; ab. *atrebatensis* (crippled), from Holmwood, 1907; ab. *nigridorsata*, Rayn.; and six specimens from N. Ireland, 1918, in one of which the yellow markings are largely replaced by the ground colour. Also photographs of the life history.

Mr. Bunnett exhibited a photograph of the chrysalis of *A. urticæ* just previous to the act of attaching itself to the silken pad, after withdrawal from the larval skin, which was still being held by a fold of the pupal integuments.

Mr. Riches exhibited a form from Aberdeen which was so strongly marked a *polaris* form as to be practically the Japaese *connexa* form; a very light red-ochreous form of ab. *parvipuncta*, bred in a hothouse; and two series bred in hothouse conditions, one near Eastbourne, where the whole brood was uniform in ground colour and dark, the other near London, where the whole brood was markedly variegated with more light areas.

Mr. Kaye exhibited several pathological specimens.

Mr. B. H. Curwen exhibited a specimen of *Sirex gigas*, found on a lady's skirt, much to her alarm, in Twickenham, in July last.

Mr. B. S. Williams exhibited a series of *Charæas graminis*, from Finchley, 1919, showing ground colour grey, dark grey, rufous, light grey, and an aberration in which the longitudinal markings were coalesced into one pale streak.

Mr. Tonge exhibited a series of *Oporabia autumnaria*, from Preston and Langridge Fell, including a strongly melanic specimen.

Mr. Frohawk exhibited a living larva of *Nonagria typhæ* which was still small, although it had been feeding fourteen months. From the New Forest, this year, he exhibited a series of aberrant *Limenitis sibilla*: (1) the first step towards ab. *nigrina*, (2) a more suffused specimen, (3 and 4) still further obliteration, and (5) complete ab. *nigrina*, (6) ab. *nigrina*, underside asymmetrical, left wing with a plain band, right wing with the band nearly obliterated; *Dryas paphia* with hindwing partly radiated with several elongated and united spots in both male and female, and two specimens with much suffusion of both fore- and hindwings from the enlargement of and union of some of the black spots; and *Argynnis cydippe* (*adippe*), a series showing gradation in the extension of the spotting, and one with only three spots in the submarginal row of the hindwing.

The decease of Mr. W. J. Ashdown (1895), a member of the Council, was announced.

On behalf of the Rev. C. R. N. Burrows, the Secretary presented a series of larval cases of various species of British Psychides.

Series of *Noctua xanthographa* were exhibited by Messrs. R. Adkin, A. E. Tonge, B. S. Williams, Hy. J. Turner, etc., and a discussion took place after the following summary of the variation had been submitted by the last named.

Mr. Hy. J. Turner exhibited short series of *Noctua xanthographa*, from Brockley, Shirley, Strood, Scotland, etc., and gave a list of the named forms with short diagnoses, as follows :—

Noctua xanthographa, Schiff., "Verz.," 83 (1776), dark greyish fusus = *tetragona*, Haw., "Lep. Brit.," 205 (1809); ab. *budensis*, Frr., "Neu. Beitr.," pl. 232 (1839), very aberrant and confused markings; var. *cohæsa*, H.-S., "Sys. Bearb.," ii., 209, figs. 95-7 (1845), pale grey; var. *elutior*, Alph., "Rom. Mem.," v., 129, pl. 6, 3 (1889), larger, forewing cinnamon or yellow-grey; var. *rufescens*, Tutt, "Br. Noct.," ii., 126 (1892), pale reddish-grey or pale reddish; var. *rufa*, Tutt, l.c., bright red; ab. *obsoleta-rufa*, Tutt, l.c., markings obsolete; var. *obscura*, Tutt, l.c., dark reddish-black; ab. *obsoleta-obscura*, Tutt, l.c., markings obsolete; var. *nigra*, Tutt, l.c., blackish-grey; ab. *obsoleta-nigra*, Tutt, l.c., markings obsolete; var. *palæstinensis*, Kalschb., "Iris.," x., 168 (1897), paler, all markings on the hindwing more distinct.

He then noted that Guenée stated ("Noctuelles," v., 337) with regard to the variation that "all the varieties are linked together, and are not able to be separated into races." The characters which were available for the action of variation seemed to be the ground, the stigmata, the transverse markings, and the scale textures. The ground is either grey, brown, red, or nearly black with all intermediate shades and combinations. The stigmata were either distinct, obscured or obsolescent, one or both. The transverse lines were also distinct, obscured or obsolescent, including the submarginal dots. The texture of the scaling was said to be coarse in one or two continental races. The space between the stigmata was sometimes emphasised in distinctive coloration.

Mr. R. Adkin's long series contained many local sets, including very dark from northern areas, Scotland, etc., some very red forms, and representatives from the Scilly and Scottish Islands. It was noted that some specimens had much emphasised venation.

Mr. Tonge on one occasion, at Deal, counted over seventy *N. xanthographa* on one sugar patch, in company with a solitary *Leucania albipuncta*, and stated that larvæ that he had had fed on from April to June.

Mr. Newman said that his larvæ had all gone down by February.

Mr. Curwen remarked on the extremely large numbers he had met with on sugar at Merton on one occasion. There were quite 80 or 90 on each of some 30 trees sugared, and nothing else.

Mr. Newman exhibited a large example of *Cirrhædia xerampelina*, from Sligo, having a very dark band; and males of *Ennomos angularia*, from Regent's Park, with much contrast between the darker outer marginal area and the lighter transverse band.

Mr. Bunnett exhibited the egg-cocoons of the spider *Agræca brunnea*, both freshly made and as subsequently daubed with mud.

Mr. Hy. J. Turner exhibited the larval cases of the following species of the Psychides which the Rev. C. R. N. Burrows was presenting to the Society.

Narycia monilifera, Mucking; *Diplodoma herminata*, Wellington; 3 sps. of *Solenobia*, Mucking, Barnes Common, and Wellington; *Solenobia lichenella* (?), Wellington; *Solenobia triquetrella* (?), Mucking, 4 joints to tarsi; *S. triquetrella* (?), Mucking, 5 joints to tarsi; *Solenobia* sp. ?, Rannoch; *Taleporia tubulosa*, Wellington; *Luffia lapidella*, Guernsey; *L. ferchaultella*, Mucking; *Fumea casta* ?, Mucking; and *Epichnopterix pulla*, Mucking; and stated that very little was known of this family, some species, so called, may be several such as *F. casta*, *S. triquetrella*, etc., of some no males were known, of others, although their habitats were quite different, yet so far no points of distinction had been made out. It was thought that the forelegs might offer some characters which would be available for differentiating the species.

NOVEMBER 29th, 1919.

ANNUAL EXHIBITION OF VARIETIES.

Mr. S. G. Castle Russell exhibited the following aberrations of British Lepidoptera:—

Dryas paphia.—New Forest. Rayed and suffused females and rayed male; a series of var. *valesina* forms, including an intermediate between typical *paphia* and *valesina*, an exceptionally well marked underside, the silver marking being accentuated, and an almost completely

spotless black form, the underside being of black, green, and silver colouring; bleached forms of *D. paphia*, including a rare type with three-quarters of the upper wings white; a female with patches of *valesina* colouring on the hindwings; an underside in which the ordinary green shade is partly replaced by bright blue; and another from which the green coloration is entirely absent.

Limenitis sibilla.—Underside of the black form, ab. *nigrina*.

Euchloë cardamines.—A yellow tipped specimen, Hants.

Leptosia sinapis.—With all the black coloration replaced by light brown, Hereford.

Brenthis euphrosyne.—Nine aberrations, including a cream coloured and a rayed example.

B. selene.—Four aberrations, including a rayed underside, Sussex and Hants.

Cœnonympha pamphilus.—Four light coloured examples, Hants and Surrey.

Aphantopus hyperantus.—From Hants, etc. Twenty-five male and female examples of ab. *lanceolata*, also very large spotted and other aberrations, including a rare form in which the spots on the upper wings are reversed in size to the usual formation, the first spot being the smallest.

C. tiphon.—Thirty-eight aberrations from Scotland, Wales, Cheshire, and Shropshire, including pale specimens, extra large spotted, and nine examples of ab. *lanceolata*.

Celastrina argiolus.—A series of six colour aberrations, including a perfect gynandromorph taken at Bury St. Edmunds.

Agriades coridon.—Six aberrations, including *striata* and *obsoleta* undersides, a very light female with one hindwing shot with blue, two forms of ab. *syngrapha* showing extreme colour variations, and a perfect gynandromorph from Blandford.

Plebeius ægon.—From Surrey, Hants, Cheshire, and Lancs. Eighty aberrations, including various shades of blue males and females, *striata* and *obsoleta*, and other undersides, and several heavily marked red and yellow margined females. Also forty gynandromorphs, each with one wing shot with blue male coloration, several being almost completely blue, but undersides in all cases being female in form. In each instance the wing with male coloration is considerably smaller than the wing entirely of female coloration.

The whole of the insects exhibited, with the exception of the gynandromorph of *C. argiolus*, were taken or bred by the exhibitor or his wife during the last two or three seasons.

Mr. Frohawk called attention to a few of the most noteworthy specimens in this exhibit, including the aberrations of *D. paphia*; (1) the specimen with the basal half white, which he thought was unique; (2) the extremely rare, if not unique, intermediate between typical form and ab. *valesina*; and (3) the black *valesina*, which was the blackest he had ever seen.

Mr. T. H. Grosvenor exhibited male and female *Attacus edwardsi*, from the Khasia Hills, and a large number of Scorpions taken by himself in Bangalore, on the Afghan Border, Waziristan, the Punjaub, the N.W. Frontier Provinces, and the Murree Hills.

Mr. B. S. Williams exhibited a series of *Lomaspilis marginata*, from Finchley, showing a good range of variations, including one with white fringes and another with yellowish-cream ground colour.

Mr. E. E. Green exhibited the Japanese Swallow-tail (*Papilio bianor*), caught in his garden at Camberley, on September 17th last. Many of these fine butterflies have been seen in the neighbourhood, resulting from the breeding experiments of Mr. Cecil Floorsheim at Bagshot. It seems possible that they may become established in this country, to a certain extent. Mr. Green has been informed by Messrs. Waterer and Sons, of Bagshot, that the larvæ have been found on *Skimmia* bushes in their nursery gardens.

A series of *Parascotia* (*Boletobia*) *fuliginaria*, a rare Hypenid, caught at light, in Mr. Green's house at Camberley. The larvæ are said to feed upon certain fungus growths in cellars and old wooden buildings. Though extremely scarce in the British Isles, the species is widely distributed in Europe.

Agrotis (?) *saucia* var. *margaritosa*, taken at sugar, at Camberley, with the apex of the forewings markedly rounded.

Typical *Luperina testacea*, from Camberley, with a smaller, more unicolorous form from the south of Scotland.

A form of *Himera pennaria*, with orange veins on the forewings, and the area between them covered with plumbeous scales.

The Rhododendron Tingid (*Stephanitis rhododendri*), an introduced pest of Rhododendrons. Its presence may be detected by a rusty-brown tinge on the upper surface of the leaves. The insects rest and feed on the undersurface.

Four examples of *Corizus maculatus*, beaten from birch. The species described by Saunders ("Hemipt. Heteropt. of the British Islands," p. 57) as "very rare."

Mr. Green also showed a convenient contrivance for covering

circular breeding-cages—such as glass cylinders or flower pots. The cover consists of an iron ring with muslin or netting stretched over it and sewn in place. The weight of the ring—which should be larger than the cylinder for which it is intended—keeps the cover firmly in place and ensures a close fit. Lead piping, bent to shape, may be substituted for the iron ring.

Mr. A. E. Tonge exhibited an aberration of *Amorpha populi*, bred from Reigate ova in June, 1919. It was almost entirely devoid of markings, the wings being plain greyish all over, and the usual red blotch was reduced to a very small area. He also showed the very rare Noctuid *Cloantha polyodon* (*perspicillaris*), taken on palings at Worthing, May 15th, 1919.

Mr. Leonard Tatchell exhibited two aberrant forms of *Arctia caja*, bred from fullgrown larvæ collected near Bedford, one showing great encroachment of the dark on to the light in forewings, with confluent spots, and the red tone replaced with pinkish-orange in hindwings. The other was a remarkable melanic specimen with almost all traces of the cream ground colour obliterated in fore-

wings; spots of smoky hue coalesced and much extended, and showing a slight amount of red underneath in hindwings; body segments distinctly darker.

Mr. Robert Adkin exhibited series of the British species of the *Nolidæ*, including *Nola centonalis*, from Deal, both captured and bred specimens, the latter being considerably the larger; the variation in the whole series ranging from a pure white insect to dark, heavily banded forms, and in one specimen the central fascia is much constricted on the inner margin. *N. albulalis*, from both its Kent and Surrey localities, the latter producing several very white specimens, in which the usual dark central cloud is reduced to a narrow stripe. Also *N. cucullatella*, *N. strigula*, and *N. confusalis* from various localities.

He also exhibited species of *Nycteolidæ*, including *Sarrothripus revayana* (*undulanus*), chiefly from the New Forest, including many well-marked forms; *Earias chlorana*, from Eastbourne, where some years ago it was very common, and from Wicken; *Hylophila bicolorana* and *H. prasinana*, the latter series including a second brood specimen in which only the two inner of the three transverse lines appeared, and these much less strongly marked than in the normal form.

Mr. L. A. Box exhibited a few specimens of Chalcids, in the hope that a little interest may some day be aroused in this fascinating family. These included *Smicra sispes*, a parasite of *Stratiomys*; *Perilampus italicus* and *P. nigricornis*, external parasites of Tachinid and Ichneumonid parasites of various moths, and having an active initial larval state, like *Meloë*; *Caratomus megacephalus*; *Monodontomerus nitidus*, a parasite of *Anthophora* bees; *Torymus bedeguaris*, the common parasite of *Rhodites rosæ*, which causes the bedeguar gall; *Orymus punctiger*, parasite of *Aulax papaveris*, which galls poppy heads; *Syntomaspis littoralis*, the common parasite of *Teras terminalis*, which causes the oak apple.

Mr. C. W. Sperring exhibited asymmetrical *Brenthis euphrosyne*, from Lincs. *Pararge ægeria*, var., from Peterborough. *Agriades coridon*, underside var. from Cuxton, Kent, with forewings striated; hindwings, near *obsoleta*. *Plebeius ægon*, male of brilliant blue; and an underside male var. with outer margin of forewings heavily clouded, the orange lunules of hindwings greatly enlarged, and the whole of the underside black spotting greatly reduced; both taken at Oxshott, July, 1919.

Mr. Percy M. Bright exhibited (1) *Brenthis euphrosyne* aberrations,

including many extreme melanic and several silvery forms; (2) *B. selene* aberrations, including a superb black variety; (3) *Chrysophanus dispar*, including one with a partly xanthic right forewing; and (4) *Rumicia phlæas*, with many remarkable aberrations, including the very rare ab. *alba*.

Mr. K. G. Blair exhibited the black form ab. *nigra* of *Cetonia aurata*, the rosechafer, from Scilly. Though not uncommon on the continent (Corsica, Tuscany, Armenia, etc.) this form does not seem to have been detected hitherto in Britain. ("Ent. Mo. Mag.," September, 1919.)

Mr. H. A. Leeds exhibited aberrations of British Lepidoptera, all captured during 1919, and including *Aphantopus hyperantus*. 1. Very dark with strong silky sheen; ocelli on hindwings only, and indistinct, one on left and two on right side. ♂ upperside. 2. Paler than type, some spots elongated. ♀ underside. 3. Bright brown ground, black rings of ocellated spots narrow. ♀ underside. All Chiltern Hills, July.

Epinephele jurtina (*ianira*). 1. Fulvous patch on forewings similar to female, black spot large but without white centre on each forewing. ♂ upperside. Monks Wood, Hunts, July 7th. 2. Somewhat paler ground, and speckled with small darker dots on forewings. ♀ upperside. Chiltern Hills, July 20th.

Hesperia malvæ. Dark ground enhancing white markings. ♀ underside. Monks Wood, Hunts, May 18th.

Cœnonympha pamphilus. Very pale and much suffused with straw colour. ♂ upperside. Chiltern Hills, August 4th.

Polyommatus icarus. Silky suffused silver-grey ground colour, lunules of all wings golden olive-green instead of orange. ♂ underside. Monks Wood, Hunts, June 7th.

Aricia medon (*astrarche*). Small and deep black-brown colour = ab. *alpina*, and white circled black spot within centre of border, and touching orange lunules on the left forewing. ♂ upperside. Herts, September 4th.

Agriades coridon from the Chiltern Hills, including ab. *fowleri*, ab. *obsoleta*, and many other interesting forms.

Strymon pruni. 1. Band and ground colour paler and appearance very smooth. ♂ underside. 2. Very dark brown ground with bright red band. ♂ underside. 3. Fulvous patches united and crossing all wings divided only by nervures = ab. *ptorsas*. ♀ upperside. All Monks Wood, Hunts, June last.

Mr. R. South exhibited the following aberrations of British Lepidoptera:—

Brenthis selene, New Forest, June 1919. Male with lower marks of forewing confluent; female with central third thinly powdered with black. *Cœnonympha pamphilus*. a. Forewings with pale splashes between veins, Middlesex. b. Underside of hindwings unusually pale, Surrey. c. Forewings with pale splashes between veins, Surrey. d. Underside of hindwing unusually dark, Essex. e. Forewings pale clouds above dorsum and tornus, Surrey. *Cacœcia* (*Tortrix*) *cratægana*, with silvery-grey ground colour, Hants. *C.* (*T.*) *xylosteana*, a dark suffused form, Hants.

Captain B. S. Curwen exhibited a collection of Zygænids, made by Signor Querci, chiefly in Italy, including *Zygæna erythrus*, *Z. rubicundus*, *Z. punctum*, *Z. achilleæ*, *Z. stoechadis*, *Z. transalpina*, *Z. ephialtes*, *Z. loniceræ*, *Z. oxytropis*, and *Z. carniolica*. There were varietal and intermediate forms and local races of considerable interest.

Mr. Clifford Craufurd exhibited two *Limenitis sibilla* ab. *semi-nigrina*, and a male aberration of *Dryas paphia*, from New Forest, July 11th, 1919.

Mr. W. Bateson exhibited drawings of flowers borne by plants produced as root-cuttings, which differed from those of the parent plants from which they had been raised. The first case, a *Bouvardia*, was published in "Jour. Genetics," vi., and subsequently two examples in *Pelargonium* had been found. These occurrences can be interpreted as showing that the parent plants are really composed of an outer periclinal layer of one variety covering over an inner core of a different variety. In illustration a wholly green plant of *Hoya carnosa* was shown still attached to the petiole of a white-skinned variegated leaf from which it had been raised. Whether formed on roots, petioles, or elsewhere, an adventitious bud may thus bring up to the surface the characters borne by the inner core of the plant. It was remarkable that of the few plants which had as yet been tested successfully, three should have given root-cuttings unlike the parent plants.

Mr. H. Moore exhibited the various forms of *Danais chrysippus*, Lin., and *Hypolimnas misippus*, Lin., and contributed the following notes:—

"The association of these two species is well known to every entomologist, but perhaps there may be others here to whom an explanation would be acceptable. *D. chrysippus* is considered the commonest butterfly in the world: the sexes are alike, tawny to deep reddish-brown, with black tips to the forewings, crossed by a

row of white spots. It is distasteful, and birds and lizards do not eat it. It is found throughout the greater part of Asia and Africa.

"*H. misippus*, male, is black with large white spots, and totally unlike its mate, which very closely resembles *D. chrysippus* in colour and markings, and in whose company it usually flies. Being edible *H. misippus* thereby escapes its natural enemies. The male, being a fast flier, can take care of itself. Its range is more extensive than *D. chrysippus*, and includes America—but only in its type forms.

"Elsewhere both species, *D. chrysippus*, males and females, and *H. misippus* females vary along parallel lines, (1) the black tips with white spots disappear and produce the *dorippus* form of *chrysippus*, and the *inaria* form of *misippus*. (2) The hindwings become white and produce the *alcippus* form of *chrysippus* and the *alcippoides* form of *misippus*. Intermediate forms also occur.

"Of course, to complete the theory of protective resemblance the several forms of each should accompany one another; generally speaking this does not appear to happen. In a large collection from W. Africa (Ashanti), where all the *chrysippus* were of the *alcippus* form, the few females of *misippus* were all typical, while the only specimen I have of the *alcippoides* form of *misippus* was found in a collection from E. Africa (Nairobi), where all the *chrysippus* were of the *dorippus* form.

"The *inaria* form of *misippus* I show are (1) from N. Nigeria, where the form of *chrysippus* was *alcippus*, and (2) from S. Africa, where *chrysippus* is usually darker in colouring than anywhere else."

Mr. A. W. Mera exhibited (1) a short series *Tephrosia crepuscularia*, bred during March and April, 1919, from a female taken at Cranley Down, Essex, July 6th, 1918.

(2) A varied series of *T. biundularia*, bred during April and May, 1919, from a somewhat melanic female taken in Epping Forest, May, 1918. A large number of the specimens showed a decided melanic tendency, which as far as he knew is of quite recent development in the Epping Forest district.

(3) Hybrids from a melanic male *T. biundularia*, and a typical female *T. crepuscularia*. One or two of them emerged early in July, a few more in August and September, increasing in numbers in October and November, the last date being the 23rd of this month, so that probably there are still more to come. The striking feature is that most of them are more melanic than the male parent, and that the later emergences are larger and darker than the earlier ones.

Mr. A. A. W. Buckstone exhibited *Colias edusa*, with the ground colour of a very dark yellow; another with the ground very pale, inclining to greenish, and the border of the forewings slightly diffused. Both were males taken at Dorking, August, 1895.

Pieris napi, with all four wings rounded, from Horsley, Surrey, May, 1918.

Callophrys rubi, with all the wings blotched with yellow, from Horsley, May, 1919.

Pieris brassicæ, with green lines on all wings, Clandon, August, 1919.

Triphæna fimbria, bred from full-fed larvæ taken at Wimbledon, including one with mahogany forewings, two with the yellow of the hindwings partly obscured by numerous black hairs and scales; and a dwarf of faded appearance, with narrow forewings, bred June, 1915.

T. comes, bred from larvæ taken in S.W. London, including two specimens with smoky hindwings, and one with hindwings pale straw colour; also an extremely pale specimen from Leeds.

Apatela (*Acronicta*) *aceris*, with the forewings dark slate colour and hindwings smoky; bred from a larva taken in S.E. London.

Tephrosia crepuscularia, a very dark specimen (var. *delamerensis ?*) taken at Mickleham, May 31st, 1919.

Semiothisa liturata, series from Oxshott, and specimens of var. *nigrofulvata* from Delamere.

Mr. C. W. Colthrup exhibited—

Pachygastria trifolii.—Pale forms of male, bred 1919, from Romney Marsh larvæ, including one specimen in which the whole of the forewings were pale fawn, the dark band being missing, only the cream discal spot remaining, without the brown ring encircling it. Also dark chocolate males from Eastbourne, taken this year by assembling.

Agriades coridon, from Swanage, including males ab. *fowleri*, and three males showing red spots on margin of hindwings. Also a female with nearly all the spots missing from the undersides of hindwings; and a female from Eastbourne, with blue scaling very near *semi-syngrapha*.

Argynnis aglaia, male with a white patch on forewing, and a female with dark suffusion over the forewings; both taken at Eastbourne.

Epinephele jurtina (*janira*).—Female with two apical eyespots on forewings, one with dark chocolate underside; a female with a black spot below the two eyespots; a female with a similar yellow spot

with dark centre at anal angle of right wing, and a male with a similar spot to the right of the eyespot on right forewing; a male with bleached left hindwing, and another male with a large area orange colour on the forewings.

Zygæna filipendulæ, with the red colour replaced by pink.

Euchloë cardamines, male, with orange on forewings replaced by pale lemon-yellow.

Rumicia phlæas, males with large spots on forewings, and another with minute spots; a male of a pale bronze colour; a female with red band on hindwings reduced to spots, and another female with the red colour almost absent from the hindwings; also male with spots on undersides of forewings radiated.

Hesperia malvæ.—One male with black ground colour, spots very much reduced, and some absent altogether.

Polyommatus icarus.—Male with aborted hindwing from which most of the spots are absent on the underside.

Aglais urticæ, in which the spots on the forewing tend to coalesce, and another in which the whole ground colour of brick red covers up the yellow blotches on the costal margin and other parts of the wings; a specimen with the yellow blotches replaced by white; another with the discoidal spots on forewings much reduced, one almost absent.

Hipparchia semele, with an extra spot between the two usual spots on the forewings; and a male in which the pale orange colour is so increased as to remind one of a female.

Epinephele tithonus.—Two females with two extra spots on each forewing and an extra spot on both hindwings; and a female with eyespot missing from anal angle of hindwing.

Brenthis euphrosyne.—Male with black spots on centres of all the wings much increased in size.

Colias edusa.—Two females with the yellow spots on outer black bands of all the wings almost absent, and a male underside in which the two discoidal spots on hindwings are radiated.

Mr. L. W. Newman exhibited *Spilosoma menthastri* ab. *walkeri*, bred; *Diaphora mendica*, female, with black costa and fringes; a bred series of *Zygæna filipendulæ*, including the yellow and salmon coloured aberrations; *Z. achilleæ* from Morven; *Lasiocampa quercûs* race *callunæ*, from Yorkshire, including a female with male coloration, and a dark specimen with the band on the hindwing obscured.

Mr. C. H. Williams exhibited aberrations of *Agriades coridon*, including a dark brown male taken at Princes Risborough in

August, 1918; many fine forms, light, dark, and yellow, of *Abraxas grossulariata*, including ab. *nigricostata*, ab. *fulrapicata*, ab. *semilutea*, ab. *lacticolor*, ab. *iochalcea*, ab. *rubrolutea*, ab. *chrysostrata-nigricostata*, ab. *hazleigheusis*, ab. *nigrisparsata*, ab. *radiata*, ab. *chrysostrata*, etc.

Mr. H. O. Wells exhibited two perfect gynandromorphs of *Plebeius agon*, taken in Berkshire, July 26th, 1919.

Mr. Edwards exhibited numerous species of the genus *Papilio*.

Mr. H. E. Garrett exhibited *Ochyria designata* (*propugnata*) with very dark and curiously mingled markings; *Epinephele jurtina* with the right forewing partially suffused with black.

Mr. H. J. Turner exhibited a collection of Lepidoptera mainly from the Argentine Republic near Cordoba, a few coming from the remote locality Tucuman. There were included two specimens of the rare and local Ceratocampid *Citheronia vogleri* (with a photograph of the hitherto unknown larva), a local form of *Prepona chromus*, from which the orange marks on the hindwings were missing, from Tucuman; *Attacus maurus* from the same place; the rare *Protoparce bergi*, and other hawkmoths, including *P. lichenea*, *P. petuniæ* race *diffusa*, and *P. sexta* race *paphus*; *Pyrameis caryae*, *Anosia archippus* (L.), *Xyleutes* sp., *Papilio thoas* form *thoantiades*, *Meganostoma casonia* ("dog-face butterfly"); a long series of *Colias lesbia*, the snout butterfly *Libythea carinenta*, the Pierid *Tatochile autodice*; *Hesperia americana*, *H. notata*, *H. domicella*, the long-tailed *Eudamus proteus*, *Ecpantheria indecisa*, a Syntomid, and several species of the groups formerly united under the term Bombyces.

Mr. F. W. Frohawk exhibited *Vanessa io* var. with ground colour pale fleshy-buff, margins rufous-brown, blue of eye-spots silvery-blue in primaries, brilliant blue in secondaries. Bred 1901, Monmouth.

Limenitis sibilla from New Forest, series of nine, showing gradation of obliteration of white on both surfaces from partial to almost complete absence of markings. The intermediate form between normal and extreme melanism is the usual type occurring in the Forest, being much more frequent than true ab. *nigrina*.

Dryas paphia, captured in the New Forest, July, 1919. Four exhibiting great variation, four with confluent spots forming streaks, and two remarkably melanic females having the greater portion of the wings richly clouded with black. The undersides are equally beautiful, the primaries with the whole central portion black,

secondaries base broadly silver and silver marginal band, remainder of wing rich metallic green.

Argynnis cydippe (*adippe*) : partially albinistic, of very pale (straw) ground colour and leaden coloured spots. Also a male with silvery-leaden median nervures instead of the normal black androconial scales. Other specimens showing variation of markings. All from New Forest, July, 1919.

Mr. W. J. Kaye exhibited a very varied series of *Melitæa cinxia* from the Isle of Wight, and an equally varied series of *Melitæa athalia*. In the former the uppersides varied from great reduction of the black spots to extra heavy markings. On the undersides, the most striking was a form with hardly a trace of black on the forewing and with a very heavy double row of black spotting across the middle of the wing. The reverse of this form with a great reduction of the black on the underside and with the inner edge of the first discal band entirely wanting. A minor form of variation in the forewing beneath was the heavy mark near the inner margin. The most extreme example of *M. athalia* was a very fine var. with the whole of the disc of forewing having the tawny orange marks coalesced. In the hindwing the only tawny spots were a single row before the margin. Otherwise, the whole wing was black. One of the undersides was a parallel form to the *cinxia* with pale markings, and the inner edge of subterminal band in the hindwing obliterated. One other form had the underside of the hindwing with very white-looking spots.

DECEMBER 11th, 1919.

There were no exhibits.

Dr. Boulanger, F.R.S., read a Paper on "Batrachians," and illustrated his remarks by a number of lantern slides. (See page 23.)

A considerable discussion followed.

JANUARY 8th, 1920.

Messrs. T. H. Grosvenor, of Redhill, F. W. Cocks, of Reading, C. R. Goodman and H. de B. Goodman, of Goswell Road, H. L. Gauntlett, of Putney, R. Swift and H. Garrett, of Bexley, were elected members.

Mr. J. J. Lister exhibited his local races of *Plebeius agon*, and

gave an account of his observations on the mosses of Witherslack, where the race *masseyi* is the dominant form, illustrating his remarks by a map of the areas referred to. (See "Proc. Ent. Soc. Lon.," 1919, p. lxiv.)

Mr. Buckstone exhibited his series of *P. ægon* as follows:—Chalk Hills, above Otford, Shoreham, etc., a large pale form; Oxshott, the type with several dwarfs and two females with blue scales, the undersides of both sexes showing a fair amount of variation both in spots and general coloration; Wisley, including a deep black female; Aldershot, fairly typical; Swannington, Norfolk, a male with the spots on the underside very small or missing; Witherslack, var. *masseyi*.

Mr. A. W. Mera exhibited his series, including var. *masseyi*, and also a female from Ipswich with the bases of all the wings blue.

Mr. Newman exhibited long series from Eynsford and other localities. He noted that the form with yellow lunules averaged about two per 1000, and rather in the males than the females. On the Kent hills the species had all but disappeared three times in the course of the last thirty years, with periods of wax and wane. Extremely blue females were about one in 500. In good years 10% would be shot with blue. He had noticed that the hotter the sunny period the more blue the females. The imagines were frequently observed to be attended by ants when drying their wings.

Mr. Sperring exhibited the Oxshott form, and a short series with orange lunules.

Messrs. B. S. Williams, A. E. Tonge, and R. Swift exhibited series from Eynesford, Holt Norfolk, and Newton Abbot respectively; the last named showed an extremely dark female.

Mr. Buckstone, referring to the periodical scarcity of butterflies, said that at Shere *Agriades coridon* had been very scarce this year and quite three weeks late in appearance.

Mr. R. Adkin remarked on the proneness of the *Lycænidæ* to run into local forms, and also to remain on a very restricted space. For instance, he had noted a specimen of *Agriades thetis*, easily recognisable by a damaged wing, day after day frequenting the same small space. He had similar experience with *Polyommatus icarus* and *A. coridon*. Such a habit would tend to produce distinctive local races.

Mr. Lister, in his further remarks, asked what was the actual cause of the peculiar *masseyi* form? There were numbers of Gulls nesting on the ground. Would their presence be a cause indirectly

by affecting the plant growth ? No doubt there were many factors in the environment, but what were they? There was much variation in the forms of *masseyi*, both in the character of the blue and in the ground colour of the underside, but although some approached none were as white as the well-known var. *hypochiona* form from the Pyrenees.

Mr. Turner exhibited a number of further species from the Digby collection of *Tineidæ*, which were about to be placed in the Society's cabinet.

Mr. Tonge exhibited an underside of *Ruralis betulæ*, with a curious perfect circle beside the narrow silvery band, apparently not in accord with the marking of any Ruralid species.

Mr. Moore showed the very rare *Papilio nobilis*, from the E. African plains near Nairobi.

Mr. Bunnett read a short paper, "Notes on the Pupation of the Nymphalids." (See page 32.)

JANUARY 22nd, 1920.

The President in the Chair.

Annual Meeting.

The Balance Sheet was read by the Hon. Treasurer, Mr. A. E. Tonge, and on its adoption presented an explanatory financial statement. (See pages x, xi, xv.)

The Report of the Council was read by the Secretary and was adopted. (See page xii.)

The President announced the Officers and Council elected for the ensuing year as follows :—

President.—K. G. Blair, B.Sc., F.E.S.

Vice-Presidents.—E. J. Bunnett, M.A., F.E.S., S. Edwards, F.L.S., etc.

Treasurer.—A. E. Tonge, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West.

Assistant Curator.—S. R. Ashby, F.E.S.

Editor of Proceedings.—H. J. Turner, F.E.S.

Hon. Secretaries.—Stanley Edwards, F.L.S., etc. (Corresponding), H. J. Turner, F.E.S. (Report).

Recorder of Attendances.—B. S. Williams.

Hon. Lanternist.—A. W. Dennis.

Council.—R. Adkin, F.E.S., R. T. Bowman, L. E. Dunster, F. W. Frohawk, F.E.S., M.B.O.U., Lachlan Gibb, F.E.S., T. W. Hall, F.E.S., N. D. Riley, F.E.S., Dr. G. C. Robertson, E. Step, F.L.S.

The President then read the Annual Address. (See page 34.)

The new President, Mr. K. G. Blair, B.Sc., F.E.S., took the chair.

Votes of thanks were passed to the retiring President, Treasurer, Officers and Council, and the Auditors for their services during the past year.

Ordinary Meeting.

Messrs. H. Morell, of Wallington, and S. W. Harvey, of Sydenham, were elected members.

Mr. Garrett exhibited an extremely dark suffused specimen of *Augiades sylvanus* from Bexley, Kent, very similar to those from the higher Swiss altitudes.

Mr. Blair exhibited a living specimen of the wasp-beetle, *Clytus arietis*, just emerged from a branch sent to the British Museum.

Mr. Hy. J. Turner exhibited *Melitaea aurinia* from various British and continental localities, including a fine series of the variegated *praeclara* form from Co. Tyrone, Ireland, a series of the darker *scota* form from the same locality, a pair of the *hibernica* form in which the outer margins are black and almost devoid of lighter markings, from Ireland, a series of the *signifera* form, reddish fulvous ground with slight straw coloured band from Penarth, a series of the large Llanbedr form much more variegated than in *signifera*, Kentish forms which approach the *provincialis* race of South France, which was also shown, the somewhat paler forms of the Irish races from Enniskillen and Mullingar, small variegated forms from Basingstoke and Carlisle (*artemis* ?), the Corsican form comparable to the *provincialis* form, but with darker, more decided black markings, a very large specimen from Montserrat, the dwarf mountain form *merope* from the Heuthal, Davos, Albula Pass, Campolungo Pass, Furka Pass, Riffel Alp, a brighter small form from the Italian Alps, and a curious small black and reddish form from Bavaria. Heuthal specimens were extremely dark, almost black, with a minimum of straw-coloured markings only. There were also two of the bright Oban specimens.

A letter was read from Mr. G. B. Pearson, who had spent a three weeks collecting trip in Jamaica in the latter part of 1919, communicated by Mr. Sperring.

Reports of the Field Meetings were read. (See pages 57, 60, 63, 67.)

Mr. R. Adkin communicated the Report of the British Association for the Advancement of Science: Conference of Delegates of Corresponding Societies, 1919.—I have to report that I attended the meetings of the above Conference on Thursday, September 11th, and Friday, 12th, at the Municipal College, Bournemouth, as your delegate. The President of the Conference, Lord Montagu of Beaulieu, read an address on "Roads and the History of Locomotion," in which he demonstrated beyond question the vital importance of maintaining the roads of this country in good going order as a means of communication between town and town and village, and so forth. Questions brought forward for discussion were "Atmospheric Pollution of Towns," introduced by Dr. J. S. Owens; "The Measurement of Rain," by Mr. de Carle Salter; and "The Importance of including Geography in the Curriculum of Higher Education," by Mr. T. W. F. Parkinson: three very diverse and interesting subjects, but I fear that none of them come within the activities of the majority of our members. I apprehend that of more interest to them will be the work of Section D, Zoology, where many papers of the utmost importance were read, and which I hope to bring to the notice of our members, in detail, so soon as the annual volume of the Association is published.

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1881 MILES, W. H., F.E.S., Grosvenor House, Calcutta. Post Box 126. *mi, b.*

1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E.16. *l, h, d, e l, e h, e d, mi.*

1910 MORFORD, D. R., 16, Spencer Road, Cottenham Park, Wimbledon, S.W. 19. *l.*

1911 MORICE, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon, Woking. (*Life Member.*) *h.*

1920 MORISON, G. D., 100, Fielding Road, Bedford Park, W. 4.

1920 MORRELL, H. A., Heathdene, Wordsworth Rd, Wallington. *l.*

1912 NEAVE, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. 4. *l.*

1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*

1918 NIMMY, E. W., F.E.S., 296, High Holborn, W.C.1. *l.*

1911 PAGE, H. E., F.E.S., Bertrose, Gellatly Road, New Cross, S.E. 14. *l.*

1915 PEARSON, G. B., 812, Stevenson Avenue, Pasadena, California, U.S.A. *l.*

1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W. 1. *l.*

1880 PERKINS, V. R., F.E.S., Wotton-under-Edge, Gloucestershire. *l, h, d.*

1887 PORRITT, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*

1912 POULTON, PROF. E. B., D.SC., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)

1897 PREST, E. E. B., 1 and 2, Chiswell Street, E.C. 1. *l.*

1919 PRESTON, N. C., 32, Dancer Road, Fulham, S.W. 6. *l.*

1904 PRISKE, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. 5. *l, m.*

1919 QUILTER, H. J., Fir Cottage, Kiln Road, Prestwood, Great Missenden. *l.*

1902 RAYWARD, A. L., F.E.S., 52, Addiscombe Road, Croydon.

1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. 4. *orn.*

1920 RICHARDSON, A. W., 28, Avenue Road, Southall.

Year of Election.

1902 Riley, N. D., f.e.s., *Council*, 5, Brook Gardens, Beverley Road, Barnes, S.W. 13.

1919 Roberts, J. G., 1, Segary Villas, Hadley Road, New Barnet.

1910 Robertson, G. S., m.d., *Council*, St. Anne's, 72, Thurlow Park Road, Dulwich, S.E. 21. *l.*

1894 Robinson, Leigh, f.z.s.

1911 Robinson, Lady Maud, f.e.s., Worksop Manor, Notts. *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.* (*Life Member.*)

1887 Routledge, G. B., f.e.s., Tarn Lodge, Heads Nook, Carlisle. *l*, *c.*

1904 Rowland-Brown, H., f.e.s., Oxhey Grove, Harrow Weald. *l.*

1890 Rowntree, J. H., Scalby Nabs, Scarborough, Yorks. *l.*

1921 Ruggles, Hy., 146a, Southfield Road, Bedford Park, W. 4.

1898 Russell, A., Wilverley, Dale Road, Purley. *l.*

1915 Russell, S. G. C., f.e.s., Roedean, The Avenue, Andover Junction, Hants.

1908 StAubyn, J. S., f.e.s., Sayescourt Hotel, 2, Inverness Terrace, Bayswater, W. 2.

1914 Schmassmann, W., f.e.s., Beulah Lodge, London Road, Enfield, N. *l.*

1910 Scorer, A. G., f.e.s., Hillcrest, Chilworth, Guildford. *l.*

1911 Sennett, Noël S., Lieut. R.N.V.R., f.e.s., 24, De Vere Gardens, Kensington, W. 8. *c.*

1910 Sheldon, W. G., f.e.s., Youlgreave, South Croydon. *l.*

1898 Sich, Alf., f.e.s., Corney House, Chiswick, W. 4. *l.*

1920 Simms, F. H., The Farlands, Stourbridge.

1920 Simms, H. M., b.sc., The Farlands, Stourbridge.

1903 Smallman, R. S., f.e.s., Eliot Lodge, Albemarle Road, Beckenham, Kent. *l*, *c.*

1908 Smith, B. H,, b.a., f.e.s., Frant Court, Frant, nr. Tunbridge Wells. *l.*

1920 Smith, S. Gordon, f.e.s., Estyn, Boughton, Chester. *l.*

1890 Smith, William, 13, St. Mirren Street, Paisley. *l.*

1882 South, R., f.e.s., 4, Mapesbury Court, Shoot-up-Hill, Brondesbury, N.W.2. *l*, *c.*

1908 Sperring, C. W., 8, Eastcombe Avenue, Charlton, S.E. 7. *l.*

1920 Stafford, A. E., 98, Cowley Road, Mortlake, S.W. 14.

1921 Staniland, L. N., f.e.s., Trewint, Coppett's Road, Muswell Hill, N. 10.

1872 Step, E., f.l.s., *Council*, 158, Dora Road, Wimbledon Park, S.W. 19. *b*, *m*, *cr*; *Insects, all Orders.*

Year of Election.

1916 Stewart, H. M., M.A., M.D., 123, Thurlow Park Road, Dulwich, S.W. 21. *l.*

1910 Stoneham, Capt. H. F., F.E.S., Stoneleigh, Reigate. *orn, l.*

1913 Storey, Gilbert, F.E.S., Dept. of Agriculture, Cairo, Egypt. *Econ. Ent.*

1911 Stowell, E. A. C., B.A., Eggars Grammar School, Alton, Hants.

1920 Swift, R., Cilmory, Knoll Road, Bexley. *l.*

1916 Syms, E. E., F.E.S., 22, Woodlands Avenue, Wanstead, N.E. *l.*

1920 Talbot, G., F.E.S., The Hill Museum, Witley. *l.*

1894 Tarbat, Rev. J. E., M.A., The Vicarage, Fareham, Hants. *l, ool.*

1913 Tatchell, L., F.E.S., 43, Spratt Hill Road, Wanstead. E. 11. *l.*

1910 Towle, P. H., F.E.S., Cranleigh, Nower Hill, Pinner. *l.*

1911 Todd, R. G., F.E.S., 54, Hornsey Lane, Highgate, N. 6. *l.*

1902 Tonge, A. E., F.E.S., *Hon. Treasurer*, Aincroft, Grammar School Hill, Reigate. *l.*

1887 Turner, H. J., F.E.S., *Hon. Editor*, 98, Drakefell Road, New Cross, S.E. 14. *l, c, n, he, b.*

1889 Wainwright, C. J., F.E.S., 139, Hamstead Road, Handsworth, Staffs. *l, d.*

1911 Wakely, L. D., 11, Crescent Road, Wimbledon Common, S.W. 19. *l.*

1880 Walker, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*

1920 Watson, D., 12, Park Place, Gravesend.

1911 Wells, H. O., Inchiquin, Lynwood Avenue, Epsom. *l.*

1920 West, W., 29, Cranfield Road, Brockley, S.E.

1911 Wheeler, The Rev. G., M.A., F.Z.S., F.E.S., 28, Gordon Square, W.C. 1. *l.*

1887 Whiffen, W. H., Holmwood Lodge, Laton Rd., Hastings. *l.*

1914 Williams, B. S., 77, Durham Road, E. Finchley, N. 7. *l.*

1912 Williams, C. B., B.A., F.E.S., Department of Agriculture, Trinidad. *l.*

1920 Wightman, A. J., 35, Talbot Terrace, Lewes, Sussex. *l.*

1920 Withycombe, C. L., 12, Prospect Hill, Walthamstow, E. 17. *l, b.*

1918 Wood, H., Albert Villa, Kennington, near Ashford, Kent. *l.*

1917 Woolacott, H. R., Hightilt Farm, Cranbrook, Kent. *l.*

1920 Young, G. W., F.E.S., F.R.M.S., 20, Grange Road, Barnes, S.W. 13.

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

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1920.

REVENUE ACCOUNT.

Expenditure.	£	s.	d.	*Income.*	£	s.	d.
To Debit balance from 1919	25	16	2	By Subscriptions, Current	56	5	0
,, One Year's rent	25	0	0	,, ,, in advance	11	7	6
,, Fire Insurance	1	8	11	,, ,, arrears paid ..	7	2	6
,, Attendance one year	2	10	0		74	15	0
,, Subscription to South-Eastern Union		10	0	,, Entrance fees	3	7	6
,, Postages, Stationery, and sundries:—				,, Dividends	1	10	0
S. Edwards 7 0 0							
H. J. Turner 10 0							
A. E. Tonge 1 13 4							
	9	3	4				
,, Entrance fees to Suspense a/c	3	7	6				
,, Vote for Library Fund	4	0	0				
,, Credit Balance	7	16	7				
	£79	12	6		£79	12	6

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

	£	s.	d.		£	s.	d.
To £60, 5% National War Bonds at cost	57	19	2	By Balance from 1919	57	17	
,, Balance (Held in Suspense)	3	5	10	,, Entrance fees, 1920	3	7	6
	£61	5	0		£61	5	0

LIBRARY FUND.

	£	s.	d.		£	s.	d.
To Debit Balance 1919..		4	11	By Fines	0	1	0
,, Subscription to E.M.M.		15	0	,, Vote from General Fund	4	0	0
,, Binding—Andrews	2	8	0				
,, Librarian's expenses		7	4				
,, Balance		5	9				
	£4	1	0		£4	1	0

PUBLICATION FUND.

	£	s.	d.			£	s.	d.
To Archer's Account printing Transactions.. ..	60	17	6	By Balance from 1919		45	13	8
,, Half Tone Blocks	1	17	11	,, Sales Waste paper	2 16 0			
,, Balance	7	11	3	,, ,, Proceedings	2 12 0			
						5	8	0
				,, Donations		19	5	0
	£70	6	8			£70	6	8

BALANCE SHEET.

Liabilities.	£	s.	d.	By Credit balances— *Assets.*		£	s.	d.
To Balance, being excess of assets over liabilities ..	83	18	7	,, General Fund	7 16 7			
				,, Suspense a/c..	3 5 10			
				,, Library Fund	0 5 9			
				,, Publication Fund	7 11 3			
						18	19	5
				,, Investments at Cost		57	19	2
				,, Subscriptions in arrear, say £15 valued at £7 ..		7	0	0
	£83	18	7			£83	18	7

Audited and found correct, this 22*nd* *January* 1921.

T. W. HALL,
F. B. CARR, } *Auditors.*

REPORT OF THE COUNCIL, 1920.

THE Council in presenting the forty-ninth Annual Report desire to state that the Society has had a successful year. Its finances, owing to the efforts of the "unofficial Committee" of last year and the assiduous work of the Treasurer, are once more in a healthy condition, while the Membership has increased from 162 to 184. Twenty-seven new Members have been elected, only two have died (Messrs. W. West and G. B. Browne), and five have resigned. In Mr. W. West, the oldest Member, the Society's Curator from the inception of that office in 1872, we have sustained a great loss. Although he had reached the age of 84, he was active until the last, being present in his usual health at the meeting of the Society, eight days before he passed away.

Mr. G. B. Browne had been a regular attendant until he moved away from London on his retirement from business.

A Special Exhibition of "Orders other than Lepidoptera" was held on May 13th, with considerable success. The Annual "Exhibition of Varieties and other Objects of Interest," was held on November 25th, and constituted a "record," 143 members and friends being present. Many series of remarkable varieties were exhibited, among them being some 1277 specimens of the extraordinary forms of *Abraxas grossulariata* shown by Lord Rothschild, Mr. Sheldon's complete collection of the forms of *Peronea cristana* with many types, Mr. C. P. Pickett's recently taken forms of *Agriades coridon*, Mr. Bowman's recently obtained new forms of *Cosymbia pendularia*, with exhibits of many noteworthy individual aberrations.

The Lantern has been used on several occasions during the past year; Mr. Dennis has kindly officiated as Honorary Lanternist.

Papers have been read before the Society by Dr. F. A. Dixey, F.R.S., G. E. Frisby, and S. Edwards, and Discussions introduced by R. T. Bowman and H. J. Turner.

After the decease of the Curator, Mr. W. West, your Council appointed *pro tem.*, Mr. S. R. Ashby, as Hon. Curator, and

Mr. T. L. Barnett as Assistant Hon. Curator. The Hon. Curator reports as follows, " During the past year the Society's Collections have been increased by the valuable bequest of our late member, Mr. W. J. Ashdown, who left his collections to the Society.

" Most of the series in the micro families of British Lepidoptera have been added to or renewed from the late Rev. C. R. Digby's collection.

" Mr. F. C. S. Bramwell, of Dyke Road Drive, Brighton, presented series of *Ino globulariae* and *Acidalia immorata*. Mr. J. B. Farmer gave the Society two store boxes of specimens of various Orders, chiefly Odonata, Diptera and Hymenoptera. Mr. Bunnett placed various specimens of Coleoptera in the collection. The Lepidoptera are well consulted by the Members for naming their specimens, and I hope when Mr. Ashdown's specimens are in position, that the ' Other Orders ' will be very useful for the same purpose."

The Honorary Librarian reports that the Library has again been very largely consulted by the Members. The late Mr. W. J. Ashdown having by his Will bequeathed " such of his books on Natural History as the Society would like to have," a small committee consisting of the President, and Messrs. Dods, Edwards, Dr. Robertson and Step, appointed by the Council, went to Leatherhead and were met by Mr. Ashdown's brother, who with them chose a large number of suitable volumes. This makes a welcome addition to the Society's Library.

Pleasant Field Meetings were held at Otford, Horsley and Byfleet, but the impossibility of obtaining reduced fares militated against large attendances and additional meetings.

Mr. R. Adkin was the Society's Delegate at the meeting of the Representatives of the Corresponding Societies of the British Association at Cardiff in August; his Report will be found on page 87.

Messrs. Edwards and Turner were your Delegates at the meeting of the S.E. Union of Scientific Societies held at Eastbourne in June.

The Volume of Proceedings for 1919, published during the past year, consists of xvi. and 104 pages with two plates.

The following is a list of the additions to the Library during the year, mainly by exchange and donation.

Books.

" Starfishes of the Philippine Islands," U.S.A. Mus. " Birds of N. America," U.S.A. Mus. " Devonian Fossils of Tennessee,"

U.S.A. Mus. "British Orthoptera," Lucas, Ray Society (purchased). "British Coleoptera," Fowler, 6 vols. (West bequest). "British Hemiptera," Saunders (West bequest). "Osteology of the Dinosaurs of N. America," U.S.A. Mus. "Trees and Shrubs of Mexico," U.S.A. Mus. "Eastern American Molluscs," U.S.A. Mus. "Macruroid Fishes of the Philippines."

Magazines and Periodicals.

"Entomological News." "Entomologist" (R. South). "Irish Naturalist." "Bulletin of the Entomological Society of France." "Canadian Entomologist." "Entomologist's Monthly Magazine." "Entomologisk Tidskrift.': "Essex Naturalist." "Entomologische Mitteilungen." "Insecta" (H. Rowland-Brown).

Reports and Transactions of Societies.

Bolletino Lab. Zool. Portici. Italy; Contributions to the U.S.A. Herbarium; Field Sanitation (Major Fremlin); Trans. Ent. Soc. of London, 1890-1919 (Major Fremlin); Smithsonian Report, 2 years; Chicago Field Mus. N.H.; Upsala Society; S. Eastern Naturalist; Report of the Brit. Assn. (R. Adkin); Ann. Rep. of the U.S.A. National Mus.; Haslemere Society; Hampshire Field Club; Torquay Nat. Hist. Soc.; La Escuela Modena; Bournemouth Nat. Science Soc.; London Entomological and Nat. Hist. Soc.; Connecticut Academy of Arts and Sciences; Columbia Entomological Society; Chicago Field Museum.

Separata and Pamphlets.

"Birds Beneficial to Agriculture," Frohawk, Brit. Mus. "Boring Animals," Brit. Mus. "Insects and Disease" Brit. Mus. "Insecta," Illinois Review. "American Species of *Marchantia*," U.S.A. Mus. "Lepidoptera of Glamorgan," H. Moore. "The Louse in Relation to Disease," Brit. Mus. "Ascent of Man," Horniman's Mus. "List of Lepidoptera, Haslemere," Oldaker. "The Furniture Beetle," Brit. Mus. "The House-Fly," Brit. Mus. "The B.M. (Nat. Hist.) Guide," Brit. Mus. "Butterflies of Cyprus," Hy. J. Turner. "*Erebia epiphron*," 4 pts., H. Rowland-Brown. "Butterflies of Macedonia," H. Rowland-Brown. "Further Studies of the *Orthobionte*," Jeannet.

TREASURER'S REPORT, 1920.

It is again my pleasant duty to report a very successful year financially, the cash balance to be carried forward being practically the same as in 1919, after allowing for the amount which has been invested in the names of Trustees for the benefit of the Society, as I foreshadowed in my last report. The fact that subscriptions paid in advance total this year £5 more than last, must however not be overlooked.

Our income from current subscriptions was £9 6s. 6d. in excess of last year's receipts, amounting to a total of £56 5s., and will with the advent of so many new members be substantially greater again next year.

Publication of proceedings cost us rather less than in 1919, but this was not due to any cheapening of the price of printing, which still tends to rise, but to the very careful editing of the Publication Committee.

Arrears which were estimated to produce £5 in the last Balance Sheet actually amounted in cash payments to £7 2s. 6d., and this year I am glad to say the defaulters are much fewer in number as some of the very old names have been removed from the roll of membership. Only twelve out of our large membership have failed so far to come up to scratch for 1920, and I hope that, should this reminder succeed in reaching any of them, it will have the desired effect of making their consciences prick them into action. I have valued arrears in the present balance sheet at £7, and may say that 30s. of this has already reached me.

No fewer than 27 entrance fees were paid during 1920, nearly half of which were from members who joined us towards the end of the year, and whose first subscription therefore covers 14 months. The balance standing to the credit of Suspense Account is this time £3 5s. 10d. as the £60, 5% National War Bonds purchased cost a few shillings more than the exact balance brought forward from 1919.

Sales of Proceedings total £5 8s. of which rather more than half was for Surplus Copies sold to the paper makers. This item is lower than the record figure reached in 1919, but is still quite good.

It will be seen from the foregoing remarks that we are still far from being in a position to run the Society on its annual

income from regular sources. Allowing £60 for the cost of publishing Proceedings our standing Expenses are rather over £100 a year, while the income from subscriptions is barely £70 and from all other sources less than another £10.

We must therefore continue to depend on the generosity of our friends to the extent of something like £20 annually to keep us sound from a financial standpoint, and my warmest thanks are due to those who so nobly came to my assistance in 1920 with donations to the Publication Fund totalling £19 5s.

In conclusion I must again thank all the members for the very kind help they have given me and for their forbearance and patience with my many shortcomings.

I will now with your permission read the figures as passed by the auditors.

The Aculeate Hymenoptera of the British Isles.

By G. E. Frisby, F.E.S.—*Read October 26th*, 1920.

The Aculeata, or stinging Hymenoptera, consist of four main divisions :—The Ants ; the Fossorial Hymenoptera, which include the many species popularly known as Sand Wasps and Wood Wasps; the true Wasps; and the Bees. Many authorities also include the Chrysids, or Firetails. With the Chrysids, however, and the Ants, I shall have nothing to do to-night, but shall confine myself to the three other divisions. I am not qualified to give a descriptive account of each British species, though there are comparatively few that I have not met with, but I think that some remarks on the habits, distribution, and occurrence of a number of them will perhaps be of interest.

Taking them in their usual order of arrangement, we will first speak of the Fossorial group, many of which our American cousins call " Huntress Wasps." The greater number of these construct burrows in wood, sandy banks, bramble stems, etc., in which they make their cells and then provide a store of sustenance for their larvæ by capturing other insects, or in some cases spiders, which are either paralysed by stinging, or killed outright. These are then placed in the cell provided, and an egg placed on the body. In this the females only are engaged, which accounts for the name of " Huntress " Wasps. The first family, the *Mutillidae*, appears to be parasitic, the largest British species, *Mutilla europaea*, having been found fairly often in the nests of Humble Bees, though it has also been dug out of a sandy bank from amongst a quantity of wings of Diptera. It is not a very common insect, though it apparently occurs over the whole of our southern counties, as do the rest of the family. I have only met with it on the sandy hills near Rye Harbour, where it can sometimes be found endeavouring to climb up the loose sand in hot weather, or induced to show itself by agitating the tufts of marram grass above the sandy slopes. The winged male occurs occasionally on bramble flowers. The closely allied *Mutilla rufipes* is smaller, and very much more abundant, being found in most sandy localities. I have found it in considerable numbers on the cliffs at Sandown Bay, in the Isle of Wight, running up and down where a large colony of the bee *Colletes daviesana* occurred. It occasionally entered the burrows of the bee, but as it seems to search every crevice it meets with, I could not say that there was any connection between it and the bee. The

commonest member of the family is the little *Myrmosa melanocephala*, which is almost sure to be met with, given a sandy patch and hot sunshine. The rarest is *Methoca ichneumonides*, which inhabits similar localities. I have, so far only met with it in the New Forest. These species of *Mutillidae* are often spoken of as Solitary Ants. They have no close affinity, however, with the true ants.

Of the next genus, *Tiphia*, I know nothing of the habits of the two species. The larger one, *T. femorata*, is said to be very partial to the flowers of the wild carrot, but I have always taken it when constructing its burrows. It is fairly abundant on the southern slopes of Redhill Common, but I have never been able to capture a specimen when loaded with its prey. Of the genus *Sapyga* there are also two British species, recorded as burrowing into banks and also into decaying wood. Smith says that he has seen the female of the commoner *S. quinquepunctata* carrying a green caterpillar to its burrow, which was found to contain four cells filled with small green caterpillars, from which he reared specimens of the *Sapyga*. Shuckard says that he has caught it entering the cells of a bee, *Osmia rufa*. I have never yet detected it carrying its prey, having taken it flying up and down old posts that were riddled with burrows, both of beetles and bees, or sometimes flying in the same way at perforated sandy banks. The second species, *S. clavicornis*, is recorded from only three or four British localities.

We next come to that very puzzling family the *Pompilidae*, consisting of several genera and a large number of species. They are all of very similar habits, exceedingly active, running rapidly on the ground or on old posts, with very short flights, so that at times it is not easy to decide where the flight ends and the run begins. They are very quick, too, to take cover under a dead leaf, twig, or blade of grass. This makes them very difficult of capture. Most of them nest in sandy banks, a few in old posts, and all, or nearly all, provision their nests with spiders. They vary very much as to their comparative rarity or abundance, though even the rarer species are sometimes to be found in some numbers. *Aporus unicolor*, which at one time was considered to be an extremely rare species, suddenly occurred in quite a number of localities. I found several near Ventnor in 1898, and met with it again two or three years later at Bexhill, where it was fairly common on the wild carrot at the edge of the low cliffs. *Pompilus rufipes*, a very showy species; *P. plumbeus*, a black insect with grey pubescence, and *P. chalybeatus*, which is red and black, are all very partial to sandhills such as occur on the coast. The first and second species are abundant usually at St. Helen's, in the Isle of Wight; the second and third are common at Camber, near Rye. *Pompilus niger*, a bold-looking black insect, is more abundant westerly, though occurring elsewhere. The largest is *Pompilus viaticus*, which is fairly common, especially on heaths. Several of the *Pompilidae* are

to be found on umbelliferous flowers. Some of the species are very little known, and there is a great likelihood of two or three fresh species being discovered. The largest known species of any of the Hymenoptera are some of the tropical members of this family, which are able to overpower the very largest spiders. Though of very similar habits in general, one species at least, *P. niger*, occasionally preys on caterpillars, and the two species of the genus *Agenia* frequently nest in old posts.

Of the two species of *Astatus*, the larger one, *A. boops*, is by far the commoner. Both, however, occur where there are good-sized patches of bare sand. The smaller, *A. stigma*, I have only taken on the sandhills at the mouth of Brading Harbour. Both species rest on the sand in the hottest sunshine, and it requires a very quick stroke of the net and a fully average amount of patience to effect a capture. The males of both species have exceptionally large eyes, which meet on the vertex of the head, and they certainly make good use of them. The prey of *A. stigma* is as yet unknown, as far as I am aware. *A. boops*' usual prey appears to be the larva of one of the larger plant bugs belonging to the genus *Pentatoma*, though, according to Smith's observations, it also preys on another kind of Sand-wasp, *Oxybelus uniglumis*. The closely-allied genus *Tachytes* comprises three species, two of which are very rare in this country. The third, *Tachytes pectinipes*, is abundant almost everywhere. The usual prey on the continent is believed to be larvæ of Orthoptera, and Smith took it at Weybridge with a small grasshopper. Shuckard, however, says that he has frequently taken it with a small, sandy-coloured caterpillar, and this entirely accords with my own experience. Another very closely-allied insect is *Dinetus pictus*, which, I believe, rests only on old records from Ascot and Windsor, in the early part of last century. The small species of *Miscophus* occur on sandy commons and prey on spiders, one of them *M. maritimus*, being found only on the sandhills at Deal. Now we come to the three species of *Trypoxylon*, with their long slender bodies, which put one in mind of *Ammophila*. The neuration of the wings at first sight resembles that of the genus *Crabro*, but on closer inspection, extra cells are seen, though enclosed by such very fine nervures as to easily escape observation. They are all fairly common, and nest either in the ground, in old posts or palings, or in bramble stems, preying on spiders. The least common of the three, *T. attenuatum*, I have several times bred from perforated bramble stems.

The very widely distributed genus *Ammophila* is represented in this country by four species. The most abundant is *A. sabulosa*, which is to be found in most sandy localities in the south of England, its long legs and long slender body putting one somewhat in mind of a Crane-fly. The petiole of the abdomen is so slender as to give the rest of the abdomen quite a detached appearance. A very similar species, but with a stalk or petiole to the second sub-

marginal cell, is *A. campestris*. It has rather a darker appearance when flying, which is especially noticeable where both species are flying together, as they do on Matley Heath, where I have repeatedly had both in the net at one stroke. *A. campestris* is a very local species, and like its relative *A. sabulosa*, it provisions its nest with caterpillars. Another common species, *A. hirsuta*, makes use of spiders. It is a large, bold-looking insect, with none of the fragile appearance of the other two I have mentioned. The fourth, *A. lutaria*, is very like the last named, but is very much rarer. The only locality where I have seen it is Deal.

Next we come to several genera of very small black wasps that nest mostly in decaying wood, or perforated bramble stems, though sometimes in sandy banks, or in the mortar of old walls. They mostly provision their nests with *Aphides*. The commonest of the number can be bred in hundreds from perforated brambles collected in the winter, and amongst the many insects that can be obtained in this way I think I may venture to say that 90 per cent. will prove to be *Pemphredon lethifer*. A large number, however, will have been destroyed by the Ichneumon *Perithous mediator*, which also will be bred in considerable numbers. Many of these species of *Pemphredon*, *Passaloecus*, *Stigmus*, and *Diodontus* can be found basking in the sun on almost any wide leaves. A very large percentage of my captures of these little animals was made at Maidstone about 30 years ago on the leaves of a Morello Cherry that was trained against a wall just outside of my window. The doubt has been raised whether the species of *Stigmus* provision their own nests or are parasitic on others.

Of very similar habits are the species of *Mimesa*. I have always found them nesting in the ground in large colonies, but they are also said to nest in holes in wood and in the straws of thatch. Where they are abundant, as I have sometimes found them at Darenth Wood and in the New Forest, quite a number can be taken at one stroke of the net. *Mimesa bicolor* is by far the commonest species, the other four or five being only occasionally met with. They usually appear to prey on *Aphides*. Very closely allied to *Mimesa*, and of similar habits, is the very common *Psen pallipes*. It is, however, often found basking in the sun on bramble and other leaves.

We now come to three genera that are sometimes united as one. As far as our British species are concerned they are abundantly distinct. Especially is this the case with the first one *Gorytes tumidus*, or as I prefer to call it, *Harpactus tumidus*. It is fairly common in sandy situations and is very active, more resembling a *Pompilus* in its habits and in its black and red colour. I have never found it with its prey. The two species of *Gorytes* proper are very much alike in appearance, and are rather striking black and yellow insects. The common one, *G. mystaceus*, is pretty widely distributed, and can often be found on the flowers of the cow-parsnip,

Heracleum. It preys on the larva of *Philaenus spumarius*, the common Cuckoo-spit, which is found in the masses of froth that are so frequent on plants. *Gorytes campestris* has the same habits, but is very much more local in its distribution. The third genus, or subgenus, *Hoplisus*, contains three British species, of which one is exceedingly rare, resting apparently on Shuckard's record from the New Forest. *H. quadrifasciatus* is occasionally fairly common, and *H. bicinctus* is distinctly rare. I have two specimens that I caught on raspberry leaves at Redhill, and a third taken by Dr. Chapman at Reigate. I know nothing of the prey of either species. Of the four species of *Nysson* practically nothing is known of their habits, though two of the four are fairly common. *N. interruptus* has been bred from decayed wood by Mr. Bignell. I have always taken *N. dimidiatus* in very warm grassy places near bushes, and have known it to feign death; a habit that is recorded also of *N. trimaculatus*.

The two British species of *Mellinus* provision their nests with Diptera, and Smith, in his catalogue of *Brit. Foss. Hym.*, says that the method of capture is for the *Mellinus* to run slowly past the fly in an apparently unconcerned manner until near enough to pounce suddenly on its victim. *M. arvensis* is one of the commonest of the Sand-wasps, being abundant in almost every sandy locality in which I have collected. *M. sabulosus* is much more local, though sometimes occurring in considerable numbers. The single species of *Philanthus* is a very bold-looking insect, though rarely met with of late years. At one time it used to be abundant at Sandown Bay, but I searched there for it during four successive seasons, from 1895 till 1898, and on two occasions since, without finding a single specimen. I know of only one recent record, an example being taken at Folkestone in 1898 by Mr. Freke. This fine insect preys on bees, provisioning its nest not only with species of *Halictus* and *Andrena*, but also with Hive Bees. I have put a continental specimen into my box to show what it is like. It is common in the Channel Islands and also in Brittany.

Cerceris is a somewhat similar genus, the species, especially the common *C. arenaria*, being fairly large, and conspicuously marked with black and yellow. There are, however, deep constrictions between the segments of the abdomen, which are wanting in *Philanthus*, and the second of the submarginal cells is petiolated, the nervures separating it from the first and third submarginals uniting above it, so that those cells approximate above and prevent contact with the marginal. *C. arenaria* captures weevils, usually species of *Strophosomus*, with which I have frequently taken it at Hastings. *C. ornata* I have taken with *Halicti*. The other species I have never taken, but Smith records *C. labiata* as preying on *Haltica tabida* and *C. 5-fasciata* as taking *Apion rufirostre*.

The genus *Oxybelus* has four pretty little variegated species on the British list. One is very common, two rare, and one is of doubtful occurrence. They resemble *Astatus* in their quick movements on

sandy places in the very hottest sunshine. They capture Diptera with which to provision their cells. The thirty or more species of *Crabro* also make use of Diptera in providing sustenance for their larvæ. Many of the smaller species of this large genus, such as *C. tibialis*, *C. clavipes*; and *C. capitosus* nest usually in perforated bramble stems. Others burrow into decaying wood. An old decaying trunk of a tree on a bright day in June is almost certain to produce a number of species. Others, again, like the common *C. cribrarius*, *C. peltarius*, and one or two rarer species, prefer to burrow in the ground. *C. dimidiatus* is very fond of holes in old brick or stone walls, and I have found a number of this species going into one hole. At one house, where I lived for a short time, I noticed this species going into a hole between two large blocks of stone, and counted as many as six going in before one came out again. As I was not able to mark any of the individuals, I could not be certain how many made use of this hole, but the number could not have been less than six, and I feel pretty certain that there were many more. Possibly the hole led to a large cavity, in the sides of which each individual had its burrow. Most of the Crabros can be found sunning themselves on leaves, and they are very fond of umbelliferous flowers, especially *Heracleum*.

The true Wasps consist of two British families, the *Vespidae* and the *Eumenidae*. The first contains the Social Wasps, which, seven in number, are all placed in the genus *Vespa*. At least, they are usually so placed, though the rare and aberrant *V. austriaca* is sometimes separated as *Pseudovespa*. The Social Wasps are most numerous at the end of the summer, the males and workers dying off rapidly with the approach of cold weather, the females, or queens only, hibernating. These emerge in the spring, sometimes even making their appearance on a fine warm day in January. About March or April, according to the weather, the banks and hedgerows are explored for suitable nesting sites. A small hole in a bank being approved of, a few cells are constructed and eggs laid. These soon hatch, and the queen feeds the larvæ, constructs new cells, and does all the general housework. In about a month the earliest of the workers emerge and take on the work of cleaning and feeding. As the population increases, more and more cells are constructed until the approach of autumn. I do not know whether the eggs are laid in the cell, or first laid and then carried to the cell, but I fancy the latter method is, at all events, the more usual. The largest species, *V. crabro*, known as the Hornet, is said to nest usually in hollow trees. I have never yet found their nests, though I have taken Hornets at Hastings, Maidstone, and, more abundantly, in the New Forest. *V. vulgaris*, *V. germanica*, and *V. rufa* always nest in the ground, as far as my own experience goes. *V. sylvestris*, although sometimes building in bushes, very frequently nests in the ground. *V. norvegica* I have seldom met with, but always in a hedgerow. I remember one nest so placed in the Comp

Woods, between Wrotham and Wateringbury. It was the first nest of *V. norvegica* I had met with, and I was anxious to secure it. I held my net beneath it, and a companion with his stick hooked it so that it fell into the net. We then ran a distance to be clear of any home-coming wasps, bottled all that emerged from the nest, and wrapped the nest up and took it with us. *Vespa austriaca* appears to differ entirely in habits from all its fellows. I have never met with it, but, according to those who have, it never constructs a nest, being more or less parasitic on *V. rufa*, to which it seems closely allied. It has, however, been seen collecting nesting material and food, so that probably it will prove to be one of those insects that have not quite lost their industrious habits, though largely dependent on a fellow species. All the wasps are quite omnivorous, feeding on flesh, fruit, vegetables, flowers, cheese, sugar, and many other substances. I have seen them attack pears outside my window, gradually eating deeper and deeper until quite lost to view, and I have also seen them rapidly remove the flesh from a dead young bird until nothing but a clean skeleton was left. I have not observed any particular association with flowers except in the case of *V. sylvestris*, which species is particularly attached to tansy and to figwort. The other species apparently visit a very great number of flowers. Ivy blossom is always a great attraction at the end of the season.

The family *Eumenidae* consists of two British genera of Solitary Wasps, *Eumenes* and *Odynerus*, the former containing but one species and the latter eighteen. The pretty little *Eumenes coarctata* is found on open heaths, though it is very local in its distribution, and I have never yet been fortunate enough to find it. It makes small clay nests attached to heath and ling, and stores small lepidopterous larvæ. Of the numerous species of *Odynerus*, a few are very rare, *O. basalis* being known only from Dorset, *O. reniformis* from Surrey, *O. herrichianus* from Essex, and *O. crassicornis* from two or three widely separated localities. Most of the others are more or less common, three or four being quite abundant. Many of them nest in holes in walls and posts, making use of mud in constructing their cells, or in modifying the size of the cavity chosen. Two or three, at least, make use of bramble-stems, and another three or four burrow into the ground. One of these burrowers, *O. spinipes*, makes beautiful curved tubular entrances to its burrows, and the same habit is recorded of *O. reniformis*. They all provision their cells with caterpillars.

The British Bees are not so varied in their choice of provision for their progeny, mostly storing pollen, a mixture of honey and pollen, or honey only. They are very unequally divided into "Solitary" and "Social" species, the latter containing only the Humble Bees and the Hive Bee. They are much more varied in their choice of a nesting site and in the structure of their cells, as well as in their selection of flowers from which to collect their food.

The species of *Colletes* are mostly prettily banded with white pubescence, and construct their cells in sandy banks, of a very thin membrane, through which the pollen is readily seen. *C. daviesana* is usually the commonest species, though others are frequently abundant. *C. fodiens*, on thistle; *C. picistigma*, on yarrow and tansy; and *C. succincta*, on heath. *C. marginata* I have only taken at St. Helens, in the Isle of Wight, on thistles. *C. cunicularia*, which differs very widely from the others in appearance, is only found on the Lancashire and Cheshire coasts. It is more like a large brown *Andrena*. The species of *Prosopis* are all small, black and shining. Many of them nest in perforated bramble-stems, though almost anything with a hole in it will suit them. Five or six of the species are fairly common, and are very partial to flowers of the bramble and mignonette. The genus *Sphecodes* contains a number of red and black bees with very scanty pubescence. They appear always to be associated with certain species of *Halictus*, on which they are parasitic. At one time it was thought that they constructed their own burrows, but I have satisfied myself, at any rate, that though they may be seen scratching at a burrow, they do not really construct one. On one occasion, on Redhill Common, I saw a *Sphecodes* apparently digging, but closer observation showed that it was only scratching away the loose earth that was being pushed out by a ♀ *Halictus*.

The members of the genus *Halictus* often form large colonies in banks and pathways, many of the smaller species being very abundant. The females hibernate after pairing, reappearing with the first warm days of spring. A few of them are quite rare, and two or three species have not been met with for many years.

Andrena contains more species than any other British genus. They burrow in much the same kind of situation as *Halictus*, especially the early species, many sandy banks being quite riddled with their burrows. The later summer species are, many of them, more solitary in their habits. Among the early species, *A. albicans*, with red thorax and red apex to the abdomen, is sure to be found on dandelions, and frequenting the same flower, the more local white-banded *A. fasciata*. *A. clarkella*, with fulvous thorax and fulvous hairs at the base of a dark abdomen, is a very early species, which I have taken on February 19th. It visits the sallow blossom. *A. apicata* is another very early insect, usually being over ere March is out. *A. fulva* is as beautiful as it is common, thorax and abdomen being covered with rich fulvous pubescence. It rapidly fades in sunny weather. Many of the *Andrenae* assume the perfect state in the autumn and pass the whole winter in waiting for suitable weather to make their appearance. The three species of *Cilissa* are very like *Andrena* in appearance and habits. *C. haemorrhoidalis* visits the common harebell, *C. leporina* the white dutch clover, and *C. melanura* frequents the red bartsia. *Macropis labiata* is a very local insect, which I have taken only at Matley Bog on the

yellow loosestrife. It is recorded from a few other localities, and is also known to visit thistles and the water plantain. The single species of *Dasypoda*, *D. hirtipes*, is like a large showy *Andrena*, and is somewhat local, preferring sandy localities on the coast. *Panurgus* has two representatives, both black, and both rather local. They occur in summer, and are partial to yellow *Compositae*, such as hawkweed, hawkbit, and cats-ear.

The next genus of importance is *Nomada*, with a large number of yellow and black or yellow and brown species. They are all parasitic, mostly on *Andrena*, though *N. sexfasciata* is recorded as occurring with *Eucera*, and I have taken *Nomada furva* apparently associated with one of the smaller *Halicti*. A few, such as *N. succincta*, *N. lineola*, and *N. alternata* are very common, and apparently associated with several species of *Andrena*. Others occur only with one or two species. *N. borealis* associates with *Andrena clarkella*, and also with *A. apicata*; *N. fucata* with *A. fulvicrus*; *N. solidaginis* I have taken with *A. furcipes*, and it has been found with other species. The largest, *N. armata*, appears to be exclusively attached to *A. hattorfiana*; *N. lathburiana* to *A. cineraria*, and *N. alboguttata* to *A. argentata*. The striking coloration and weak stinging powers of *Nomada* would appear to be disadvantageous to its success as a parasite, but I cannot say that any such idea is confirmed by observation. Another parasitic genus is *Epeolus*, containing two species, which are associated with *Colletes*. *E. productus* has always been regarded as parasitic on *C. dariesana*, but recent observations by Dr. Perkins make further investigation desirable. Although I have bred large numbers of *Colletes* I have never obtained *Epeolus* in that way. I am getting more cells this winter to breed from, in the hope of throwing some light on the matter. *Coelioxys* is another genus of parasites of very distinctive appearance. They are all black, with spots and bands of white pubescence, large head and thorax, and with abdomen tapering very rapidly to a point. I have always found them with the leaf-cutter bees, *Megachile*, but they are known to be parasitic also on *Anthophora* and *Saropoda*. The two rather bulky-looking species of *Melecta* are parasitic on *Anthophora*, the rarer *M. luctuosa* attaching itself to *A. retusa*, whilst the much commoner *M. armata* associates with both *A. retusa* and *A. acervorum*. The last parasitic genus of the solitary bees is *Stelis*, with three species, which in this country always select one or other of the genus *Osmia* as a host. The two commonest species associate with *Osmia leaiana*; the rare *S. 8-maculata* selecting *O. leucomelana*.

Coming back for a few minutes to the industrious bees; we notice first the single species of *Ceratina*, a very showy little blue bee, which I have bred from bramble stems. The two species of *Chelostoma* are wood-borers. The larger one I usually take on old posts, the smaller in hare-bells, canterbury bells, or the nettle-leaved bellflower. *Eriades* is closely allied, but its single species is

very rare. It appears to collect resin for use in the construction of its cells. The leaf-cutter Bees, *Megachile*, are true summer insects, and are most of them fairly common and widely distributed. They burrow into banks, walls, and posts, or sometimes make use of an existing hollow. They line their burrows with pieces of leaves, frequently rose-leaves, but a number of kinds are used, even those of virginia creeper (*Ampelopsis*). Oval-shaped pieces are used at the sides, the different pieces overlapping; circular pieces are used at the ends of the cells. The segments are cut from the leaves very rapidly, and the bees are quite conspicuous objects when flying with their loads. Two species are found more especially at the sea-side, *M. maritima* and *M. argentata*, though they sometimes occur inland. I have taken them both on Redhill Common, and the former also on Dartford Heath.

Osmia is another of the interesting genera that make their nests almost anywhere. Very few of them, however, appear to line their burrows with leaves. The larvæ spin very tough cocoons when full-fed. *O. rufa* is the species that often nests in an old lock, entering by the key-hole. *O. bicolor* and *O. aurulenta* are well known from their frequent use of snail-shells. Mr. V. R. Perkins has seen the former species cover the used snail shell with a little pile of bents from two to three inches in height. An interesting northern species is *O. parietina*, which attaches its cells to the underside of stones. These have been known to hatch out at intervals during a period of three years.

The single species of *Anthidium*, a very handsome and common insect, makes use of any suitable hole it can find, lining it with fibres scraped from the stems of plants. It is the only British bee in which the male is larger than the female.

Another conspicuous bee is *Eucera longicornis*, the male only having the exceedingly long antennæ, from which it gets its specific name. It is very partial to the vetches, especially *Vicia sepium*.

The genus *Anthophora* contains four species, of which two, *A. retusa* and *A. acervorum*, are Mason Bees, constructing smoothly polished clay cells in walls and banks. The first named species is the more local, the other is one of our commonest spring bees, often appearing at the end of February. The other two species of the genus are summer bees, not appearing till July. *A. furcata* burrows in old wood, and *A. 4-maculata* in banks and walls. Both are very partial to the black horehound, *Ballota nigra*. Scarcely separable generically is *Saropoda bimaculata*, very similar in appearance and habits to *A. 4-maculata*, It is most abundant at the sea-side. I have seen it in very great numbers at Sandown Bay.

The only bees remaining to be mentioned now are the Humble Bees, the genus *Bombus* and their very similar parasites, *Psithyrus*, the latter only differing slightly in structure from the true *Bombi*. The females, or queens, of both genera, pass the winter in an impregnated state, and emerge in the early spring. The *Bombus*

then proceeds to construct a nest, in a hole in the ground in some species, amongst herbage in others, often appropriating an old nest of a field-mouse. A mass of pollen is provided for the larvæ and added to when necessary, and a cell containing a number of eggs placed on it. These are kept warm by the brooding queen. When hatched they feed on the pollen and also on a liquid honey and pollen, on which they are fed by the queen. A few workers are soon produced who help in the labours of the nest. As the nest becomes more populous the Queen devotes all her time to egg-laying and various indoor duties, the workers collecting the honey and pollen and doing most of the work of the nest, such as cell construction, feeding the larvæ, and clearing away debris. The young queens emerging late in the season help in the home for a little while, but after pairing seek out their winter quarters; the males do not return to the nest but continue a life of pleasure at flowers, etc., until killed off by inclement weather. The parasitic queen, *Psithyrus*, makes its appearance later in the spring than *Bombus*, and searches for a nest of the latter that already contains a small number of workers. It puts the queen *Bombus* to death, and persuades the workers to rear a *Psithyrus* family. This genus contains males and females only, no workers being required. They are very similar to *Bombus* in appearance, and it is interesting to note that the red-tailed *P. rupestris* is parasitic on the red-tailed *Bombus lapidarius*. *P. vestalis* also is very like its host, *B. terrestris*.

This brings my few notes to an end. I think enough has been said to prove that the Aculeate Hymenoptera are an exceedingly interesting order, or sub-order, of insects. There is room for any amount of research, and it is impossible for a few workers to do it all. In many cases I have had to depend on the observations of others; but where possible I have relied on my own experiences.

Sexual Dimorphism.

By Dr. F. A. Dixey, M.A., F.R.S., F.E.S.—*Read November 9th*, 1920.

Those of us who are familiar with the oak woods of the south-eastern parts of Great Britain, the counties for instance of Essex and Suffolk, have very likely had opportunities of watching the splendid "Purple Emperor" butterfly, as it glides about among the breezy tree-tops and settles from time to time upon a lofty twig, the glossy metallic purple of its wings flashing and glowing in the summer sunshine. We may also, though this is less likely, have encountered in the same places a somewhat larger butterfly with similar markings, but with a ground-colour of sober brown; the brilliant purple showing no trace of its presence. The difference between these two forms of butterfly is one of sex; the one with wings of glowing purple being the male, and the larger, quieter-coloured insect, the female. We have here, then, dimorphism of another kind than that with which we dealt on a former occasion, the two different aspects being borne, not by separate generations according to season, but by separate individuals of the same generation.

There are many more instances of this sexual dimorphism among our common butterflies; the female, for instance, of the well-known "Orange-tip," is entirely destitute of the bright patch of colour that ornaments the wings of the male. In many species of blue butterfly the two sexes are so dissimilar in aspect, that they might easily be taken for different species.

On the other hand, there are plenty of cases where the sexes hardly differ. So far as the wing-patterns are concerned, the sexes of the tortoiseshells, the peacock, the painted lady, and the red admiral are nearly identical. The same may be said of the swallowtail, the wood white, the pale clouded-yellow, the small heath, and several others. In another set of instances, the sexes although very similar are yet distinguishable at a glance. Hence we see that, as in the case of seasonal dimorphism, every kind of transition exists between a difference so slight as to be scarcely distinguishable, and a divergence so great that without direct proof no one would believe that the two forms could belong to the same species.

As in the dimorphism which we were considering when I last addressed you, the question at once suggests itself, can we do anything towards explaining this curious phenomenon of sexual divergence? Must we regard it as an ultimate fact of nature, or can we

find any principle, teleological or otherwise, which will help us to get at the meaning of the facts presented to our observation? The answer in this case is very much like that given to the former enquiry. There is a residue of facts which we cannot at present explain; but in many instances we are able, with a high degree of probability, to assign a definite reason, founded on utility, for the different aspects assumed by the male and female respectively. In order to get some further light upon this, let us examine the matter a little more closely.

It is probably well known to most of my hearers that of the three kinds of common white butterfly that haunt our lanes and gardens throughout the summer, some individuals are furnished with black spots on the upper surface of the wings, and some not. Speaking generally, the heavily spotted individuals are females, and those with few or no spots are males. So far then, as this particular group of butterflies is concerned, the females tend to exhibit a larger amount of dark pigment than the males. If we take into view not only the white butterflies of our own country but also those of other regions, we find the same tendency often carried to a higher pitch. There is a genus of white butterflies, named *Belenois*, some species of which are not unlike our common whites, though there is generally somewhat more black about them than in our native kinds. These *Belenois* butterflies belong mostly to Africa, but they are also found in southern Asia, and south-eastwards as far as the Australian continent and some of the Pacific islands. The females in nearly every instance show a strong accentuation of the dark markings of the males. This may go on to such a degree that the female might almost be called a "black" butterfly instead of a white one. In some females of *Belenois severina* from the shores of the Victoria Nyanza, the white of the upper surface is reduced to a dusky basal patch on each of the four wings, next to the body, the remainder of the wing-surface being of a smoky black. The corresponding male has a black apex and border; but these are spotted with white, and occupy far less space than the dark areas of the female. So too, the male of *Belenois peristhene*, one of the Pacific island forms, has a deep black apical patch and marginal band; but in the female the apical and marginal black have overspread perhaps two-thirds of the whole wing-space. Good examples of the same state of things may be seen in the genus *Delias*. The male of *Delias descombesi*, from the Eastern Himalayas and the Indo-Chinese peninsula, is on the upper surface a white butterfly with a narrow fuscous edging. On the corresponding surface in the female the forewings are black with some white spots and streaks, and the hindwings, though mainly white, have a broad black margin. In *Delias inferna* from New Guinea, the male is orange coloured with black apex and border; the female is black with an area of dusky orange at the bases of the wings, occupying perhaps a third of the whole surface. Many species of the genus *Teracolus* are character-

ised in the male by the possession of a bright patch of orange at the tip of the forewing. This is often reduced in the female; or may be entirely absent, the two sexes then looking quite dissimilar; as may be seen in *Teracolus casta*, a species from East Africa. Here the male, except for the apical patch of orange, is mainly a white butterfly; the female is without the orange tip, and is almost completely suffused on the upper surface with dark fuscous, the white only appearing in isolated patches. The same kind of description applies to many species of the genus *Ixias:* the large form known as *Ixias evippe*, for example, being in the male a bright yellow butterfly with a conspicuous orange tip, while a common form of the female is a dark smoky-brown insect with a few whitish patches, and often with no trace of the apical orange. Cases of this kind are numerous, and even where the difference between the sexes is very much less than in the examples we have just had under notice, the tendency in the female to assume a duller or darker appearance than the male is very frequently to be recognised. I suppose that most of us are familiar with the tawny butterflies spotted with black on the upper surface, and showing streaks or patches of silvery lustre on the hindwing beneath, that frequent our woods and clearings in July and August. In *Dryas* (*Argynnis*) *paphia*, one of the handsomest of these Fritillaries, as they are called, the ground colour of the female is always duller, and the black spots larger, than in the male. But besides the ordinary form of the female, in which the difference from the male is not markedly conspicuous, there is another form, in this country perhaps most often met with in the New Forest, in which the ground colour is of a deep olive-brown, contrasting strongly with the bright fulvous hue of the male. In another species of Fritillary, *Argynnis sagana*, which is a native of China and Japan, the ground colour of the female is of a sage-green so deep that the black spots are scarcely visible upon it, while a few patches upon the forewings are of a creamy white, which tells out conspicuously against the dark green background. The male, both in markings and colour, is very like that of our British *Dryas* (*Argynnis*) *paphia*, and of course very unlike its own female. Without going further in search of instances, we can say then, that the difference between the sexes, in at any rate a large number of cases, manifests itself by an increase of dark pigment in the female. This may prevail to a greater or less extent, and may have the general effect of rendering the female comparatively dull and inconspicuous, or in some instances (as in the female of *Argynnis sagana* just spoken of) may constitute a feature in a pattern which becomes conspicuous by virtue of its contrasts of colour.

The kind of sexual dimorphism that we have been considering is chiefly concerned with the colouring of the upper surface; we will now turn to another type of difference, in which it is the under and not the upper side at which we must look for the marks of sexual differentiation.

There is an interesting group of butterflies, comprised in the genera *Catopsilia* and *Callidryas*, not very far removed in point of relationship from our own "brimstone butterfly," members of which group are to be found in the tropics of both Eastern and Western Hemispheres. These butterflies vary much on the under surface, but many of them present, when their wings are closed over their back in the ordinary position of rest, an appearance which is strongly suggestive of a dead and partly decayed leaf. The usual coloration in these specimens is yellow, with irregular spots and blotches of brownish crimson; and in the midst of one or more of these blotches are generally to be seen a few pale spots, which look like the holes or "windows" that are apt to occur in withered leaves. These spots are not really transparent, but are formed by glistening white scales which produce the effect of transparence. There is little doubt that a butterfly showing these features, when settled with closed wings among withered leaves, would escape detection from all but the very sharpest-sighted enemies. They form a good example of what is called "protective resemblance."

Now the point to be observed is that those individuals which show the protective resemblance in greatest perfection are females. The males under certain circumstances exhibit the same kind of likeness to dead leaves, but always to a far less degree than their mates. Here then we have a group of cases in which the females are better protected than the males, the protection coming into play not during the flight of the insect, but when the butterfly is settled and at rest.

We may now take into consideration a form of dimorphism which is of a specially interesting character, and which throws fresh light on the bionomic significance of this divergence between the sexes.

There is a group of butterflies called *Nepheronia*, the males of which are of a pale glossy blue, bordered and streaked with black. In the females the blue is replaced by a creamy white, which may sometimes in places become yellow; the streakiness is greatly enhanced, and a submarginal row of dark spots usually makes itself visible. All these features render the aspect of the females very dissimilar from that of the males; but in proportion as the females depart in appearance from the males of their own species, they approach the characteristic aspect of an entirely different group of butterflies, found in the same regions, viz., India, Burma, and the islands of the Malay Archipelago. These latter butterflies belong to the sub-family of Danaines, with which Pierines like the *Nepheronia* have nothing but a remote affinity. We have here what is evidently a case of mimicry. There is a strong presumption that the Danaines are avoided by insect-eating birds, and there is every reason to think that the *Nepheronia* females derive benefit from the protection afforded by the characteristic aspect which they share with the Danaines.

Closely allied with the Eastern *Nepheronia*, are the *Leuceronia* of Africa. In two of these *Leuceronia* we find forms of the female differing widely from the male, and bearing a close resemblance to other butterflies which are believed on good grounds to be distasteful. I shall return to these later.

In the New World we have other instances of the kind. *Perrente charops*, a Pierine from Central and South America, the male of which is on the upper side a black butterfly with a powdering of bluish grey, has a female whose upper side is dark brown with no grey powdering, but crossed on the forewing by a diagonal band of bright scarlet. This brings it into mimetic relation with a large assemblage of butterflies, all characterised by the same general type of coloration, including many members believed on good evidence to be immune. Other examples are plentiful; thus we have in Central America *Pieris viardi*, the male of which is a white butterfly of quite ordinary aspect, while the female is furnished with black and yellow streaks which assimilate it in aspect to the very conspicuous insect *Heliconius charitonia*.

There is a curious set of instances belonging to the mimetic category, but differing in one respect from those that we have just been considering. In these, though dimorphism still obtains as between the sexes, both sexes are mimetic, but in unequal degree. In *Perrhybris pyrrha*, for example, a Pierine from Brazil, the female belongs, by its coloration on both surfaces, to a group of protected insects which includes a large number of members from different subfamilies of butterflies and even of moths. The male on the other hand is on its upper surface simply a white butterfly with a black apex to the forewings. The same applies to the under surface of the forewings; but on the under surface of the hindwings there is displayed a mimetic pattern like that of the female, though a less perfect copy of the original. In another case, that of *Dismorphia praxinoë* from Central America, which is also one of the *Pierinæ* or "white" butterflies, the female is completely mimetic on both surfaces; while the male though for the most part exhibiting an imitative pattern like that of the female, retains, on the under surface of the forewing and upper surface of the hindwing, a considerable area of the original white.

We have added then to our stock of data this further fact; that even when both sexes are mimetic in some degree, the female frequently displays a far more perfect imitation of the distasteful model than does the male.

Let us now turn back for a time to those cases where the female is mimetic and the male shows no trace of imitative assimilation. The instances that we have examined hitherto belong to the subfamily of *Pierinæ*, of which our common whites, brimstones and clouded yellows are members. But the phenomenon is by no means confined to butterflies of this group. Many probably of my hearers are acquainted with the common tropical butterfly *Danaida*

chrysippus, a brown insect with a black apical patch crossed by a band of white. This butterfly is mimicked by other butterflies belonging to many different groups, and among others by the female of *Hypolimnas misippus*, a Nymphaline butterfly related to our Fritillaries and Vanessas. The male *Hypolimnas misippus* is black with a bluish iridescence, and is made conspicuous by the presence of large blotches of dead white. The male is thus completely dissimilar from the female in aspect, and shows no trace of the resemblance to *Danaida chrysippus* which is so noteworthy in the latter sex. In other species of *Hypolimnas* the male is equally non-mimetic, while the female presents a close resemblance to species of the distasteful genus *Euploea*.

In several of the instances that have come before us, you may have noticed that I have avoided making statements about the females as a whole, speaking rather of "a form of the female," or "some of the females," thus implying that not all of the females of a given species will fall under the description that is being given. Thus, in the case of *Ixias evippe*, some of the females are furnished with an apical orange patch, and some not. In all cases, however, the female *evippe* is a duller and less conspicuous insect than the male. It can hardly have escaped the notice of any observer interested in butterflies that the females generally have a greater tendency to variation than the males; and this tendency occasionally undergoes a very striking development. Not only may we get two or more forms of the female of a given species differing in comparatively small particulars such as the presence or absence of an orange-coloured patch at the apex, but we may find the females of one and the same species falling apart into separate groups which are absolutely different in appearance; so different, indeed, that no one in the absence of direct proof would believe them to be of the same species, Let us take for example the very remarkable *Papilio dardanus*, one of the swallowtail butterflies of South Africa, and not very far removed from our own British swallowtail. This butterfly has three or four different forms of female, all quite unlike each other, but each of them bearing a close resemblance to a butterfly belonging to an entirely different family. The brown form with a black and white apical patch mimics *Danaida chrysippus*; the black and white form is a copy of *Amauris dominicanus*, and the dark form with white spots on the forewing and an ochreous band on the hindwing bears a close resemblance to *Amauris echeria*.

In the instance of *Papilio dardanus* all three models are Danaines, and are quite remote in affinity from the Swallowtail butterflies that imitate them. But there are cases, almost equally striking, where the female is similarly polymorphic, each form resembling a butterfly, not of another family, but belonging to the same group, *viz.*, the *Pierinae*, as the mimic itself. A good example of this state of things is afforded by *Leuceronia argia*, a butterfly found under various slightly different forms over the

greater part of the African continent south of the Sahara. The male is a white butterfly not unlike our large cabbage white. It has, like that insect, a black apex to the forewing, with a gradually narrowing prolongation along the outer border. The general ground-colour is white, often with a tinge of pale bluish-green. These males are all very much alike, though slight differences may be seen in the dark apical patch, according to the locality from which the specimen comes. But when we turn to the female, we find at least eight different kinds, each with a pattern on the upper surface that makes it easily distinguishable from all the rest. And each of these different forms bears a more or less close resemblance to another Pierine butterfly; four Pierine genera being represented among the models. There is first of all the white, black-bordered form which may be considered typical. This is like a member of the genus *Belenois*, *B. theuszi*. The addition of an orange basal flush to this form with the heavy dark border gives us a form which recalls at once the male of *Mylothris rüppellii*, a conspicuous member of a well-known distasteful genus. In another kind of the female, the black border is somewhat less pronounced, and in place of the brilliant orange flush on the upper surface, a pale pinkish tinge just shows through on the upper surface at the base of the forewings. This brings it near in aspect to the male of another *Mylothris*, *viz.*, the well-known and widely-distributed *Mylothris agathina*. The female *Leuceronia argia* may also have a border of conspicuous and isolated dark spots, while the basal flush is very large in extent, and vermilion instead of orange. In this case the resemblance is still to *Mylothris rüppellii*, but to the female rather than to the male. This last, which is the form of the female most often met with in Natal, is often accounted, together with its male, as a separate species, under the name of *L. varia*, Trim. There is also a form of the female which is like the typical form, except that the ground-colour is bright yellow instead of white. This resembles the West-African *Belenois ianthe*. The addition, in some specimens of this last, of a basal orange flush, gives the appearance of a yellow form of *Mylothris rüppellii* known as f. *erlangeri*. The form with slightly-marked spotty border and orange basal flush may have the hindwings yellowish, in which case it falls into line with the upperside of the female of *Phrissura phœbe*, an African member of the group which includes the splendid sharp-winged *Appias* or *Tachyris* of India and the Malayan Archipelago, and also with the underside of a large colour-combination of white butterflies, consisting of many genera, the central type of which is probably again the widely-distributed form *Mylothris agathina*. From this variety of the female the basal flush may be omitted; it then resembles certain females of *Pinacopteryx pigea*. Lastly, there are females of *Leuceronia argia* with brown forewings and white hindwings. These are strikingly similar to the females of *Mylothris spica*.

Another species of *Leuceronia*, *L. thalassina*, has also several kinds of female, though not so many as *L. argia*. Each of these also resembles a species belonging to one or other genus not at all closely related to *Leuceronia*.

I ought here to mention that though in speaking of these females of *Leuceronia* I have given the name of the butterfly which each form on the whole most resembles, it would in many instances have been easy to adduce other species to which the resemblance is almost equally close. The fact is that these homoeochromatic assemblages, as they have been called, that is to say associations characterised by similarity of colour and pattern, are often very extensive, comprising many species of diverse genera; and it may sometimes be difficult to say that a form which clearly belongs to a given association (or as Weismann has called it, a "mimicry ring") is more closely assimilated to one constituent member of that association than to another. Some species of *Mylothris* is generally considered, with good reason, to be the central model controlling, so to speak, the general aspect of each of these Pierine assemblages; but it will often happen that a *Leuceronia* female for instance, which is a member of one of these assemblages, will show a greater likeness to another subordinate member than to the central *Mylothris*. Further consideration of these matters would lead us into the great question of Mimicry, which is not our primary subject on the present occasion; and we must be content to note that these divergent members of the female sex are not simply partners in mimetic pairs, each pair consisting only of mimic and model, but are constituents, in several cases somewhat outlying ones, of more or less extensive "mimicry rings," or, to use again a term perhaps less open to objection, "homoeochromatic associations."

Let us now consider what light these various facts are able to throw upon the use and significance of sexual dimorphism. We have seen that in many cases of sexual diversity the female is characterised by a greater prevalence of dark pigment, resulting frequently in a comparative dulness of colouring. In other instances the female may show a specially close resemblance to certain inanimate objects, such as dead leaves. Or again the female may depart in great measure from the ordinary standard of the species, and may become a more or less exact copy of a butterfly of another species, sometimes far removed in point of affinity.

Now the one common element in these different manifestations of female divergence is the protection afforded thereby to the individual against the attacks of its enemies. It is true that the subject of mimicry gives rise to some difference of opinion among naturalists; but without going into matters of dispute, it will be quite safe for us to say that there is a very considerable measure of agreement that many conspicuous forms of insect life are relatively immune from attack; and that other insects which resemble the immune forms are enabled by their resemblance to enjoy at least

some share in that immunity. This may be granted without any prejudice to the question of how the resemblance or the immunity arose.

So too, in the case of the resemblance to inanimate objects, and particularly to dead leaves. The protective effect of such resemblance is obvious. When, however, we come back to the instances where the female is simply duller or darker than the male, the significance of the sexual character is not so plain. The case is no doubt analogous to that of many birds, for instance those of the group of pheasants, where we so often find a male of splendid plumage associated with a female of comparatively dull and inconspicuous colouring. Selection by the females of brilliantly-coloured or peculiarly ornamental mates has, as is well known, been thought to be answerable for the specially masculine attractions of both birds and beasts. It is conceivable that the same principle may operate among insects, and certain facts are known which lend this view some support. But even so, some positive reason seems to be required for the comparative dowdiness of the females.

There is, I think, little doubt that the ruling principle here is the same as in the cases of the mimicry of other insects and of the resemblance to dead leaves, *viz.*, the demand for protection. With the birds that have been mentioned, the protection is afforded by way of concealment. The female while on the nest is comparatively safe from observation on account of the sober colouring of her plumage, which harmonizes more or less perfectly with her surroundings. The same will hold good to some extent in regard to insects at rest; but it may also be the case that inconspicuousness, short of actual concealment, may favour the escape of the dull-coloured females from the attentions of insect-eating foes. I have often been struck by the fact that when the two sexes of a dimorphic butterfly are flying together in some number, the eye readily picks out the males as the more conspicuous, the females though perhaps equally numerous, tending by comparison to escape observation. This was particularly noticeable in South Africa; the butterfly I have specially in view being *Belenois severina*, where the extra allowance of dark pigment on the wings of the females certainly tended to diminish the conspicuousness of that sex as compared with the male; and where also the broad dark border to the wings, almost invisible during flight, caused the females to appear appreciably smaller than their mates; and, therefore, presumably less tempting as objects of pursuit and capture. All this gives reason for thinking that generally in these cases the aim of nature is to pay exceptional attention to the preservation of the life of the female.

The reason for this preferential dealing on the part of nature has been pointed out by Alfred Russel Wallace. From the point of view of the individual, no doubt the life of the male is as important to *him* as that of the female is to *her*. But when we regard the welfare of the species, it is plain that the life of the

female is the more important of the two. The female is the guardian of the future brood, and her destruction at any time before her eggs are properly disposed of with a view to the welfare of the next generation, means depriving that next generation of a large mass of recruits. When the eggs are once laid, the after-care of the family does not concern the butterfly as it does the bird, but still the eggs are carried by the butterfly for a sufficiently long period before laying to make it highly necessary to run as few risks as may be. Hence, I think, the special provisions for guarding the life of the female. The safety of the female is called for in the interest of the race.

It seems to be the case, as we have already noticed, that females generally have a greater tendency to vary than their corresponding males. "Varium et mutabile semper Femina" has a wider application than was originally intended. This fact, as has been pointed out by Professor Poulton, has no doubt contributed to the bringing about of the phenomena with which we have just now had to deal. In the diversity of material presented for operation by the comparative instability of the female sex, Natural Selection has found its opportunity for specially safeguarding the interests of that sex, and through it those of the race at large.

We may claim then to have found a basis of utility for many of the manifestations of sexual dimorphism which have presented themselves to our notice. It must nevertheless be admitted that our present knowledge does not permit us to assign such a significance to every case that exists. We must be content for the present to acknowledge that there are certain features associated, if we may use the expression, with femaleness; beyond which recognition we cannot go. This is the case, for example, with dark spots on the wings which characterise the females of our common whites.

One more question may be asked and answered in conclusion. What bearing have the facts of seasonal dimorphism, discussed in my former lecture, on the sexual dimorphism which has been our subject to-day? We have obtained some insight into the principles which underlie the two sets of phenomena considered separately; what results are found to follow from the two in combination? The answer is an interesting one; but in order to arrive at its full value, it will be necessary to recall some of the conclusions arrived at on the former occasion. It will be remembered that we found reason for thinking that in tropical regions the dry season was a time of greater stress and competition than the wet; and that the method of concealment was probably a more efficient means of protection than the method of display. In accordance with this we found that many species which alternated between a cryptic and an aposematic or "warning" coloration, reserved the former, being the more efficacious mode, for the period of drought. In view of the facts adduced during the present lecture, it is interesting to

observe that the incidence of seasonal dimorphism is often different as between the sexes; the cryptic coloration, usually more perfect in the female than in the male, being in the case of the former sex frequently prolonged into the wet season, at which time the latter sex has lost it completely.

Let me give a few examples. There are two pretty species of the genus *Teracolus*, known as *T. puellaris* and *T. phisadia* respectively. In both of these, which inhabit dry and sandy localities in north-eastern Africa and western Asia, the female retains at all seasons a reddish, sand-coloured underside. The underside of the male of *T. puellaris* in the dry season is similarly coloured; in the wet season it is bright yellow. The male of *T. phisadia* is similarly bright yellow beneath in the wet season; in the dry season it may either retain its bright yellow hue, or may become sand-coloured like the female. The underside in both sexes of *Teracolus auxo*, a well-known butterfly in South Africa, is in the dry season coloured like a dead leaf; the resemblance being increased by a leaf-like modification of shape, best marked, be it observed, in the female. In the wet season, though the leaf-like contour is lost in both sexes, the female retains some of the cryptic coloration which is at that period quite absent from the male. A similar description will apply to an interesting butterfly from the New World; *Pyrisitia proterpia* of Central and South America. Here the leaf-like "uncination" or "hooking" of the wings, in what appears to be the dry-season form, is carried to a still greater extent, and in the female is especially remarkable. In addition to the uncination of the forewing, the hindwing is in this sex prolonged into tails which may stand either for the stalk, or, as is perhaps more probable, for the sharp apex of the leaf to which the colouring of the underside affords so close a resemblance. The male shows a tendency in the same direction, but to a considerably less extent. In the wet season neither sex exhibits uncination or is furnished with tails, but the female is duller in hue beneath, and less conspicuous than the male.

Finally, as exemplifying the same principle of superior advantage to the female manifesting itself in a different way, we may take the curious instance of *Belenois thysa*, an African butterfly which mimics the well known and prevalent *Mylothris agathina*. In the dry season the mimicry is extremely good, the resemblance being, as Mr. Trimen says, "deceptively close in both sexes," the male copying the male *Mylothris*, and the female the female. In the wet season the mimicry is a good deal less exact, and the female *Belenois* often loses her special resemblance to the female *Mylothris* altogether; becoming merely, like her mate, a rather rough copy of the male *Mylothris agathina*.

Putting all these facts together, we may, I think, consider that we have gained, not indeed a complete explanation, but some light on the facts of butterfly Dimorphism, whether seasonal or sexual.

The dry season as compared with the wet makes greater demands on the provisions for individual safety from enemies, and the dry-season broods become modified accordingly. The female sex demands a higher degree of protection than the male, and so we see that when the same means of protection are employed in common by both sexes, the female enjoys them in greater measure. When the methods employed are different, the more efficacious contrivance is appropriated by the female. When the mode changes in correspondence with the change of season, we often find the female still clinging in the time of plenty, to the means of defence which enabled her to tide successfully over the hazardous time of stress and adversity.

This finishes what I have to say on the present occasion about Dimorphism as exemplified in Butterflies. We may consider, I think, that we have not only been able to pass in review a series of facts which in themselves are both curious and interesting; but, what is of more importance, that we have been able in the case both of seasonal and of sexual dimorphism to gain some insight into the bionomic significance of this remarkable phenomenon.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

Read January 27th, 1921,

By K. G. Blair, B.Sc., F.E.S.

LADIES and GENTLEMEN, from the Reports of the Treasurer and the Council that you have heard read you will have learned that in spite of the present hard times the position of the Society is a flourishing one, your membership continues to increase, attendance at the meetings remains at a high level, and the number and interest of the exhibits maintains a very satisfactory standard. In particular at our last Annual Exhibition of Varieties the attendance was a record one, falling very little short of 150. The exhibits on this occasion, while numerous and of great interest, were perhaps to a greater extent than usual confined to the Lepidoptera, and we missed completely the botanical exhibits that usually add a welcome note of variety to these occasions.

The Field Meetings have perhaps been less successful than any other feature of our programme, but in view of the unsettled state of the weather that persisted almost throughout the summer, we can regard this comparative failure as our misfortune, rather than our fault. The soaking with which the keenness of those of us who attended the Horsley meeting was rewarded, was certainly enough to damp any ardour for future meetings, but came too late in the day seriously to interfere with the success of that meeting.

We have lost only two members by death in the course of the year, but the loss of one of these was a very heavy blow to the Society.

Wm. West, for so many years of Greenwich, was born in 1836.

For nearly 50 years he was in the employ of the engineering firm of John Penn and Son, from which he retired in 1899. He was one of the founders of the Society, and was appointed the first curator of our collections, an office which he held up to the time of his death. Most regular in his attendance at our meetings, he was known to all of us as an indefatigable collector of the Coleoptera and Hemiptera. His collection of the Hemiptera-Homoptera which was exceptionally fine, was presented by him to the Natural History Museum only a few months before his death. Though his knowledge of these and other orders was great, and always readily placed at the disposal of any one desiring information, he seldom wrote more than short notices of captures. The articles on Coleoptera and Hemiptera for the Survey and Record of Woolwich and West Kent (1909) are from his pen, a large proportion of the records being of his own captures.

George B. Browne, born in 1851, joined our Society in 1900, but since his removal to Benfleet, about six years ago, was seldom seen at our meetings. A banker by profession, his interests in entomology were confined to the Lepidoptera. He was a frequent visitor to Wicken Fen, a portion of which he purchased and eventually transferred to the National Trust.

Mr. W. Chittenden, though at the time of his death, at the age of 72, in April last, not a member of our Society, was numbered in our ranks from 1888 to 1912. He was a keen collector of British Lepidoptera, devoting his attention mainly to the *Noctuidæ*.

Outside our ranks a number of prominent entomologists have passed away.

The death of Dr. Charles Gordon Hewitt at the early age of 35, is a serious loss to the economic branch of biological science. He was appointed the first lecturer in economic zoology at the University of Manchester; and in 1909 he went to Canada as Entomologist to the Dominion; in 1917 he was appointed Consulting Zoologist to the Canadian Commission of Conservation. In addition to much valuable laboratory and research work he had devoted a great deal of attention to the improvement of legislation to deal with agricultural pests.

Frank Milburn Howlett was another of our foremost imperial economic entomologists, being at the time of his death Imperial Pathological Entomologist at the Agricultural Research Institute at Pusa, India.

The Rev. Henry Stephen Gorham, who died in March last at

the age of 81, had long retired from active entomology. His most important contributions to literature were the volumes on the Malacoderms, and on the *Erotylidæ*, *Endomychidæ* and *Coccinellidæ* for the "Biologia Centrali-Americana" (1880-1889). He had formed large collections of these families of beetles, and it is to be regretted that a large proportion of these have been allowed to pass into the possession of continental collectors and Museums.

Mr. Alfred E. Hudd died at the age of 75 years. Though perhaps personally unknown to many of us, he was an authority on the Lepidoptera of the Bristol district, and assisted in working out the life history of many species for Buckler's work on the "Larvæ of British Lepidoptera." More recently he had devoted his attention to the Diptera of that district.

Of Continental Entomologists the most noted who have passed away during the year are perhaps :—

Edmund Reitter, a prolific writer on Palæarctic Coleoptera. To British Coleopterists his best known works are his "Catologues of the Coleoptera" of Europe, his "Bestimmungs-tabellen" of very many of the families, and his volumes on the Coleoptera of the "Fauna Germanica." The 'key'-method of treatment so greatly adopted by him is a model of conciseness combined with scientific accuracy.

Professor J. R. Sahlberg is known chiefly for his work on the Northern Palæarctic Coleoptera and Hemiptera.

On these occasions, in addition to a brief survey of the position of our Society during the year just closing it is usual for the President to offer a paper on some subject connected with the work of the Society, the subject chosen being as a rule either of general interest, or on some branch of the work which he has made especially his own. For this part of my address to-night I have chosen one which I hope will be of general interest to the members, *viz.* :—

Insects in Winter.

It is a little startling to reflect that even in the depth of winter, when there seems to be an almost complete absence of insect life, the insects are nevertheless present; in individuals indeed somewhat less numerous than when in full summer they are in countless thousands everywhere around us, yet every species that we find in summer is with us also in winter—if only we know where and how to look for it. Indeed, if we consider the general statement that for each pair of the parents, however great

their immediate progeny, only one pair arrives at the stage in their turn of laying eggs, it is evident that in the case of those species which pass the winter in one of the early stages, the number of individuals extant during the winter must be actually greater than the number of the parent generation, at any rate than of such of them as succeed in reproducing their species.

The reaction of winter upon insect life is felt both directly and indirectly. Directly by the withdrawal of the energising influence of sunshine, while the low temperatures induce lethargy and torpidity; (these influences can be observed in a minor degree on any cold, dull day in summer); indirectly by the cessation of vegetable growth and the dying down of many of the herbaceous plants, which means the cutting off of the food supply of a large part of the insect host. These consequences of winter are not equally felt by all insects. Certain lepidopterous larvæ, for instance, whose food supply is not seriously interfered with, are very much more affected by winter than others in similar circumstances, some seeming to wake up and be ready to feed during any warm spell throughout the winter, while others will commence hibernation comparatively early in the autumn and not wake until spring is well advanced. Those insects whose food supply is completely cut off must perforce find some means of tiding over the barren months of winter until the fresh spring growth enables them to feed again.

Now of the four main stages of an insect's life two, the egg and the pupa, are in any case periods of more or less prolonged fasting, and very naturally, as may be thought, a large number of insects take advantage of one or other of them as a convenient stage in which to tide over the winter months.

In spite, however, of apparent quiescence, both these stages are in reality periods of histological activity and reorganisation; in the egg the cellular tissue is dividing and differentiating to form the parts and organs of the young larva, while in the pupa these organs, having reached their full size, are being altered, or even broken up and reformed as the organs of the perfect insect, often very different, and required to perform very different functions from those of the larva. It is not then altogether surprising that many insects have adopted one of the physically more active though physiologically comparatively quiescent stages, *i.e.*, the larva or the imago, as that in which to pass the winter.

In this case the insect is said to hibernate, by which term is meant to enter into a torpid condition during which no food is taken,

no energy expended in movement, and respiration and all other vital functions are reduced to a minimum. This phenomenon of hibernation is, as already indicated, very much more complete in some insects than in others; it may indeed be considered as an attempt to reassume, temporarily, the resting stage of the egg or pupa. The very attitude taken up by a hibernating wasp for instance, with the legs folded ventrally, the tarsi directed backwards, and the wings also folded ventrally, between the second and third pair of legs, recalls exactly that of the pupa; the insects only grip being by means of the jaws firmly closed and grasping some stem or fibre. This attitude is quite different from the ordinary resting attitude of the wasp, when the wings are folded down the back, and the grip maintained by the feet, and is never assumed except for purposes of hibernation.

In this case the insect is said to hibernate, by which term is meant to enter into a torpid condition, during which no food is taken, no energy expended in movement, so that respiration and all other vital functions are reduced to a minimum. This phenomenon of hibernation is, as already indicated, very much more complete in some insects than in others; it may, indeed, be considered as an attempt to reassume temporarily the resting state of the egg or pupa. The very attitude taken up by a hibernating wasp, for instance, with the legs folded ventrally, the tarsi directed backwards, and the wings also folded ventrally between the second and third pair of legs, recalls exactly that of the pupa, the insect's only grip being by means of the jaws firmly closed and grasping some stem or fibre. This attitude is quite different from the ordinary resting attitude of the wasp, when the wings are folded down the back, and the grip maintained by the feet, and is never assumed except for purposes of hibernation.

What are the precise factors that bring about hibernation has puzzled many investigators. That it is not cold alone is evident from the fact that many hibernating insects take up their winter quarters long before cold weather sets in. Also, exposure to cold artificially produced does not necessarily induce hibernation. Similarly, it is not lack of food that induces hibernation, since many insects, both larvæ and adults, commence hibernating many weeks before there is any scarcity of food. Nevertheless, it appears that the absence of food at the end of the period may conduce to a considerable prolongation of the hibernating state. Dr. Chapman records observations on the larvæ of *Leioptilus tephradactyla* (6). The

larvæ were kept in two cages with plants of golden rod. In one cage, as soon as the new growth appeared in the spring, the larvæ commenced to feed upon it, but the plant being unable to maintain headway against their attacks, when the cage was examined the larvæ were found to be all dead of starvation. In the other cage the plant died during the winter, but when this cage was examined at the same time as the other, the larvæ were found to be alive and healthy. Not having been able to break their winter's fast, they had been able to prolong it for some weeks, while the others having once recommenced feeding were not able to survive subsequent starvation.

Dr. Chapman concludes that the constancy of the occurrence of the habit in any species of insect, and the persistency of attempts to hibernate under abnormal conditions, prove that it is a matter of instinct and inherited habit rather than the immediate consequence of definite physical conditions. For the origin of the habit he suggests that we must look to the quiescence of protoplasm at a low temperature and under starvation, and that hibernation should be considered a function of the protoplasm rather than of the organism as a whole. It would thus be seen in its simplest form in the case of those species that pass the winter as an egg or pupa.

Not only may any one of the four main stages of an insect's life be selected by a species as that best adapted for the purpose of hibernation, but usually each species remains quite constant in this respect. It seems, indeed, as though the capacity for hibernation were limited, as regards any particular species, to the one stage in its life. Experiment (17) seems to show that if, by any means, an insect can be induced to pass beyond its normal hibernating stage before winter overtakes it, it has then passed beyond its capacity for hibernating, and will perish if not fed frequently (17). In a few cases this capacity for hibernating is more elastic; *Nemeophila plantaginis*, for example, will hibernate almost as readily in the pupal as in the larval state, while a few species such as *Arctia caja* and *Plusia gamma* can hibernate in practically any stage. With most insects the capacity for hibernation is limited not only to one of the four chief stages, but usually to a definite period in that stage. An insect that winters as an egg, for example, may do so while the egg is "fresh," so to speak, before the development of the contained embryo has commenced, or development may be already complete, and the young larva ready formed within the

shell, but waiting for the spring before it bursts its bonds. The eggs of *Lymantria monacha*, for example, may be seen to contain the fully-formed larvæ in September, yet they do not emerge until the following March or April. From this it is but a step to the state of things exhibited by certain Fritillary Butterflies, the young larva of *Dryas* (*Argynnis*) *paphia* (20), for example, emerging from the egg in July, enters at once into hibernation after devouring the empty egg-shell from which it has hatched. Many other larvæ pass the winter while still young, *e.g.*, *Limenitis sibilla*, *Abraxas grossulariata*, etc., others when half or nearly full grown, until finally, as in the case of *Macrothylacia rubi*, they hibernate as fully-fed larvæ that do not feed again after waking from their long winter sleep, though they drink greedily, and take full advantage of whatever sunshine there may be, before spinning up to pupate. I am not aware of any lepidopterous larvæ, at any rate in this country, that pass the winter in a prepupal state within their cocoons, waiting until the spring before the moult takes place, but such is commonly the case in the Hymenoptera, at least in the aculeate and the phytophagous divisions of the order.

In certain *Zygaena* larvæ Burgeff (3) has shown that the 3rd or 4th moult produces a special hibernating instar in which the larva takes no food, its colours are dull, the size of the head is even smaller than that of the previous stage, the contents of the body are viscous, and particularly resistent to drought, and the larva enters at once into hibernation. When it wakes up in the spring it drinks greedily, increasing in size, and soon moults again, resuming its normal colours before commencing to feed again. In these larvæ there is therefore a special hibernating stage during which no food is taken, and showing definite structural characters, sharply defined by a moult before and after hibernation. This special stage appears to be intercalated between the normal larval instars rather than to be a normal instar completely given up to the purpose of hibernation.

The larva of the beetle *Drilus flavescens*, which feeds upon snails, also assumes a special form for hibernating purposes very different from the active predatory form. Some *Zygaenidae* show a further interesting phenomenon in that some larvæ, after hibernation, will feed up rapidly, and produce moths in the ensuing summer, while others of the same brood will remain small, and eventually hibernate a second time before attaining the perfect state. In this latter case Burgeff was unable to recognise a definite

hibernating stage comparable to that referred to above assumed during the first winter.

Then we have the large number of insects that hibernate in the pupal state. As in the case of those hibernating in the egg, development may be delayed by the winter until the following spring, or it may be already complete before winter supervenes. It is well known, for instance, that the moths of the Small Eggar are ready formed within the pupæ in the autumn, but they do not emerge until the February following. This same species is a good example of a similar phenomenon to that we saw in the *Zygaena* larvæ, *viz.*, what is known to lepidopterists as "lying over." Not all the moths of a brood will emerge when their time is due, but many of them will remain over for another year, or even two or more years before emergence. This behaviour is not dependent upon the meteorological conditions at the time of year the species is due to emerge. If the pupæ of a brood that have been reared all together under precisely similar conditions be examined in the autumn, some of them will be found to be dark coloured, with the markings of the moth plainly discernible through the pupal sheath. Others will be seen to be pale, greenish-amber coloured, and evidently quite undeveloped. From the former the moths will emerge the following spring, or if, for any reason, such as unfavourable weather at the time, they fail to do so, they will perish without producing moths.* The undeveloped pupæ remain without change until the following summer, when in some or all of them development will take place, and the moths emerge the February following. Probably, however, some will still remain unchanged to produce moths the third or fourth February after their larval period. What are the factors that determine whether development shall proceed or be postponed is a complete mystery, but obviously this "lying over" is a means of providing against the extinction of the species in case of unfavourable conditions supervening at the time of year, in any case very undependable, when the species is due to emerge.

Finally, we have those insects that pass the winter in the perfect state. Disregarding for the moment those truly winter insects that only attain the perfect state, and pair, oviposit and die all within the winter months, which for the present purpose may be regarded as divided between the late autumn insects that pass

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* South says that it is the moth ready formed within the pupa that lies over until the following year, but in my experience this is not so.

the winter in the egg stage and the early spring insects that hibernate as pupæ, we will consider only those that truly hibernate in the perfect state. Here, again, we find that this period of hibernation can intervene early or late in the stage of the insect's life, *i.e.*, the insect may hibernate comparatively soon after emerging from the pupa, in any case before the great business of life—mating and reproduction—has begun, or mating may take place before hibernation. In the former case, of course, both sexes hibernate, and mating takes place in the spring. This is the case with most, if not all, of our hibernating butterflies. In the latter case, there being no further need for the ♂ ♂, these die off before winter, and only the impregnated ♀ ♀ survive. Probably the best known instance of this is found in the Hymenoptera, in the Wasps and Bumble Bees.

There is, as mentioned before, great diversity also in the depth of this winter sleep. Some species, *Aglais urticae*, for example, very early take up their winter quarters, and though restless for a while, and apt to move about in bright warm weather, usually sleep undisturbed until the arrival of spring. Other species are much more restless, and easily waked by a warm day. *Pyrameis atalanta* is on the wing very much later than most of the Vanessids (it was exhibited at our meeting on November 11th last, and probably remained lively for some time later than that) and is notoriously a bad hibernator. Mr. Newman has told us that it is easy enough to keep the species alive through the winter by keeping it warm and feeding it at intervals, but in natural conditions there is some doubt as to whether it ever really succeeds in surviving the winter, except perhaps in Cornwall and the Scilly Islands, where the climate is sufficiently mild to allow of it finding food throughout the winter. Possibly it is so exceptionally in other parts of the country, but on the other hand Mr. Newman suggests that the individuals occasionally seen during the winter are in reality only very late emergences. The species certainly belongs to more southern climes than our own, where the winters are sufficiently bright and mild to allow of its survival without entering upon a true period of hibernation, so that when it migrates to our latitudes it has not acquired the capacity of standing prolonged cold and fasting. *Pyrameis cardui* in Egypt is said to be on the wing throughout the year with a continuous succession of broods.

Quite a number of these insects that hibernate in the perfect state show a marked partiality for human habitations as a place of

retreat. This is scarcely surprising, as the most pressing requirements for their purpose are absence of damp and shelter from the wind. That dwelling houses are warm in addition to being dry and sheltered, is probably a misfortune from the insect's point of view, as the artificial warmth tends to interfere with the winter slumber. Probably outhouses, hollow trees, timber stacks, etc., are much more satisfactory as hibernacula. The Vanessid butterflies, and many of the hibernating moths, are frequently found in these situations. Caves also are sometimes much frequented by certain species, on one occasion, for example, I found considerable numbers of *Scoliopteryx libatrix* and *Triphosa dubitata* on the walls and roofs of caves, which habitat they shared with numerous gnats and Long-eared Bats, but the Vanessid butterflies were altogether wanting from the association. *Gonepteryx rhamni* frequently shows a marked preference for the interior of a thick holly bush as a winter resort, though it will sometimes pass the winter on an exposed stem.

A peculiar feature about these hibernating insects is the tendency many of them show to congregating in large numbers. Amongst the Diptera several species exhibit this habit, frequently forming mixed swarms. Thus Ashworth notes a case of the Anthomyiid *Limnophora septemnotata* forming the bulk of the swarm, though the *Muscidæ*, *Pyrellia eriophthalma*, *Muscina stabulans*, *Protocalliphora grœnlandica*, and *Pollenia rudis* were present in smaller numbers. Further, the Chalcid parasite, *Pteromalus* (*Stenomalus*) *muscarum* is usually found mingled with these swarms of Diptera. Another Chalcid, *Pteromalus deplanatus* (20), is also found sometimes in incredible numbers, and is almost uncanny in its ability to creep into minute crevices, getting into picture frames, frequently between the pictures and the glass, into drawers, books, etc. It is of interest to note that of both species of *Chalcididæ* mentioned the swarms consist entirely of females, at any rate of many thousands examined I have never found a male amongst them. Of some of the flies, too, only females are found in the swarms. Those of *Limnophora septemnotata* and *Muscina stabulans*, on dissection, have been found to have their receptacula seminis full of spermatozoa, though the ovarian tubes are immature. Evidently then these flies are impregnated before hibernation, and on resuming activity in the spring will feed up and develop their ovaries and soon be ready to lay fertile eggs. Of other species such as *Pyrellia eriophthalma*, *Pollenia rudis*, and *Aphiochæta rufipes*, both sexes have been found in the swarms.

The Vanessid butterflies sometimes show a tendency to congre-

gate for hibernation. Very often, it is true, they are found singly, but it is by no means unusual to find three or four, or more, in the same corner of the room. Mr. Frohawk tells me of one case observed by him of nine *Aglais urticæ* all close together, practically touching one another. In September, 1918, I went into an empty house in which almost every room had half a dozen or more butterflies on the ceiling, while the window sills were littered with dead ones, *V. io*, *A. urticæ*, and *Eugonia polychloros*.

Of *Melitæa cinxia* the larvæ hibernate gregariously when young beneath the shelter of leaves spun together close to the ground, while the winter nests of *Euproctis chrysorrhœa=phæothæa* and *Aporia crataegi* are well known.

Some of the Ladybird beetles show a marked partiality for window frames, and the sash-cord boxes at the sides; hundreds of the Two-spot Ladybirds may often be found in such a situation, with the Seven-spot Ladybird usually in smaller numbers. Certain Carabid Beetles also, *Anchomenus dorsalis*, *Calathus melanocephalus*, etc., frequently congregate in large numbers under stones, etc., during the winter, though they are scarcely true hibernators.

Other instances of insects that hibernate in colonies are of course the Ants and the Honey Bee, but these must be placed in a different category from those just noted. In both these cases the impregnated ♀ ♀ survive for a number of years, living in protected colonies or nests with a large number of workers. The insects, however, do not become torpid, but require frequent feeding throughout the winter.

To return to those insects that only attain the perfect state and pass their brief lives, mating and reproducing their kind, all within the winter months. These belong to various orders, *e.g.*, Lepidoptera (*Cheimatobia*, *Hybernia*, *Nyssia*, *Pœcilocampa*, etc.), Neuroptera (*Boreus*), Diptera (*Chionea*, *Trichocera*, etc.), and Collembola.

A noteworthy feature about those species of moths that emerge during the winter months is the large proportion of them that have only rudimentary wings in the female sex. Examples of this phenomenon are found in different families, in the *Amphidasidæ* (*Phigalia* and *Nyssia*, but not in *Biston* and *Amphidasis*), in all the *Hyberniidæ*, in the *Larentiidæ* (one genus only, *Chimatobia*), in *Diurnea fagella*, etc., so that it is not due to origin from a common ancestor with a wingless ♀. There are also a few groups with wingless ♀ ♀ that emerge during the summer, *e.g.*, the genus *Orgyia* and the *Psychidæ*, etc. Nevertheless, from the fact that this feature

is so characteristic of winter-emerging moths we must conclude that it serves some definite purpose in connection with the time of year at which they appear. That these species are descended from ancestors having normally winged females is evidenced by their belonging to families quite normal in this respect, and by the fact that the pupæ possess well developed, almost normal, wing cases. So we must conclude that the possession of wings, at least by the ♀, must have been of some definite disadvantage to the species, and that in the course of evolution they have been lost. The ♂♂ are of course fully winged; as they have to seek out the comparatively stationary females the possession of full powers of flight would appear to be even more necessary to them than to most species; evidently they are uninfluenced by the factors that led to the loss of wings in the female. What then can have been the danger of wings to the female, and to the female alone? The most obvious suggestion is, that by the possession of wings they might wander from a situation suitable for depositing their eggs. A moth when it emerges from the chrysalis at the foot of the tree upon which the caterpillar fed, will usually climb up the stem of the tree to develop and dry its wings, and very frequently the female will wait here to be impregnated before attempting flight. In the case of these winter emerging moths it was presumably dangerous to the species for her to fly after impregnation, probably because of the unlikelihood of her finding another tree suitable for depositing her ova. But why should this danger be greater in winter than for the vast majority of moths at other times of the year? This question has puzzled many entomologists, and various attempts at a solution have been put forward. It has been suggested that owing to the likelihood of rough weather the females might be blown away from their foodplants with the risk of not being able to find them again, or that her wing expanse is liable to damage in high winds, possibly to such an extent as to prevent her attaining the food plant proper to her species.

Mr. Hudson (13) has drawn attention to a very similar condition of things amongst the winter-emerging moths in New Zealand, and advances the theory that the numbing effect of cold may be the particular danger threatening the female, rendering her perhaps unable to move and seek out the foodplant, though retaining sufficient vitality to deposit her eggs wherever she may happen to be; it would therefore be important for her that she should not be able to leave the foodplant in case of being overtaken by cold. In any case

it is evident that the ♂ would be equally subject to injury; but for the propagation of the race this would be of comparatively little consequence; from that standpoint it is much more essential that he should retain his mobility in searching for the ♀.

Another theory advocated by our esteemed member, Dr. T. A. Chapman (5), postulates that the dominating factor is the dormant state of vegetation at the time of year when these moths are ovipositing. According to this investigator moths recognise the food-plant suitable for their progeny, not by sight or touch, but by smell; he assumes that all vegetation during active growth emits characteristic odours or scents, but that when dormant these emanations are no longer given off, or at any rate to a very small degree, and the winter moths are consequently unable to search them out. Hence it is important that the female moths should not leave the tree or shrub up which they have climbed on emerging from the pupa.

This theory does not account for the loss of her wings by the ♀ Vapourer Moth, or for the yet further degeneration of the ♀ ♀ of the family *Psychidæ*, in which cases some other factor must be looked for; neither does it explain why certain other winter-emerging moths, such as *Himera pennaria*, *Pœcilocampa populi*, *Eriogaster lanestris*, etc., should have retained their wings in both sexes; but it does, I think, offer a very valuable suggestion as to the connection between this phenomenon of aborted wings in the ♀ sex and the dormant state of vegetation in winter. That the larvæ of the moths in question are all very general feeders on trees and shrubs, which frequently grow more or less densely upon the ground, would seem to lend additional support to this theory.

Certain *Tipulidæ* that appear in winter are also apterous or semi-apterous in the ♀. In this country we have *Tipula pagana* which, though not truly a winter insect, appears in October, *i.e.*, very much later than any other of our *Tipulidæ*, while in New Zealand several species appear in the winter months, the ♀ ♀ of which, where known and probably in a good many species where unknown, have aborted wings.

In this connection mention may also be made of the little wingless Panorpid, *Boreus hiemalis*. This case, however, differs from that of the Moths and *Tipulidæ* previously considered in that here we find the wings aborted in both sexes. These insects, too, are completely terrestrial, running and hopping on the ground over the moss in which the larvæ have developed, and probably afford a

more normal case of the atrophy of organs that are no longer required.

The mode of dispersal of these species of moths with wingless females has been the subject of discussion. It has been suggested that they are carried about by the males when paired, but positive confirmation of this theory by actual observation is strangely lacking. Indeed I know of only one case (22) in which it has been observed, and then only when the insects were disturbed. Alternative modes would be presumably (i.) by the wandering of the ♀ after emergence before finding a suitable tree or shrub to climb up; in view of the active way in which they can run they might be expected to cover very considerable distances; (ii.) by the wandering of the larvæ either when seeking a suitable spot for pupation or earlier. Considering the readiness with which they drop from the taller vegetation and the frequency with which some of them may be found crawling about on low-growing plants, it seems likely that this method forms no inconsiderable factor in the dispersal of these species.

We have already seen that one of the principal directions in which insect life is affected by the conditions of winter is in consequence of the fall of the leaf and the dying down of many of the summer plants. But in the almost infinite variety of insect life there are, of course, a large number of insects whose food supply is not thus cut off, so that among these we may look for species which feed through the winter, or at any rate during the large portion of it when the weather remains mild and open.

Many predaceous insects, such as beetles of the families *Carabidæ*, *Staphylinidæ*, etc., remain more or less active throughout the winter, subsisting upon hibernating insects, larvæ, eggs, and so forth.

Aquatic insects are in this respect perhaps more highly favoured than most. In anything but the smallest pools the temperature practically never falls below freezing point, so that the denizens of our ponds and rivers are favoured with a much more equable temperature all the year round than have the aerial insects, and pond life continues, at a somewhat slower speed it is true, but otherwise scarcely altered, throughout the winter. Many of the aquatic insects are, of course, air breathers, obtaining their air supplies direct from the atmosphere at the surface of the water. This is to some extent interfered with when the ponds are frozen over, but sufficient oxygen for their reduced needs is usually held in

bubbles beneath the ice, or accumulates from the aquatic plants. For those creatures that breathe the air dissolved in the water, *e.g.*, larvæ of *Odonata* and of many *Diptera*, breathing presents scarcely more difficulty than obtains when the water is open. As regards the food supply, too, aquatic insects are well situated; the larger ones are mostly predatory upon the smaller, while the latter feed mostly upon minute forms of vegetable growth, or upon decomposing vegetable tissues.

But even amongst the aquatic insects there are a few that appear to have a true period of hibernation either as larvæ in the mud at the bottom, or as the perfect insect which may hibernate away from the water. To the former class seem to belong some of the mosquitoes, *e.g.*, *Anopheles bifurcatus* and *A. plumbeus*, while of other mosquitoes such as *Anopheles maculipennis*, *Culex pipiens*, *Theobaldia annulata*, etc., the adult ♀ hibernates.

It might be expected that Lepidoptera whose larvæ feed on evergreens, would show a proportionately large number of overwintering caterpillars, but a little consideration seems to show that this is not so. If we take the case of our pine-feeding larvæ, for instance, the only ones that hibernate in the larval state are *Ellopia fasciaria*, and the different spp. of *Thera*, which hibernate as young larvæ. The majority, *Sphinx pinastri*, *Trachea piniperda*, *Macaria liturata*, *Fidonia piniaria*, and the pine-feeding *Eupitheciae* pass the winter in the pupal stage (I do not include numerous other species, such as *Lymantria monacha* that sometimes feed upon pine, but more usually upon deciduous trees).

Of ivy feeders the proportion of hibernating larvæ is greater; thus we have *Urapteryx sambucaria*, *Boarmia repandata*, and *B. rhomboidaria*, *Triphæna* spp., *Mania* spp. (but all of these also feed on deciduous plants and for the most part have a period of true hibernation). *Celastrina argiolus*, *Odontopera bidentata*, etc., pass the winter as pupæ.

Other lepidopterous larvæ whose food is obtainable throughout the winter, and which probably feed more or less during mild spells may be grouped in the following classes:—

i. Stem-borers; *e.g.*, *Cossus*, *Zeuzera*, the *Sesiidae*, etc., all of which grow but slowly and spend more than one winter in the larval state.

(N.B.—Not borers in the stalks of annuals, such as *Gortyna flavago*, etc.)

ii. Root feeders; *Hepialus*, *Xylophasia monoglypha*, certain Agrotids, etc.

iii. Lichen feeders; *Lithosiidae*, and the genera *Bryophila*, *Cleora*, etc.

iv. Many grass feeders; *Satyridae*, *Hesperiidae*, many *Leucaniidae*, etc.

v. Many polyphagous species feeding on low plants that remain green throughout the winter.

Pictet (17) has shown that of Lepidopterous larvæ those that feed more or less throughout the winter respond very much more readily to artificial warmth than do those that feed only on deciduous plants, and into whose life-cycle there necessarily enters at some period of their existence a prolonged period of rest. In the case of *Lasiocampa quercûs* for example he found that even if the larvæ were kept at a warm temperature they nevertheless hibernated as under normal conditions.

It was possible to shorten this resting period to a certain degree, but in this case the pupal resting period was correspondingly prolonged, so that the time of emergence of the resulting imago was not altered. So also in the case of species that hibernate in the egg stage, if they could be induced to hatch before their time the subsequent larval period was correspondingly prolonged. Possibly Mr. Newman or other of our members who have experience in forcing pupæ to any extent would give us their conclusions as to how far the species that respond readily to forcing are feeders upon foliage that persists throughout the winter, and how far those that do not so respond are feeders upon deciduous foliage.

If we consider briefly the different orders of insects as regards the way in which they pass the winter, we at once find ourselves handicapped by lack of data concerning almost all the orders except Lepidoptera. At any rate the Odonata (15) would appear to be one in which in this country we can find no hibernating imagines,* probably all over-wintering as nymphs. As, however, these are aquatic, long-lived, and predaceous, that the nymph should hibernate is almost a foregone conclusion. They are, however, sluggish, and feed very little if at all during the winter.

The grasshoppers (14) are predominantly summer or autumn insects, yet at least one genus (*Tetrix*) is known to hibernate in the

* Mr. Lucas informs me that on the Continent *Sympycna fusca* regularly hibernates.

adult stage, the majority with little doubt in the egg stage. The wood cricket almost certainly hibernates sometimes as a nymph, sometimes as an adult. Of our wild cockroaches little is known as to their winter habits, probably they hibernate either in the egg or in the adult stage. Our British earwigs probably all hibernate as adults, though possibly of some of them it is only the ♀ ♀ that do so. Of the Neuroptera again I know of none that hibernate as the adult.*

Of the more highly developed orders one can find numerous examples of species that hibernate in either of the principal stages, though the Hymenoptera and Coleoptera appear to shew a marked disinclination to hibernating as pupæ, many species delaying the pupal ecdysis until the spring, while of others the adult stage is reached in the autumn though the insect does not emerge from its pupal retreat until the advent of spring.

I have endeavoured in these somewhat random notes to put before you a few of the many interesting points in insect biology that confront us when we consider the effects upon insect life of the annual periods of rigour and stress due to the winters of our own country, but I have not attempted to follow the gradual adaptations evolved to meet the increasing severity of winter as we pass from subtropical conditions to the yet more rigorous winters of the arctic regions; neither have I referred to acclimatisation experiments, attempts either to establish in our latitudes species belonging to countries which enjoy milder and brighter winters than our own, or to establish in such countries certain of our species that are accustomed to winters of greater severity.

In conclusion I should like to thank you for the patience with which you have received this somewhat prolonged and rambling dissertation. I wish also to express my appreciation for the honour you have done me in again electing me as your President. And in doing so I wish very heartily to thank the Officers and Council of the Society for their continuous kindness and encouragement in the performance of my duties during the past year. With such able and experienced lieutenants to advise in time of doubt or difficulty, the position of President becomes that most delightful one of receiving all the *kudos* while somebody else does the work.

* Mr. Lucas reports *Hemerobius stigma* in January, but whether the species hibernates is not certain. *H. nitidulus* emerges very little later.

List of Works to which reference is made.

1. Andres, A.—"La Phase d'engourdissement ou Hibernation en Egypte chez quelques Lépidoptères." *Bull. Soc. Ent. Egypt*, iii.. 1911, pp. 89-96.
2. Ashworth, J. H.—"Note on hibernation of Flies." *Scottish Naturalist*, 1916, pp. 81-84.
3. Burgeff, H.—Beiträge zur Biologie der Gattung *Zygaena*. *Zs. f. wiss. Insektenbiologie*, vi., 1910, pp. 39-44 and 97-98.
4. Baumberger, J. P.—Hibernation a periodical Phenomenon. *Ann. Ent. Soc. Amer.*, x., 1917, pp. 179-186.
5. Chapman, T. A.—On Winglessness in Winter Moths. *Ent. Rec.*, xv., 1903, pp. 43-46.
6. Chapman, T. A.—A Note on Hibernation in Lepidoptera. *Ent. Rec.*, xxii., 1910, pp. 168-170.
7. Chapman, T. A.—Apterous Females of certain Lepidoptera. *Ent. Mo. Mag.*, 1913, pp. 8-10.
8. Chapman, T. A.—Apterous Females of Winter Moths. *l.c.*, pp. 81 and 82.
9. Chapman, T. A.—Apterousness in Lepidoptera. *Trans. Lond. Nat. Hist. Soc.*, 1916, pp. 49-76.
10. Dupont, A.—Note sur quelques particularités d'hivernage chez les Insectes. *Bull. Soc. Sci. Nat.* Rouen, xlv., 1910, pp. 29-31.
11. Frey, R.—Beitrag zur Kenntnis der Arthropodenfauna in Winter. *Meddel. Soc. Fauna et Flora Fenn.*, 1913, pp. 106-121.
12. Graham-Smith.—Hibernation of Flies in a Lincolnshire House. *Parasitology*, xi., 1918, pp. 81-82.
13. Hudson, G. V.—Notes on semi-apterous Females in certain species of Lepidoptera. *Ent. Mo. Mag.*, 1912, pp. 269-275.
14. Lucas, W. J.—*Monograph of the British Orthoptera.*
15. Lucas, W. J.—*Monograph of the British Dragonflies.*
16. Newman, L. W.—The Hibernation of *Vanessa atalanta* in Captivity. *Trans. Ent. Soc.*, 1911, pp. 173-174.
17. Pictet, A.—Le Role joué par la Selection Naturelle dans l'Hibernation des Lépidoptères. *Proc. IX.e Congrès Internat. de Zoologie à Monaco*, 1913, pp. 774-788.
18. Porritt, G. T.—Apterous or semi-apterous females of certain Lepidoptera. *Ent. Mo. Mag.*, 1913, pp. 63.
19. Porritt, G. T.—The Wingless Geometer. l.c., pp. 79-81.

20. Scott, H.—*Pteromalus deplanatus*, Nees, in buildings. *Ent. Mo. Mag.*, 1919, p. 13.
21. South, R.—*Butterflies and Moths of the British Isles.*
22. Stenton, R.—Conveyance of a semi-apterous female moth by a male. *Ent. Mo. Mag.*, 1913, p. 89.
23. Wood, J. H.—The Wingless Geometer. *Ent. Mo. Mag.*, 1913, p. 59.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 12th, 1920.

Mr. K. G. Blair, F.E.S., President, in the Chair.

Mr. C. L. Withycombe, of Walthamstow, and Capt. Crocker, of Bexley, were elected members.

The Rev. F. M. B. Carr exhibited long series of *Hibernia defoliaria* and its variations, and introduced a discussion on the species of the genus *Hibernia*. He contributed the following note of his remarks:—

Notes on the Hibernias.

"The five species under consideration are all of the commonest. One has seen oak-woods stripped of their foliage by the larvæ of *H. defoliaria*, and I well remember a day in Dimminsdale, Staffordshire, when the birds flew off the stripped oak-trees, literally in thousands, where they had been enjoying a diet chiefly composed of the larvæ of this moth. Yet, if one does not care to turn out on a winter evening, it is quite easy to collect for years without getting a decent series of this common species. The same holds good of *H. aurantiaria* and *H. rupicapraria*, so far as my experience goes.

"Of *H. leucophaearia*, resting on the tree-trunks, and *H. marginaria*, which seems to prefer palings, one can pick up quite a fair number in the daytime; but, considering how common they are, the other three species are met with very sparingly in this way. And again, one can take hundreds of larvæ of these species and hardly breed an imago from the lot. Perhaps others have discovered the secret of bringing them through—I must confess I, personally, have had but little luck with them.

"If one is to get a series, one must resort to night-work; and until I went to live in Cheshire, I had had little opportunity of working any of the species by night. However, in the spring of 1917, I went round the hawthorn hedges just outside my garden at Alvanley, and by the aid of a 'dim, religious light' (all that one dared show in those days) I made my first acquaintance with *H. marginaria* var. *fuscata*. The type, with which we are all so

familiar in the south, seems to form a comparatively small proportion of the individuals one meets with in the Delamere Forest district, where the insect is very variable, and forms intermediate between the type and var. *fuscata* probably predominate. I have had no opportunity of working this species since 1917, but hope to do so again this spring.

"I have with me a short series of intermediate forms, and of var. *fuscata* from Cheshire, and a typical male from the New Forest for comparison.

"I have already seen var. *fuscata* this year, on January 20th, which seems an early date, especially for so far north as Cheshire.

"*H. leucophaearia* I have not worked at night. It is quite common in Delamere Forest, and as variable, I think, as in most localities, some examples showing a tendency to melanism.

"I worked hard at *H. defoliaria* last October and November. It does not appear to be at all common round our Alvanley lanes, though there are oaks in all the hedgerows. I first noted it last year (1919), on October 17th. By October 25th it was in countless hundreds in Delamere Forest, and abounded to the time of my last visit to the forest, on November 24th, being particularly abundant during the earlier part of that period.

"Before dark the males were to be found resting on the bracken, sometimes on the top, and sometimes underneath the fronds, but the few dozen to be picked up in this way were as nothing compared with the myriads that appeared after dark. At first they were to be found fluttering in the grass, which seemed to show that the great majority had been at rest on the ground, perhaps many of them under the dead leaves. Then, as the evening wore on, they flew and settled on the twigs, especially of the birches, and on grass stems, and sometimes one found oak-trunks fairly plastered with them. I shall never forget the sight. With them were mingled countless *Cheimatobia brumata* and *C. boreata*, including many very dwarf examples, and *Himera pennaria*; the last-named species varying from a dull, creamy shade to apricot or brilliant rose-colour, with very occasionally an example largely suffused with leaden-coloured scales.

"I have a series of *H. defoliaria* from Delamere Forest, the forms of which are somewhat difficult to classify, but which might, perhaps, be roughly divided as follows:—(1) The type. (2) Forms differing from the type in having part, or the whole, of the median area of a *white* ground colour. (3) Forms with cream ground

colour and very dark brown to black transverse bars. (4) Forms with red-brown ground colour and black transverse bars. (5) Forms with red-brown ground colour and darker hind-marginal area. (6) Forms devoid, or almost devoid, of markings, ranging in ground colour from smoky dark brown to orange-brown, and including one very pale cream-coloured example (Mr. S. Gordon-Smith, who was collecting with me, took two or three more of these very pale forms). (7) Pale forms, with orange or yellow transverse bars.

"The females shown are typical, and I have for comparison four of Mr. Bowman's smoky forms from Epping Forest. I think I am pretty safe in saying that this particular form does not occur in the part of Delamere Forest worked by Mr. Smith and myself. Our darkest form appears to be found in the darker unicolorous examples, and this has no dark suffusion of the hindwings such as is seen in the Epping Forest dark form.

"Lastly, I come to *H. aurantiaria*. This is, perhaps, less often met with than any other members of the genus in the daytime. It was a good deal later than *H. defoliaria* with us, being at its commonest towards the end of November, when *H. defoliaria* was falling off in numbers. When it did come out fully it was, if anything, even more abundant than its relative. I remember one cold night, November 10th, just as we were getting along nicely, every moth suddenly disappeared—not *one* to be seen anywhere. We then discovered we were slipping about on ice. One wondered what became of all the moths. On another occasion I found a small patch of grass alive with males of *H. aurantiaria*. After searching for the cause of this assemblage, a female was discovered sitting on a grass-stem. A few minutes later, on coming back to the spot, I found the successful suitor in possession.

"One was pleased to find *H. aurantiaria* in such numbers, as *Day's List* for Cheshire says: 'Local and apparently rather scarce . . . . Delamere Forest, local and not common.'

"The series I have with me from Delamere shows; (1) Forms almost without markings; (2) Forms with heavily-marked transverse lines; (3) Form largely suffused with leaden scales; (4) Forms with darker hind-marginal area.

"The ground colour varies considerably, some being of a rich orange. The size is variable also, one specimen in my box being exceptionally large."

Mr. A. A. W. Buckstone exhibited series of, and contributed the following notes on the genus :—

1. *Hibernia defoliaria* from West Wickham, Bexley, Wimbledon, and Epping Forest. One specimen of those shown is particularly interesting. It has the bands on forewings of a purplish hue. I have taken this species as early as late September and as late as mid-April. From 1887 to 1913 I paid considerable attention to the perfect insect, and during that period must have captured some thousands, of which the two hundred and fifty specimens here before you are a fair example. Judging from my experience, I should say this species is more variable, both as regards markings and size, than it was a few years ago. The non-banded form ab. *obscurata* is greatly on the increase at West Wickham and Wimbledon, and collectors inform me that it appears to be more common than formerly in Epping Forest, where it is becoming darker in colour. This variety appears to be subject to "crippling" of the wings more than any other. The females of this species are not so sensitive to severe weather as are those of the other members of the genus, and will emerge from the pupa even when the grass has frost upon it.

2. *H. aurantiaria*, from Wimbledon, Epping Forest, and West Wickham, including very pale (almost white) specimens.

3. *H. marginaria*, from Wimbledon, Richmond Park, and Oxshott; var. *fuscata* from Anerley, Surrey, and Leeds, also a series of a form of this species about intermediate between *fuscata* and the type. These last-mentioned were bred from a female *fuscata* taken near Oldham, in a wood where the typical form is supposed not to occur. The ova were forwarded to me at Wimbledon, and the larvæ were bred in that district, the food given them being birch.

4. *H. rupicapraria*, from Wimbledon and Epping Forest. The males from the last-mentioned locality are slightly darker than those taken in the former. On exceptionally mild and moist evenings the females have been seen to jump considerable distances. Possibly the light of the lamp causes this skittishness.

5. *H. leucophaearia*, from Wimbledon and Richmond Park.

6. *H. aurantiaria* and *H. defoliaria* might be considered early spring insects, as there is no considerable emergence of either species until after a touch of winter.

Messrs. R. Adkin, R. T. Bowman, A. E. Tonge, H. A. Leeds, P. S. Williams, Edwards and Turner exhibited the same species.

Mr. Bowman's series of *H. defoliaria* were taken in Epping

Forest during the past few years, and only one had been met with in the daytime. He contributed the following notes on the variation and the aberration he exhibited :—

General classification of males.—I. F.W. of uniform colour, ranging from yellow to dark brown, speckled with black; H.W. white, faintly speckled. II. F.W. pale or dark brown, with submarginal band and faint discal spot; H.W. white, speckled, with a faint central spot. III. F.W. of whitish or yellowish ground colour, with orange-brown submarginal band and a distinct discal spot; H.W. white, faintly speckled, with black central spot. IV. F.W. of pale to deep yellowish ground colour, with chocolate brown submarginal band and a large discal spot; H.W. white, faintly speckled, with black central spot, some showing a slight indication of a submarginal line. V. F.W., ground colour rich brown of varying depth, with deep chocolate submarginal band and discal spot; H.W. more faintly speckled than any of the former, many showing development of a submarginal band. VI. F.W. heavily suffused with black of varying intensity, the submarginal bands and discal spots being obliterated in those with the darkest scaling; H.W. suffused with black of varying intensity, the body is also noticeably affected by melanism, the black scaling of the wings extending over the body.

General classification of females.—I. to V. inclusive. The ♀ has a body of a mottled appearance, both on the upper- and undersides, the mottling also extends over the legs. VI. The ♀ has a black body, both upper- and undersides, only the thorax being mottled; the legs have the least traces of white at the joints only.

Mr. B. S. Williams showed a few specimens of *H. aurantiaria*, one being rather remarkable in having a suffused and purplish colour with nervures prominent from their orange red coloration. The Finchley *H. defoliaria* this season had been somewhat smaller than usual.

The President remarked on the three areas where the melanism of these species appears to predominate, Epping, Delamere, and Yorkshire.

Mr. Porritt reported that he had found *Phigalia pedaria* fully out near Huddersfield, on January 17th of this year, and had seen one specimen as early as December 4th in 1919. Mr. Tonge reported the species on January 15th, at Redhill, Surrey.

Mr. F. Lindeman, of Sao Paulo, and Mr. S. Abbott, of Catford, were elected members of the Society.

There was an exhibition of Lantern Slides.

Mr. Lucas showed a series of views of the woods at Oxshott as they were, contrasted with the same portions as they are now; and called attention to the new vegetation which has become predominant since the cutting down of the pine trees, such as the large area of Moor-grass, *Molinia cærulea*, and the new crops of young birches.

Mr. Main exhibited slides illustrative of the development of the "blister beetle," *Lytta vesicatoria*, and "rose-chafer," *Cetonia aurata*, comparing them with corresponding details of *Meloë*: the larvæ of *Euchloris smaragdaria*, and parts of the life-histories of the beetles *Dorcus parallelopipidus*, *Lucanus cervus*, *Necrophorus humator*, *Nebria brevicollis*, *Pterostichus madidus*, and *Rhagium inquisitor*.

Mr. E. J. Bunnett's series included the eggs of *Chrysopa flava* with the footstalks combined, and twisted together into a compound stem; compared with those of *C. vulgaris*, each on a separate footstalk; cocoons of Pine Saw-fly, *Pteronus pini*, L. (?); the perching attitudes of *Vanessa urticæ* on flowers of cow-parsnip; cocoons and imagines of *Yponomeuta cagnagellus*: resting attitude of *Abraxas ulmata*. Also the larva of *Acronicta leporina*; eggs, egg-breaker, and newly hatched larvæ of *Stenopsocus cruciatus*.

Mr. Dennis's slides were of plants photographed in the Snowdon district, among them the cotton-grass, sundew, various saxifrages, wild thyme, mosses and lichens, including *Cladonia furcata*.

Mr. G. Roberts exhibited slides of several species of birds, and views of Selborne and Folkestone Warren.

Mr. A. A. W. Buckstone exhibited a long series of bred and captured *Himera pennaria* from Wimbledon Common, West Wickham (a dwarf male), Bexley (a pale yellow female), and Oxshott (a male with all wings freely sprinkled with minute black dots, giving the insect a smoky appearance), and made the following remarks. "The Wimbledon specimens vary in colour through various shades of yellow to grey and red. A male has the cross lines on forewings close together, the inner lines being elbowed outwards near the inner margin, so as to unite with the outer lines.

"The larvæ of this species are found commonly most seasons at Wimbledon, on oak and birch, but I have not found it in any great quantity on other trees and shrubs. It is stated by some authori-

ties to be a cannibal, but I have not found it so, although I have bred it in considerable numbers."

Mr. Garrett showed an extremely pale xanthic example of *Cœnonympha pamphilus* taken at Wicken.

MARCH 11th, 1920.

Mr. A. C. Jump, of Wandsworth Common, was elected a member.

Mr. R. Adkin exhibited a specimen of *Pyrameis atalanta* in which the usual red coloration had become yellow, and the spots of the marginal bands of the hindwings were absent, taken in 1876 at Folkestone; an aberration of *Vanessa io*, in which the eyespots of the hindwings were represented by large black patches set in a pale ring, and another in which the eyespots of the hindwings were quite light in colour with two pupils; they were taken at Wimbledon and Southport respectively many years ago.

Mr. T. H. Grosvenor exhibited a series of eggs of the Indian kite, *Milvus govinda*, taken during the breeding seasons of 1917-1919, in the Jallandhar district of the Punjab. The clutches exhibited varied in number. A single egg was not common, and was usually abnormal. The prevailing and apparently typical number is two, for at least 75 per cent. of the nests examined contained two. Three was not uncommon, and four was observed only once. The number of nests examined was, in 1917, 206 nests; in 1918, 174 nests; and in 1919, 168 nests; total, 548 nests.

The exhibit was the result of careful selection for variation. The nests are always placed in a tree at least forty feet from the ground, and measure about three feet across and at least one foot thick. They are for a carrion bird, very clean, being built on a foundation of sticks, and lined throughout with dried grass; in one instance with cotton procured from a neighbouring cotton field.

Mr. Barnett exhibited a series of *Satyrus semele* from S. Devon, showing much variation in the second spot on the underside of the forewings; in some cases this was large and pupilled, in others very small and unpupilled; a series of *Plebeius ægon*, with much variation in the underside spotting, and a striated form; a *Polyommatus icarus*, with very large black spots on the underside of the forewings, and an ab. *icarinus*.

Mr. A. A. W. Buckstone exhibited three forms of

Agriades coridon occurring at Shere, Surrey, *viz.*:—(1) A dwarf form found at the top of the downs; (2) a somewhat larger one at the foot; and (3) a still larger one, which does not appear until the two smaller forms are about over, and then is found over the entire hillside. He also showed a series from Royston, Herts, for comparison.

On the 12th of July, 1917, and on the 15th of the same month in 1918, this species was very abundant at Shere, a large number being worn. As most species of insects appeared to be as forward in 1919 as they were in the two previous years, he fully expected to find *A. coridon* when he visited the locality on July 9th last. But not a single specimen was observed, although it was a cloudless day. However, on visiting the spot on August 2nd, the species was found to be out, though not in any great numbers. About two dozen specimens only of the dwarf form were observed, but, with the exception of two, all were in poor condition. The larger form was fresh, but scarce as compared with the two previous years. Two specimens only of the largest form were seen.

On the 19th of August, when the downs were again visited, the males of the larger form were found to be few in number, and mostly in poor condition. The females were plentiful but not in much better condition than the males. No dwarf was observed, neither was a specimen of the largest form seen.

Messrs. Blair and Main exhibited living aquatic larvæ of *Corethra* sp., *Mochlonyx* sp., *Ochlerobatus nemorosus*, and *Anopheles bifurcatus*. He said that the *Corethra* were eating each other in default of Entomostraca, their usual food; and the *Mochlonyx* swallowed the *Ochlerobatus* larvæ whole, tail first, subsequently casting up the skin and other undigested matter.

Mr. B. S. Williams exhibited a bred series of the melanic form of *Dysstroma truncata* from Finchley; although of the second brood, they equalled the first brood specimens in size.

MARCH 25th, 1920.

Mr. A. A. W. Buckstone exhibited short series of *Brephos parthenias* from Wimbledon, Oxshott, Darenth Wood, and West Wickham, and stated that the Wimbledon examples were, speaking generally, larger and darker than those from the other districts. One of the former series has greasy-looking forewings, due to an

abnormal amount of blue scaling. These blue scales are freely sprinkled over the wings. Both the Oxshott and the Darenth series contain a specimen with the hindwings considerably paler than usual. Of two undersized specimens from West Wickham, one is exceptionally dark, and the other has the orange of the hindwings very pale; the forewings of both are very narrow. The species was on the wing by the middle of March, 1920.

He also exhibited ova of *Apocheima hispidaria*, and stated that they were always laid in crevices in even rows and bunches, and the larvæ from the lower eggs eat their way through those above.

Mr. B. S. Williams exhibited two males and six females of a very striking form of *Cidaria* (*Dysstroma*) *truncata* from Finchley (bred), in which the basal third was black, margined by a lighter line, the central area being solidly black succeeded by an emphasised white line, and the outer margin lighter and not uniform in coloration. This form does not appear to have been recorded hitherto.

Mr. Hy. J. Turner exhibited three species of the genus *Utetheisa* (*Deiopeia*).

(1) *U. pulchella* from several localities, and including ab. *candida* with pure white ground, from Natal; ab. *lotrix* with crimson spots more developed and conjoined, from Assam and New Ireland; and ab. *thyter* (?) from Cyprus, with the black spots becoming more or less obsolete and the markings generally paler.

(2) *U. ornatrix*, from the warmer parts of the American continent, with forewings suffused with pink and tinged brown.

(3) The very beautiful sub-species *renusta* of *U. bella*, from Jamaica, in which the thorax and forewings have the orange markings of the type form replaced by brilliant crimson.

Mr. K. G. Blair exhibited the galls made in the stems and twigs of aspen by larvæ of the Longicorn *Saperda populnea*.

Mr. Barnett reported taking the following species on March 21st, at Oxshott:—*Brephos partheuias* in numbers, *Xylocampa areola*, *Tephrosia crepuscularia*, *T. punctularia*, *Trichopteryx carpinata*, and *Gonepteryx rhamni*; and in Ashtead Woods, *Eugonia polychloros*.

Spring larvæ were, speaking generally, reported to be very scarce, such as *Arctia villica*, *Lasiocampa quercus*, *Cosmotriche potatoria*, etc., and those that were met with were very small. *Arctia caja* larvæ were in fair number. Imagines of *Euchloë cardamines* and *E. polychloros* had been met with in several localities, while *B. partheuias* had swarmed, and *Hibernia leucophæaria* had been scarce.

APRIL 8th, 1920.

Mr. S. Gordon-Smith, of Boughton, Cheshire, was elected a member.

On a communication from the Essex Field Club, a resolution was passed strongly opposing the proposed enclosure of portions of Wanstead Flats and Epping Forest.

The special feature of the meeting was an exhibition and discussion of *Dysstroma* (*Cidaria*) *truncata*, introduced by Mr. R. T. Bowman, in which Messrs. Turner, Newman, Mera, Tonge, and others took part.

Mr. Bowman dealt with the great resemblance between the imagines of *D. truncata* and *D. immanata*. Seeing that practically all our examples of *immanata* are *caught* specimens, it is important that we should find a *conclusive* method of differentiating between these two species in the *imago* stage. He found that the second line from the thorax has a very sharp and well-defined projection in all examples of *immanata*, whereas this line assumes the shape of an irregular zigzag line without a definite projection, and is very indefinite, often invisible, in the case of *truncata*. It was subsequently found that this distinction held good throughout the large number of both species exhibited by Mr. Newman.

Mr. Bowman stated that there are normally *two* broods of *truncata* in May, June, and August, but in the year 1917 he reared *four* broods, the third emerging in October and the fourth in December. He paired examples in August, 1919, but they failed to produce a third brood, the larvæ hibernating instead, with the result that he was obtaining an early spring brood.

The *second* brood often produces var. *comma-notata*, the yellow form, but he did not know whether this variety was general throughout the country. He had bred this yellow form from a ♀ taken at Horsley, in June, and had caught it wild in Epping Forest in August. Last year he bred about fifty imagines from a ♀ taken at Witley, Surrey, but they did not include any yellow forms, all being identical with the wild-caught ♀. He had also bred a long series of the smoked form, from Finchley, without the yellow form resulting. It would almost appear, therefore, that the yellow form var. *comma-notata* is restricted to certain districts.

The typical form from Finchley is a dark smoky form; but Mr. B. S. Williams last year captured a very beautiful form with a dark, well-defined, broad central band, this band standing out very prominently owing to the adjacent areas being very light, almost white. The central band reminds one of *suffumata* or *picata*.

Mr. Williams had very kindly shared the resulting ova with him; both had bred a number of examples of this new aberration. He found that about one-third of the resultant imagines were of this new form and two-thirds of the typical smoked form.

When obtaining four broods in 1917, probably as the result of a warm summer, he found that the *second* brood examples were on the average, slightly smaller than the captured (first brood) females; the *third* brood were, however, quite up to normal size, and the *fourth* brood examples proved to be the largest. Neither third nor fourth brood from the race produced the form *comma-notata*.

Owing to the succulent nature of the leaves, he found that the larvæ thrive best on sallow, but this is not obtainable after October or November. This winter, he had hibernated the larvæ on bramble, giving them the young leaves as soon as they appeared in February, and as a result, the imagines that are now emerging are very large examples. Honeysuckle is also an excellent food plant as soon as obtainable in the early spring.

Mr. Hy. J. Turner contributed the following notes on *Dysstroma truncata*, Hufn.:—

"This species and its variation is exhaustively dealt with by Mr. L. B. Prout in the *Trans. City of Lond. Ent. Soc.*, p. 46, etc., 1901, and p. 33, 1908, where he has unravelled all the early references which may relate either to this species or to *D. citrata* (*immanata*), with which it was confused until the middle of last century, when Hellins, in 1861 and 1864, effectively separated them by breeding, showing that *D. truncata* was double-brooded, while *D. citrata* was single-brooded in nature.

"Subsequent writers have shown the characters by which the very similar imagines can be separated, of which the following is a summary:—

"*Cidaria* (*Dysstroma*) *truncata*: Forewings broad, blunt, somewhat elongate; brown, grey-brown, or smoky-brown, sienna shades black or weak: central band blacker, or browner, or ochreous, or white with grey marking, outer edge jagged with long blunt teeth. Hindwings darker, with an obscure, transverse, slender central line, curved or bluntly and squarely angulated; basal markings blurred; subterminal line uninterrupted; costal patch very small; discoidal spot large; midwing darker.

"*Cidaria* (*Dysstroma*) *citrata*: Forewings pointed, rather ovate; grey-brown or tawny-brown, sienna shades brighter; central band broad, black, pale ochreous, or white with fine dark lines, second

line long points from the band. Hindwings light, with a slender, transverse, obscure, or rather sharply angulated line in the middle; basal markings sharp; subterminal line well interrupted; costal patch boldly white; discoidal spot often small.

"To the above must now be added the difference of the subbasal line, as shown by Mr. Bowman.

"The various named forms are as follows :—

"*Dysstroma truncata*, Hfn., 1767. Central area grey (through strong freckling on white ground); rust colour in outer area normal.

"ab. *centum-notata*, Schultz, 1775. The central band is broadly white or greyish-white. Wood, *Index*, 578. Newman, var. 1.

"ab. *russata*, Schiff., 1776 (*perfuscata*, Haw., *strigulata*, Fab.). The central band is black or nearly so. Wood, *Index*, 580. Hub., 445, Geom.

"ab. *rufescens*, Ström., 1783 (*comma-notata*, Haw., *mediorufaria*, Fuchs., *ochrearia*, Schultz.). The middle of the wing is tawny-yellow. Wood, *Index*, 577. Newman, var. 2.

"ab. *saturata*, Steph., 1831. The central band is dusky grey-brown, and the brown colour has spread over the outer tawny band. Basal and marginal area rather dark and dull. Central area as in type. Wood, *Index*, 579.

"ab. *infuscata*, Tengstr., 1869. Marginal area bluish-ashy, almost without markings; hindwings infuscated.

"ab. *schneideri*, Sandb., 1885 (*nigerrimata*, Fuchs). Almost unicolorous smoky black, or very dark grey.

"ab. *mixta*, Prout, 1908. Central area tawny, basal and marginal areas and costa dark fuscous.

"ab. *olivacea*, Prout, 1908. Olivaceous in tone, no bright colouring, central area the palest, inner sienna band wanting, outer dull."

Mr. Robert Adkin exhibited the specimen of *Salebria obductella* that was taken by Mr. Sydney Webb, on August 31st, 1888, near Dover; together with others said to have been taken by a Mr. Button, near Gravesend, subsequently. He said there was no doubt as to the authenticity of Mr. Webb's capture, or as to that of one taken by Mr. Purdy in the Warren at Folkestone, but that the Gravesend captures needed confirmation.

He also exhibited specimens of *Cateremma terebrella*, a species that was first recorded in this country in 1886, by Lord Walsingham, who reared it from larvæ found in aborted cones of *Abies*

douglasii, near Thetford, Norfolk. Mr. J. H. Durrant also bred the species from cones of *Abies cephalonica*, from the same neighbourhood, and Mr. Tugwell reared one from a shrivelled cone found under spruce trees in Surrey. It would therefore appear that this species has obtained a footing in this country, and should be more frequently met with than appears to have been the case of late years. *S. obductella*, on the other hand, appears to have failed to do so, and is likely to be again found only should a future immigration bring stragglers to our shores.

Mr. L. W. Newman exhibited a curious gynandromorph of *Hibernia marginaria*, right side ♀, left forewing ♂, left hindwing about half normal size ♂, both antennæ ♂, and body the appearance of ♂, from Chaily, Sussex. He reported that he knew of one oak in Bexley Woods which was already in leaf, and parts of the tree had leaves well out on March 31st.

Mr. Harding exhibited a number of aberrations of *Aglais urticæ*, which he had met with during the past 40 years experience of breeding, including ab. *bolandii* with much increased blue, ab. *atrabatensis*, ab. *latakensis*, and many forms of ab. *connexa*. He had never succeeded in getting a very pale form. He also showed a *Pyrameis atalanta* with a chrome yellow band on the forewings; and a *Hipocrita jacobææ* in which the red was also changed to a chrome yellow.

Mr. Tatchell exhibited a fine xanthic form of *Epinephele tithonus* taken by Mr. Rippon, in Dorset, in 1893, and a living arva of *Trochilium crabroniformis* (*bembeciformis*) in a stem of willow.

Mr. Bunnett exhibited imagines and cases of the Psychid *Taleporia tubulosa* (*bombycella*), from Farnborough, Kent; a bred specimen of *Pyrausta ostrinalis*, and the beetle *Dorytomus tortrix*, bred from poplar catkins.

APRIL 22nd, 1920.

Mr. Stanley Edwards exhibited *Tenaris honrathi*, from Java, *T. selene*, from New Guinea, *Dynastor napoleon*, from S. America, species of *Opsiphanes*, and *Dasyophthalma crenata*.

Mr. Newman exhibited fine varied series of the following species: *Gonodontis bidentata*, including the pale Cheltenham form; *Xanthorhoë rivata*, *X. montanata*, *Hydriomena impluviata*, *H. furcata* (*elutata*), *Tephrosia luridata* (*extersaria*) with unusually large forms;

Boarmia cinctaria, and some curiously radiated forms of the first brood of *Tephrosia bistortata*.

Mr. Hy. J. Turner showed a number of species of the genus *Plusia*, allied, more or less closely, to the common *Plusia gamma*.

Mr. B. S. Williams exhibited a few specimens of *Rumicia phlæas* from Finchley, showing forms with ill-developed spotting, one ab. *kochi* with pear-shaped spots, a heavily spotted form, and dusky forms with dark nervures and wide borders, chiefly collected in the hot season of 1911, when the species was abnormally abundant.

Captain Crocker exhibited a collection of Lepidoptera representative of what he had met with in the battle-fields of the N. of France, chiefly taken in 1919. Included were *Issoria lathonia*, *Melitæa cinxia* collected on ground which during the winter, when the larvæ were hibernating, would often be under water, *Apatura iris* (common), *Nordmannia ilicis*, *Colias hyale*, etc. Among the moths were *Aglaia tau*, *Lymantria dispar*, *Notodonta tritophus*, *Cosmotriche potatoria* including a number of males with female coloration, and some unusually dark, the range of colour aberration being large; *Sciopteron tabaniformis*, bred from poplar stumps where the wood had been cut for fencing, and *Senta maritima*, a fine series in much variety.

In the notes on the season *Drymonia chaonia* was reported as occurring in mid April; the larvæ of *Arctia villica* was very scarce in W. Kent, where it was usually abundant at this time of year. *Lasiocampa quercûs* larvæ had been found in abundance feeding on sea-buckthorn, and was reported to feed readily on viburnum. The Rev. E. Tarbat reported that in E. Hants he had as yet seen no *Celastrina argiolus*, and no "whites," that the sallows were exceptionally early, and that during the fine weather of February and March nothing had come to sugar.

At the Special Meeting held subsequently for the purpose, Mr. A. E. Tonge was elected to be co-trustee with Mr. R. Adkin, Mr. E. Step having resigned.

MAY 13th, 1920.

Mr. Stanley Edwards exhibited a number of exotic species of Coleoptera, including an extremely large specimen of the Goliath beetle *Goliathus druryi*, and of Orthoptera, including some of the larger Phasmids, etc.

Mr. S. R. Ashby exhibited four drawers of his British Coleoptera: the ground beetles of the genera *Anchomenus*, *Bembidium*, and *Trechus*; the *Lamellicornes*, including the genera *Lucanus*, *Onthophagus*, and *Aphodius*; the *Buprestidæ* and *Elateridæ*, and the Weevils of the genera *Rhynchites* and *Apion*.

Mr. Barnett exhibited a portion of a decayed gatepost which had been appropriated and excavated by a leaf-cutter bee, *Megachile*, one cavity containing fifteen cells, which was considered an abnormal number. He also showed a brilliantly marked young viper, with intense black markings on a whitish ground, and the trunk of a lizard, measuring seven and a half inches, taken from the body of another viper.

Mr. F. W. Cocks exhibited the following Coleoptera from the neighbourhood of Wellington College, Berks., being the species which were the more strikingly characteristic of the district:— *Pterostichus angustatus*, Dufts., *Anchomenus sexpunctatus*, L., *A. quadripunctatus*, de G., *Criocephalus ferus*, Kraatz, *Asemum striatum* var. *agreste*, F., *Corticaria fenestralis*, L., *Sphindus dubius*, Gyll., and *Melanophila acuminata*, de G. The *Melanophila* had been quite abundant since the felling of trees had been in progress.

On behalf of Mr. Carr, Mr. Step exhibited the Coral-wort, *Dentaria* (*Cardamine*) *bulbifera*, from near Chalfont Road, Bucks, where it grows in abundance.

Mr. H. Moore exhibited a collection of Indian Orthoptera, and read the following notes:—

"Through the kindness of Mr. Grosvenor I am able to exhibit the Orthoptera he collected when stationed at Bangalore, S. India, from May to October, 1916. They are an interesting lot, and though one is assured this and that are common, the pleasure of possession is none the less when one handles his first specimens. But when they are some of the curiosities of insect life, what one has wished for and never expected to get, one feels very kindly to the donor, and satisfied with himself. Happily I am not called upon for remarks, but I would like to point out a few of those of special interest. Of the *Mantidæ* perhaps that of the grass I found most attractive, though the prettily coloured *Creoboter urbana*, Fab., might appeal to others. The grass mantis, *Schizocephalus bicornis*, L., when unset, with its legs and body all of a tangle, was like a wisp of hay, and with antennæ and cerci so much alike, one had to look closer than usual when pinning to discriminate the head from the tail. The curious *Cymatomera rugosa*, L., is one

of the rarer insects of the plains, which must require most careful searching for when at rest on the trunks of trees. Amongst the *Acridiidæ*, the great green arboreal locust, *Acridium* sp., is another uncommon species of the plains, but the most important, economically, is *A. peregrinum*, Ol., the migratory locust, and *A. succinctum*, Lin., the Bombay locust, also a migratory species. The most impressive is surely *Teratodus monticollis*, Gray, a very buffalo of grasshoppers, with its great thorax and jaunty air. The so-called Coffee locust, *Anlarches miliaris*, Fab., and the painted grasshopper *Poecilocera picta*, Fab., though of no economic importance, furnish examples of warning colours, not being good to eat and consequently having no natural enemies. Amongst the *Locustidæ* is the great *Mecopoda elongata*, L., another rare insect of the plains, though common in the hills. One of the greatest curiosities of Indian insect life is *Schizodactylus monstruosus*, Don., still of uncertain systematic position. In the Mole-cricket, *Gryllotalpa africana*, Beauv., a species found in Africa, Asia, Australia, and elsewhere, we have an instance of the disadvantage of giving a geographical name to anything before its geographical distribution is known. *Brachytrypes achatinus*, Stoll, the common brown cricket, is notable as being the noisiest.

"I would like to record my appreciation of the self-denial and unexpected generosity of Mr. Grosvenor, which adds another happy memory to many others associated with members of this Society."

Mr. W. West exhibited four drawers of British Hemiptera, including a specimen of the extremely rare European Reduviid species, *Pygolampis bidentata*, which he had taken in May, 1914, in the New Forest, the second recorded British specimen.

Mr. H. W. Andrews exhibited a number of species of British Diptera to illustrate wing-patterns and coloration, and contributed the following note :—

"The Diptera are well known as one of the 'clear-winged' orders of insects. The typical dipterous wing consists of two layers of transparent membrane of a more or less vitreous nature, and the only colouring is the iridescence caused by structural modification of the surface. Yet, on looking over a large number of species there is a considerable amount of colour and pattern to be found. I have selected from my collection various species of the different families illustrating the extent and character of wing-pattern and coloration obtaining in the order. This exhibit by no means pretends to be a complete one, as I have not nearly enough material

at my disposal for that purpose, and one of the important subdivisions of the order—Nemocera (mosquitoes, craneflies, etc.)—is hardly represented at all. In addition to the examples shown, I have made an attempt to group together specimens illustrating various types of colour and pattern, ranging from the simple tinged or darkened wing to the completely patterned surface of the Trypetid group. It will be seen that these types vary and combine among themselves, and it is also to be noticed that it is the exception rather than the rule for one particular form of pattern to be confined to one family. In consequence but little use can be made of wing pattern in classification of the various genera, except in the case of the *Trypetidæ*, where all the species have more or less definitely patterned wings. These wing patterns and colours seem all to be of a pigmental character, and I believe the only case of scale patterning occurs in certain species of mosquitoes, and that these get rubbed off soon after emergence. The colours seem confined to black, brown, and yellow, and in one family (*Dolichopodidæ*) the extreme tip of the otherwise darkened outer margin of the wing is white. Certain flies mimic species of other orders, notably Hymenoptera, but in these cases the wing pattern usually plays a secondary part to the shape and coloration of the body of the insect. Sexual variation in wing colour seems very scarce, and is usually confined to a darkening or tinting of the wings of the males, while the females have the typical clear wings. A comparison of the wing markings of Diptera with those of other normally clear-winged Orders should form an interesting subject for study."

Mr. Coppeard exhibited living specimens of the Palmated Newt, *Molge palmata*, and its eggs. This was said to be a more widely distributed species than was commonly supposed, and was really the "common" newt; *Molge vulgaris*, the so-called Common Newt, being more restricted to the south-eastern area of Britain.

Mr. Priske exhibited series of the shell of *Helix virgata* from various localities, including Deal, Box Hill, Torquay, Tenby, etc. From the last place he showed white examples ab. *subaperta*. He also showed the red form (ab. *rufa*) of the slug *Arion ater*.

Mr. Withycombe exhibited a cultivated plant of the Butterwort, *Pinguicula grandiflora*, and pointed out one leaf with the margin curled over an insect. He stated that insects were captured by the plant by means of a viscous fluid secreted by mushroom-shaped glands developed on the upper surface of the leaves. The presence of an insect causes the leaf margin to curl gradually inwards and

over the insect. The soluble matter is then absorbed by the plant, the leaf uncurls, and the débris, wing parts, chitin, etc., blow away. The plant is easily grown from seed. He also showed the Common Butterwort, *P. vulgaris*, with a very pale flower, from Beeston Bog, Cromer.

Mr. Main exhibited various species of Mosquitoes, including *Anopheles bifurcatus*, *Theobaldia annulata* and *T. morsitans*; *Ochlerobatus dorsalis*, *O. nemorosus* and *O. lateralis*, with a series of preserved larvæ. He also showed a cage he had used successfully for the experimental breeding of mosquitoes.

Mr. Dennis, on behalf of Mr. R. S. Bagnall, exhibited several microscopical preparations of Protura, including two species of *Acerentomon*, *A. doderoi*, Silv., from Kent, and *A. affinis*, Bagn., from County Durham. A collection of Symphyla made by Mr. W. Ruskin Butterfield, including *Scutigerella immaculata*, Newp., *S. biscutata*, Bagn., *S. spinipes*, Bagn., *Scolopendrellopis subnuda*, Hans., *Symphylella vulgaris*, Hans., *S. jacksoni*, Bagn., *S. horrida*, Bagn., *S. minutissima*, Bagn., *S. delicatula*, Bagn. Also *Symphylella dunelmensis*, Bagn., taken in Durham County.

MAY 27th, 1920.

Exhibition of Living Objects.

Mr. A. W. Richardson, of Southall, was elected a member.

Mr. Hugh Main exhibited a specimen of the Californian Hesperiid *Epargyreus tityrus* bred from a pupa sent to him by Miss Fountaine. He also showed *Adscita statices*, the larvæ of a species of oil-beetle (*Meloè*), and imagines and larvæ of *Galerucella lineola* (Col.), all from Eastbourne.

Mr. Blair exhibited the wasp *Odynerus pictus*, males and females, with the cells from which they had emerged. The cells were affixed to the sides of a large stone at Shanklin, I. of Wight. This Hymenopteron stocks its nest with larvæ of beetles. He also showed *Siphlurus armatus*, Eaton, ♂ and ♀ and larvæ, a rare Ephemerid described by the Rev. A. E. Eaton in 1870 on ♂ examples from Killarney and Hampstead, the ♀ being then unknown. Its rediscovery not far from the original Middlesex locality is interesting. Also *Cassida equestris*, F., beetles and egg-clusters on water-mint, from the canal side near Denham.

Mr. L. W. Newman exhibited ab. *radiata-lutea* of *Abraxas*

grossulariata and an almost black aberration of form *varleyata*; larvæ of *Calymnia pyralina* feeding on elm; four forms of the larvæ of *Saturnia carpini*, all of one brood, sleeved on plum; a *Callimorpha dominula* just emerged out of doors; several larvæ of *Trichiura crataegi*, all different forms; and two females *Pheosia dictæoides*; and remarked that he had obtained ova from a female to which a male *P. tremula* (*dictæa*) had assembled.

Mr. Alfred Sich exhibited living imagines of *Nepticula septembrella*, Stt., bred from pupæ found in leaves of *Hypericum* at Hindhead, Surrey; larva of *Salebria betulæ*, Goeze, off birch, Richmond, Surrey; and a raceme of Foxglove, *Digitalis purpurea*, L., showing abnormal growth, the flowers of the lower part growing irregularly around the stem. At the apex is a confused growth of sepals with coloured points, below this a ring of about twenty stamens, and below the stamens a large flat spreading disc with a diameter of 3¼ inches. The ordinary flowers are of the usual purple. The disc appears to be formed of half-a-dozen flowers, or rather the lower spotted portions of these, the central portion is whitish and there is a broad margin of deep purple. The disc is continuous except in the upper portion where it is divided down to the growth of sepals. The specimen is from a garden at Chiswick, and is the monstrosity known as "peloria."

Mr. Newman reported that he saw no fewer than eighteen species of butterflies on the railway banks at Bexley, 12 miles from Charing Cross, on May 16th., *viz.*, *Pieris brassicae*, *P. rapae*, *P. napi*, *Euchloë cardamines*, *Gonepteryx rhamni*, *Brenthis euphrosyne*, *Pyrameis cardui*, *P. atalanta*, *Aglais urticae*, *Vanessa io*, *Callophrys rubi*, *Rumicia phlaeas*, *Polyommatus icarus*, *Celastrina argiolus*, *Coenonympha pamphilus*, *Pararge megera*, *Nisoniades tages*, and *Hesperia malvae*.

It was also reported that the famous Monkswood, the home of *Strymon pruni*, was to be cut down and ploughed to grow wheat.

Mr. F. W. Frohawk communicated a note that he had in the course of a few days in early May obtained three good aberrations of butterflies:—*Aglais urticae*, "dark, no blue spots, and one costal yellow spot almost gone, suffused with brown, and other noticeable differences." *Pieris napi*, "with a large spot on the left primary and barely any spot on right—quite striking. *Euchloë cardamines*, of the only two pupæ he had one male emerged, "with a conspicuous black dot in the centre of the secondaries."

There were numerous other exhibits of common species obtainable at the time.

MAY 29th, 1920.

FIELD MEETING—SHOREHAM AND OTFORD, KENT.

Conductor, B. W. ADKIN, F.E.S.

An enjoyable outing was held in this beautiful neighbourhood. The route taken was over the Downs from Shoreham Station, through the woods, and road, wood and footpath to the summit of Otford Mount, and thence by footpath to Otford Village.

The meeting was well attended, and all expressed pleasure with the scenery, though the insects were somewhat disappointing, only common species being observed.

Tea was served at the Bull Hotel, Otford, the party walking back to Shoreham Station.

JUNE 10th, 1920.

There was a special exhibition of *Calymnia trapezina*, Messrs. R. Adkin, B. Adkin, Stanley Edwards, A. E. Tonge, and Hy. J. Turner taking part.

Mr. Hy. J. Turner read the following notes on the lines of variation of the species, and gave a summary of the various named forms.

LINES OF VARIATION.

SHAPE: ♂ shorter, more angular wings. ♀ broader and long wings.

FOREWINGS, Ground: ochreous irrorated with brown. Basal and postmedial areas suffused with whitish, the medial and terminal areas suffused with rufous—typical form. Bright rufous; pale yellow tinged with rufous; ochreous white suffused with brown; ochreous white irrorated with brown; grey brown; whitish grey; bright ochreous slightly reddish; dark grey; black central band on white-ochreous; wholly black. Margins: (*Cilia*) rufous tinged brown; same colour as ground. Base: often a shade lighter than discal area. Disc: often darker than base and outer area. Transverse lines: (1) Short basal line from costa dark, sometimes absent. (2) First line dark, very oblique and straight, usually very distinct, white edged on side, rarely defective. (3) Second line dark, elbowed bluntly outward towards the costal area, white-edged towards outer margin; these two lines nearer together in the male than in the female. (4) The area between these lines usually of a

deeper shade, more or less, is often traversed by a partial or complete cloudy, ill-defined narrow, still darker band. (5) The subterminal line ill-defined, narrow, cloudy, sometimes scarcely traceable, sometimes emphasised by dark spots, and margined a lighter shade outwardly. (6) Just before the base of the cilia a row of minute deep black dots, usually present. (7) Small pinky, flesh-coloured clouds sometimes present on different parts of the wing. Stigmata: 1. Reniform, outlined faintly, same colour as ground, but a blackish large dot almost invariably present. 2. Orbicular present, but scarcely outlined usually.

Hindwings.—Ground: Ochreous suffused with brown, especially towards terminal margin. Smoky-white or smoky-brown with a yellow gloss. Costal region pearly pale yellow. Hind margin widely pale yellow in all lighter specimens. Cilia yellowish-white, darker somewhat in darker specimens. Transverse line: Sometimes an ill-defined dusky line across the disc, beyond the middle; smoky discal spot present in the lighter examples.

Named forms.—Whitish or ochreous grey: f. *pallida*, Tutt, transverse lines nearly obsolete; f. *trapezina*, L., transverse lines distinct; ab. *rufo-pallida*, Tutt, red central band; ab. *nigro-virgata*, Tutt, black central band (very rare); ab. *obscura*, Aur.; ab. *badiofasciata*, Teich. Brightly ochreous, slightly reddish: ab. *obsoleta-ochrea*, Tutt, transverse lines nearly obsolete; f. *ochrea*, Tutt, and f. *carnea*, Warr., transverse lines distinct. Bright red: f. *rufa*, Tutt, transverse lines distinct; ab. *obsoleta-rufa*, Tutt, transverse lines almost obsolete; f. *grisea*, Tutt, pale dark grey dusted (greenish), transverse lines darker; ab. *nigra*, Tutt, black, with paler transverse lines (very rare); f. *saturata*, Stgr. (*exigua*, Butlr.), brownish, hindwing blackish, forewing grey brown; ab. *conspersa*, Warr., extra dark *grisea*.

In Mr. R. Adkin's exhibit was a very fine example of the rare ab. *nigra*, in which the pale lines showed plainly, consisting of the pale shade bordering the usual dark lines of the species, they seemed somewhat farther apart than the black lines in normal specimens.

In Mr. B. Adkin's exhibit was an extremely fine dark banded form, ab. *nigro-virgata*, Tutt=(?) ab. *obscura*, Aur.=? ab. *badiofasciata*, Teich. He also showed a specimen with a clear, slate-coloured ground.

Mr. Step exhibited a living plant of the small yellow balsam (*Impatiens parviflora*, D.C.), from a large colony in a green

lane at Wimbledon Park. An annual herb, native of Siberia, it is of rare occurrence in this country, and is set down by Hooker as an escape from gardens. It is, however, difficult to suppose that a plant with such small flowers in proportion to its large leaves, with no economic value, would have been introduced deliberately into gardens. Loudon gives the year of its introduction as 1820, so this is its centenary.

Mr. Withycombe exhibited an immature form of the Homopteron *Ledra aurita*, beaten from oak.

Mr. Main exhibited sycamore leaves showing tracks of the larva of the saw-fly, *Phyllotoma aceris*, and referred to the difficulty in breeding these insects.

Mr. Tonge remarked that he had been told by Mr. Coppeard that Micro-Lepidoptera were easily bred if enclosed with their food in paper bags placed on the damp floor of a disused greenhouse, and suggested that possibly other orders of insects could be so bred out successfully.

JUNE 12th, 1920.

FIELD MEETING—HORSLEY.

Conducted by STANLEY EDWARDS AND HY. J. TURNER.

This was a whole day field-meeting and about a dozen members were present. The route taken was by the footpath near the railway, through the fields of West Horsley Place to the church, and thence by the path for the sheep leas and Netley Heath, returning by the chalk lane to the "Duke of Wellington" Hotel for tea.

The morning was somewhat threatening, but although thunder and rain seemed to be present all around the party were in no way inconvenienced until the mid-afternoon, when the immunity of the morning was broken and the storm passed immediately over, and most of the party being more rather than less unprotected got fairly wet through. However, all arrived safely at the tea, and did such ample justice to the fare there provided that the proprietress insisted upon an increase in the charge for our meal.

The ground has been visited by the Society on numerous previous occasions, of which reports have already appeared, so that no detailed list of captures has been appended. Most of those present were quite satisfied with the results of the day's collecting, although nothing not previously recorded turned up.

Mr. Hy. J. Turner exhibited a varied series of *Hydriomena furcata*, Thun. (*Hypsipetes elutata*, Hb.=*sordidata*, Fab.), and also a copy of Thunberg's "Dissertationes" (1784), in which the species was first described and figured. He said that the species had been dealt with from most points of view by Mr. Prout, in 1906, in a paper read at the North London Nat. Hist. Soc., and published in the "Ent. Record," vol. ix., p. 84, *et seq.* He gave the following summary of the variation and tabulation of the named forms.

Lines of Variation.—I. *Size.*—Considerable variation. Bilberry and heath fed larvæ invariably produce small imagines; sallow fed larvæ in moist situations usually produce full-sized specimens. Bred specimens are often small unless the larvæ be sleeved, possibly owing to the larval habit of spinning leaves together. II. *Colour.*—Very variable. The small moorland forms are, as a rule, the more varied, often very prettily tinged with red or yellowish brown. The lowland forms are more frequently dirty greenish. The ground may be light green, yellowish green, dark green, brown green, purplish green, cinerous, fuscous, or nearly black. This is crossed transversely from the costa by about half a dozen irregular dark lines, often interrupted and abbreviated, almost always strongly marked on the costa, but dwindling to complete absence on the inner margin in many cases. These lines are not apparent, of course, on the dark ground specimens which are practically uniform in coloration. In detail these lines are (1) basal, slender, angled, abbreviated, black. (2) The first line, often obscure or broken up into parts, rather broad, purple-black. (3) Similar line close following. (4) Stripe of pale clouding, broken into blotches. (5) The "second line," incomplete, sinuous, black. (6) Similar to the last, expands to a broad blotch, sharply angled, which angle has a black dash going to apex, then ill-defined and almost absorbed by a roundish whitish blotch about the middle of the hind margin, a very constant feature of the species, then continuing in a slender line. Between lines 4 and 5, which vary in relative position, there is a tendency to have a wide clear band of the ground colour, which often becomes light in shade, the form *albofasciata*. The hind margin has numerous fine black dots in pairs.

Named forms.—This very variable, generally distributed and common species has received a number of names from various authors, especially the older ones, some still perhaps only in the position of probability, such as *miata*, Hufn., *rectangulata*, Fab., and

virgata, Fourc. The other names can be allotted to the various forms which were formerly considered as separate species. In addition there is either the same or a practically identical species in N. America, with named forms, which probably should be treated as a race of our European *furcata*.

Mr. Barnett exhibited a long series of *H. furcata*, mainly from Darenth, most of the specimens being large, and one a fine example of the *infuscata* form, with no trace of marking.

Mr. S. Ashby exhibited eight specimens of the rare beetle *Lema erichsoni* swept near Rye, Sussex, in April last, by Mrs. Ashby and himself.

Mr. Bunnett exhibited a series of the Rhyncophorous beetle *Attelabus nitens* (*curculionoides*) with examples of the topmost leaves of oak twigs rolled by the larvæ. He also showed larvæ and pupæ of the Homopteron, *Ledra aurita*.

JULY 8th, 1920.

Mr. Newman exhibited living larvæ of *Phryxus livornica*, from eggs laid by a female captured in Dorsetshire, in May of the present year. The ova hatched on May 31st, and by July 7th twelve of the larvæ were full fed. Their habit was to rest in the glaring sun and to feed only on the blossoms of *Galium verum* and of *G. mollugo*, with which they were supplied. Fuchsia they absolutely refused, and much preferred growing *Galium* to cut sprays. Some of the larvæ were still quite small. They were apt to attack each other if confined in close quarters.

Mr. Withycombe exhibited a half-grown larva of *Saturnia pyri*, from a batch of ova sent to him from France. He also showed the Liverwort, *Marchantia polymorpha*, calling attention to the peculiar stalked female organs (carphocephala) developed on the thallus; also the rare Roman nettle, *Urtica pilulifera*, from his garden at Walthamstow where it appeared as a weed.

Mr. L. E. Dunster exhibited a series of *Melitaea aurinia*, taken in May, in Somerset; and a series of *Epinephele tithonus*, taken in August, 1919, showing additional spots on the forewings.

Mr. Carr showed a series of *Brenthis euphrosyne*, taken at Crockham Hill, Kent, including a somewhat suffused example.

The President exhibited the solitary bee, *Colletes daviesana*, bred from cells found at Shanklin, together with various parasites and

inquilines bred from the same cells, including:—*Prosopis communis*, Nyl., *Bombylius minor*, L., *Epeolus productus*, Thoms., *Miltogramma punctata*, Mg., *Hemiteles*, sp. Also living specimens of the Isle of Wight "Tiger Beetle," *Cicindela germanica*, bred from larvæ found on May 4th last.

JULY 22nd, 1920.

The President exhibited *Cimex pipistrellus*, the Hemipteron which infests the bat, and contributed the following note:—

"*Cimex pipistrellus* closely resembles *C. lectularius*, but has wider flat margins to the prothorax and is clothed with longer hairs. The species is, as its name implies, parasitic on bats. This specimen with others was found in a bathroom, but it was found that bats were breeding immediately above. That it can and will draw blood from a human host is established, but that it will thrive on such diet is rather doubtful. At any rate a ♀ that was given such a meal on 31st May last was dead a few days later. A freshly developed ♂ was fed on the same day and on July 21st was also dead. On the other hand the ♂ exhibited had developed after feeding as a nearly mature nymph, as also has the ♀ now exhibited. Some young nymphs hatched from the egg have fed, but have not yet reached the second instar. When feeding, either nymphs or adults, no sensation is noticeable and no inflammation or irritation follows, a very different result from that following the bite of *C. lectularius*."

Mr. Priske recorded a remarkable occurrence which befell some traps for Coleoptera which he had set in Richmond Park. Five out of six traps set contained a distinct species of *Necrophorus*, *viz.*, *N. mortuorum*, *N. humator*, *N. vespillo*, *N. ruspator*, and *N. interruptus*, whilst in the sixth trap were two species of *Silpha*.

Mr. Newman reported that he had bad luck with his larvæ of *Phryxus livornica*, the whole batch having died when full-fed, and he had heard that those retained by Mr. Hedges had also perished, whereas Mr. Bright, who only had about a dozen, had successfully got them into the pupal stage.

He reported that he had found *Argynnis aglaia* abundant, and *Plebeius aegon* in fair numbers; that *Melanargia galathea* had apparently gone from W. Kent, whilst *Pyrameis atalanta* had again appeared; that the 2nd brood of *Rumicia phlaeas* was out; and that nearly everything he had in captivity was making a second brood.

JULY 24th, 1920.

Field Meeting—Byfleet.

Conducted by Stanley Edwards, F.L.S., F.Z.S.

There was only a small attendance, possibly owing to the previous night having been very wet, as was the early morning. However, the weather cleared up, and a most enjoyable, sunny afternoon was spent along the canal bank and the adjoining low ground. Insects were decidedly scarce, but many useful species were obtained by the members, and a pleasant tea was obtained at the "Green Room," a private restaurant near the station.

Mr. Lucas reported: "It was hoped to get *Panorpa cognata*, Ramb., which was captured (one female) on a previous excursion (July 23rd, 1904). The date was correct, but the only specimens captured were two females of *Panorpa communis*, Linn. Dragonflies, which were not so much in evidence as they should have been, were: *Enallagma cyathigerum*, Charp. (common); *Ischnura elegans*, Lind. (rather common); *Agrion puella*, Linn. (a few); *Calopteryx splendens*, Harris (one female); *Aeschna grandis*, Linn. (only one captured, but apparently others seen): *A. juncea*, Linn. (one teneral female). Amongst the plants: A few examples of *Impatiens fulva*, Nuttall, were found bearing the brilliant orange blossoms (in the usual way, practically all the flowers are cleistogamous); *Eriophorum vaginatum*, Linn., was obtained in fruit in boggy ground near the canal; *Potamogeton heterophyllus*, Schreb., was found in flower, as well as in fruit, in the canal. The three plants named are not of the commonest."

Messrs. G. S. Robertson and Alfred Sich reported the occurrence of *Pieris napi*, *P. brassicae*, *Epinephele tithonus*, *E. jurtina*, *Plebeius aegon*, *Acidalia inornata*, *Pseudoterpna pruinata*, *Cosymbia pendularia*, and larvæ of *Cerura vinula*, *Orgyia antiqua*, *Lomaspilis marginata*, *Cabera pusaria*, and *Tephrosia punctularia*, among the Macros. Among the Pyrales were *Crambus uliginosellus* (common in the heathery bog), *C. pascuellus*, *C. tristellus*, *C. culmellus*, *C. inquinatellus*, *Scoparia ambigualis*, *Scopula ferrugalis*, and *Hydrocampa stagnata* (a few). The more notable micros reported were *Coleophora anatipennella*, *Lithocolletis alnifoliella*, *Cerostoma lucella*; mines and larvæ of *Bucculatrix frangulella* on *Rhamnus frangula*, and *Elachista cerusella* larvæ mining in leaves of *Phragmites communis*.

AUGUST 12th, 1920.

It was announced that Mr. W. West, an original member of the Society, had died on July 30th. Mr. West had been Hon. Curator from the establishment of that office in 1872.

Mr. B. S. Williams exhibited a specimen of *Pyrameis atalanta* having the lowest (third) subapical spot absent, and agreeing with an example described in Mr. Woodford's account of the butterflies in Oxford University Museum (*Ent.*, Aug., 1920). It was the only variety bred out of 400-500 larvæ in 1912.

Mr. E. Step exhibited living specimens of *Dorcus parallelopipedus* which he had found on the side-walk of a road in Wimbledon Park.

He also reported the Mountain Polypody (*Polypodium phegopteris*) as plentiful in a locality to the west of Lyndhurst, New Forest. " Although one station for it is given in Townsend's *Flora of Hampshire*, it is not in this part of the county ; so that I was pleased a year ago to receive a letter from Miss M. G. Tennant, enclosing a specimen of the Fern, and asking if I knew of this locality she had discovered eight years previously. At my suggestion she reported the find to the Rev. E. F. Linton, F.L.S., who is recording the Flora of the district. Last week Miss Tennant again wrote to say that she finds her *phegopteris* station much more extensive than she had realised last year, the plant forming dense clumps in the moist alder-thickets for half a mile along a certain stream ; one tuft seen was over four feet across. From the particulars my correspondent has furnished, I should imagine the species is not newly established, and one wonders how it has escaped the observation of the numerous botanists who have made the Forest their hunting ground. For reasons that will be obvious, I refrain from giving precise details of the locality, though for my personal guidance the lady has kindly mapped the spot."

Mr. Alfred Sich exhibited pupal cases of *Aphelosetia* (*Elachista*) *cerusella*, Hb., and the larval mines in a leaf of *Phragmites communis*, which had contained four larvæ, and three pupæ spun up on other leaves. The four larvæ all produced imagines. The mine was gathered at Byfleet on the occasion of the Society's excursion this year.

He also showed the three British species included in the genus *Ochsenheimeria*, viz., *O. mediopectinella* (*birdella*), *O. bisontella*, and *O. vacculella*.

AUGUST 26th, 1920.

Mr. Hugh Main exhibited a living nymph of *Mantis religiosa* from S. France, and referred to its habit of hanging from a twig when at rest. It was usually very sluggish. Mr. Grosvenor confirmed Mr. Main as to the hanging habit from his own observation of Indian species of Mantis. Mr. Main also exhibited a large spider, *Lycosa* sp., referred to by Fabre, which lives in holes in the ground, and prefers butterflies and moths as food, but if particularly hungry will eat larvæ and flies. Fabre states that the female sits on the raised edge of its hole holding up its egg cluster to the sun, but Mr. Main saw neither the female acting thus nor the raised edge. He showed a second species which fed readily on flies and the fat larvæ of *Rhagium inquisitor*.

Mr. Bowman exhibited a male *Parasemia plantaginis* in which the hindwing on the right side was duskily suffused. It was bred from Portsmouth larvæ. From 60 pupæ 55 imagines emerged in the course of four days. He noted that the apical fascia vary from being entire to much interrupted.

Mr. Barnett exhibited a long series of *Hydriomena furcata* from Coomb Pyne, S. Devon, in which the all green, the light banded, the much variegated and the very dark forms with intermediates were all present; a short series of *Ematurga atomaria*, those from Limpsfield being small and very yellow, comparable to the prevalent continental form in colour, while those from Oxshott were very variable, some being much suffused with very small lighter areas; also a *Plebius ægon* from Oxshott, with a brilliant white submarginal band on the underside.

Mr. B. S. Williams exhibited a number of Fungi collected at Finchley that day, including *Russula emetica*, *R. integra*, *R. citrina*, *Paxillus involutus*, *Laccaria laccata*, *Lactarius quietus*, *Hypholoma fasciculare* and *Clavaria cristata*.

Mr. Sich remarked that he had discovered that the newly hatched larva of *Coleophora ibipennella*, after mining for about two days in the birch leaf upon which the eggs had been laid, constructed its first case by uniting the frass extruded from its mine with silk. Before leaving the mine it cast its first skin.

Mr. Edwards reported *Celastrina argiolus* on August 16th, but so far had only seen an odd specimen of *Catocala nupta*, which usually was fairly common around Blackheath.

Mr. Edwards and Mr. Grosvenor exhibited a number of forms

of the polymorphic *Papilio memnon* from the Indo-Malay region, and the former read a paper on the species, of which the following is a summary :—

"The Group, of which *P. memnon* is the chief member, has about fourteen species to which the subdivisional (or subgeneric) name of *Iliades* has been applied. It is one of the most typical and interesting groups in the Malay *Papilioninae*, and is distributed from continental India and the Malay Peninsula throughout the Malay Archipelago. It was in relation to the species of this group that Wallace first formulated his celebrated conclusions as to the dimorphism, trimorphism and polymorphism of the female sex, conclusions that were subsequently accepted and corroborated by Trimen, who made similar observations in South Africa, and since supported by W. H. Edwards in N. America, who has shown similar variation in species belonging to that fauna.

"The form known as *P. agenor*, L., often indistinguishable from typical *P. memnon*, was considered by Linné to be a distinct species, because he described *P. memnon* from the male and *P. agenor* from the female, and at the same time considered the male of the latter to be a mere aberration of *P. memnon* of which he did not know the other sex. In 1776 Cramer figured and named the male *P. agenor* as *P. androgeos*. Subsequently Hübner, aware that Cramer had described and figured in 1775 another *Papilio* under the name *P. androgeus*, gave the name of *Iliades mestor* to Cramer's figure (♂ of *P. agenor*, L.).

"If we treat the various "species" erected by Butler, Distant, Rothschild, and others as local forms, there stand out (teste Dr. Jordan in Seitz) four or five main subspecies with several subsidiary ones, each of the former having a considerable number of local female forms attached to it. These are with their localities as follows—

A. Main subspecies : (1) *P. memnon*, L., from Java, Borneo, Banka, etc., with ♀ f *laomedon*, Cr., ♀ f *achates*, Sulz., etc. ; (2) *P. agenor*, L., from Continental India, Burmah, Sikkim, Malacca, China, etc., with ♀ f *esperi*, Btlr., ♀ f *alcanor*, Cr., ♀ f *cilix*, Dist., ♀ f *achates*, Cr., etc. ; (3) *P. ancens*, Cr., from Sumatra, Nias, etc., with ♀ f *eribinus*, Haase, etc. ; (4) *P. pryeri*, Roths., from Loo Choo Isles ; (5) *P. merapu*, Dohr., from Sumba.

B. Subsidiary subspecies: (6) *P. oceani*, Dohr., from Engano ; (7) *P. perlucidus*, Früh., from Lombok, etc.

C. Aberrational and seasonal forms.

"The males of all these local races differ but little in their markings and form, in some races a red spot occurs in the base of the cell in one of the seasonal forms, in other races it never appears, while the amount of the red area at the base of the wings is also variable.

"The females however are dimorphic in the shape of their hindwings, the latter occurring both tailed and tailless; in colour and pattern they are very polymorphic, not only forming local forms but seasonal as well. Local forms which occur predominently in one area occur aberrationally in other areas.

"In Sumatra at least four distinct forms of the female have been named, three of them tailless and one tailed. Dr. Martin has frequently bred the species from larvæ, which fed on *Citrus limetta* and *C. decumana*, and on one occasion he bred all four forms of female from eggs laid by one female, while on another occasion eggs laid by a tailed female did not produce a single tailed descendant like herself.

"There is but little suggestion of mimicry in the species, but Wallace says that the ♀ f *achates* of *P. memnon* mimics the form *donbledayi* of *P. coon* (Trans. Linn. Soc., 1865)."

Professor T. D. A. Cockerell, who was present as a visitor, gave a short account of the entomological national collection in the United States of America.

SEPTEMBER 9th, 1920.

Mr. J. B. Farmer, of Brixton, was elected a member.

Mr. Bowman exhibited a brood of *Ephyra porata* bred from ova laid by a female captured at Witley, which had emerged in two distinct series: about one half of the brood in August and the other half the following spring; and called attention to the curiously close resemblance of the spring series to the allied species *E. punctaria*.

Mr. H. Main exhibited the larvæ of three species of hymenopterous parasites, which were feeding on larvæ of the Longicorn beetle, *Rhagium inquisitor*, common in Epping Forest in recent years.

Mr. Turner exhibited about forty species of moths taken by Mr. Grosvenor in India, chiefly at Bangalore, including a fine example of *Attacus edwardsi*, a series of *Trabala vishnu* with female colour

dimorphism and extremely large anal tuft; a bred *Crishna macrops*, several Hypsids, a few *Zygæna cashmirensis*, the conspicuous "Cossus," *Duometus leuconotus*, with clean white tufted thorax.

Mr. H. Moore exhibited the hymenopteron *Mutilla europæa*, taken near the pier at Bournemouth, with other species of the genus from Egypt, the Ionian Islands, the Upper Amazons, and Indiana.

Mr. Bunnet exhibited *Coccinella hieroglyphica*, from Keston, with its black aberration.

Mr. Grosvenor said that *Agriades thetis* was absent, and only a few *A. coridon* were to be seen at Reigate this autumn. Mr. Farmer reported *A. coridon* common at Riddlesdown. *Pyrameis atalanta* was in plenty.

SEPTEMBER 23rd, 1920.

Exhibition of Lantern Slides.

Mr. Adkin exhibited views of Selborne from old engravings.

Mr. A. E. Tonge's exhibit illustrated the resting positions of *Geometridæ*.

Mr. Main showed the seasonal forms of *Pieris napi* f. *bryoniae*; the stages and pupal chamber of *Timarcha coriaria* (Col.); the metamorphoses of *Donacia* sp. (Col.), the larva feeding on the roots and underwater stems of aquatic plants.

Mr. Bedford (of Lewes) exhibited slides of rare insects captured in Sussex, *Papilio machaon*, *Euranessa antiopa*, *Orrhodia erythrocephala*, etc.; local birds; rare and local orchids, etc.

Mr. Withycombe exhibited slides of *Chrysopa*, *Hemerobius*, *Syrphus*, and *Stratiomys* sp.; also flowers of frogbit, *Hydrocharis morsus-ranæ*, etc.

Mr. Coltbrup's series showed chiefly the resting positions of butterflies and moths.

Mr. Dennis illustrated Windermere and its flora, and showed a series of ferns.

Mr. Grosvenor exhibited a number of Indian *Terias*, many of them from the collection of the late Col. Bingham; and referred to the difficulty of recognising many of the species which had been erected by different authors.

Mr. Bowman exhibited a short series of *Tricopteryx* (*Lobophora*) *carpinata*, bred from a female captured at Oxshott, of which 20 per cent. had very dark, well-emphasised transverse lines on the fore-

wings. He pointed out that the lobe on the hindwing of this species was very small.

Mr. Hy. J. Turner exhibited three species of the genus *Eacles* from the New World. *E. imperialis*, the well-known N. American species, *E. grandis*, the closely allied species from Sao Paulo, S. Brazil, and a further species sent to him by Mr. Lindeman from Cordoba, Argentine. He also showed coloured photographs of the larvæ of the two last named showing that they were distinct species.

OCTOBER 14th, 1920.

Mr. J. B. Farmer exhibited a storebox filled with British Odonata, etc., which he was presenting to the Society.

Mr. Riley exhibited, for Mr. R. South and on behalf of Mr. Dolton of Reading, some aberrations of British Lepidoptera taken during the past season in the Reading district, including *Agriades coridon*, male, intermediate between the form *albicans*, H.-S., (Spain) and the form *apennina*, Zell. (Italy). Its appearance in Britain is very unusual, and the two specimens in the British Museum are both labelled "Hungary." There was also a very unusual form of *Hibernia leucophæaria*, the marking forming very conspicuous wavy transverse bands on an almost clear grey ground. In addition there were two dark grey-brown females of *Bupalus piniaria*, a form which occurs at Oxshott occasionally.

Mr. Hy. J. Turner exhibited a series of *Zygæna filipendulæ* taken on the eastern portion of the southern slope of Box Hill. Practically the whole of the large number examined, of which those exhibited were a sample, had the sixth-spot more or less feebly developed, and in some worn specimens it was almost obliterated. The specimens were generally small. There were several ab. *cytisi* in which the pairs of spots were united to form three separate blotches, as well as various modifications of spotting, including an example in which a streak of scarlet united the 5th and 6th blotches with the joined 3rd and 4th blotches.

Mr. Newman exhibited a living larva of *Hyloicus pinastri* from Suffolk, the last of a small brood, the others having pupated.

Mr. B. S. Williams exhibited three female examples of *Pieris rapæ* from Finchley, showing a small dusky spot in the disc of the hindwing; also an abnormal *Rumicia phlæas* with the spots on the left forewing somewhat striate.

Mr. Johnson exhibited a short series of *Pieris napi* bred from ova from an Irish female. All the female specimens were banded, one also suffused somewhat with yellow. He showed in addition a gynandromorph of *Pieris rapæ*, and a varied series of confluent forms of *Zygæna trifolii* from Folkestone, where the species had been very common.

Mr. Blenkarn exhibited the very rare *Carabus niteus* and other Coleoptera, taken near Poole this year.

The Secretary referred to a pamphlet on Mosquitoes issued by the S.E. Union of Scientific Societies, and a short discussion took place on the breeding habitats of the group.

Numerous reports on the season were given. Mr. Newman had spent seven weeks at Folkestone, where the larvæ of *Pyrameis atalanta* were extremely abundant. *P. cardui* larvæ were very scarce and not seen on nettles. *Pieris brassicæ* larvæ were very scarce also. Worn specimens of *Colias edusa* occurred sparingly. *Polyommatus icarus* always seemed worn, although a few fresh ones appeared daily: one was quite fresh on October 2nd. Three worn *C. hyale* were taken. *Aricia medon* was frequent. *Argynnis aglaia* was in fair numbers and fresh in September. *Melanargia galathea* was seen in September, as also was *Hipparchia semele*. Fresh and worn *Rumicia phlæas* were seen all the time. *Agriades thetis* was scarcer than he had ever known it at Folkestone. It continued to emerge till October 8th. *A. coridon*, usually scarce on the hills, was this year very much commoner, up to September 20th. *Manduca atropos* was taken on a lamp. *Leucania extranea* had been taken in both Devon and Cornwall. *L. vitellina* had occurred in Devon, while *Heliothis peltigera* had been frequently captured. Mr. Sich reported *Tortrix pronubana* from N. London.

OCTOBER 28th, 1920.

Mr. A. E. Stafford, of Mortlake, Mr. S. B. Hodgson, of N. Kensington, and Mr. W. P. Colhoun, of Co. Derry, were elected members of the Society.

Mr. Hugh Main exhibited the living larvæ of the Mosquito *Anopheles plumbeus*, which he had found in plenty in the rot holes of trees in Epping Forest during a walk on October 24th. The holes were both high up and among the roots raised above the ground. The larvæ of *Ochlerotethus* was also present.

Mr. Hy. J. Turner exhibited a number of species of *Ophideres* (Noct.) from the Indo-Malay Region, including one from New Guinea. He also showed the extremely young curved black case of *Coleophora lutipennella* found on oak at Chiselhurst and pointed out on some of the oak twigs a very small Coccid which had sunk itself into the young bark; and small specimens of the beautiful orange cup-fungus *Otidea aurantia*.

Mr. A. A. W. Buckstone exhibited a very dark female specimen of *Boarmia consortaria* taken at Oxshott in June, 1920, and said that he had taken a similar one at Wimbledon about the same date. He also showed hybrids of *Pygæra curtula* ♂ and *P. reclusa* ♀, with typical specimens of the two species for comparison.

Mr. Garrett exhibited a blue female of *Polyommatus icarus* from Bexley, in which the red marginal blotches were well developed on the forewings, with hindwings much suffused with bluish-white.

Mr. Blenkarn exhibited Coleoptera, including *Chrysomela graminis* from Wicken Fen, September, 1920, *Elater elongatulus* from the New Forest, August, 1920, and *Agabus brunneus* from Hants, August, 1920, where the species was originally discovered.

Mr. Barnett, for Mr. Cornish, exhibited a portion of a decayed window frame in which a leaf-cutter bee, *Megachile maritima*, had made a string of ten cells fashioned of cut pieces of rose-leaf.

Mr. Frisby exhibited a complete series of British Aculeate Hymenoptera, and read a paper, "The British Aculeates." (See page 1.)

There was a considerable discussion.

NOVEMBER 11th, 1920.

Mr. A. E. Hemming, F.Z.S., F.E.S., Whitehall, was elected a member.

Mr. T. H. L. Grosvenor exhibited a number of species of *Limenitis*, *Athyma*, and *Neptis* from the Thibetan and Hindo-Malayan Region, and called attention to the close similarity of *Athyma punctata* to *Hypolimnas misippus*.

Mr. L. W. Newman exhibited a short series of *Polyploca flavicornis*, including gradations from the very dark Rannoch form through variegated specimens to the very light south form.

Mr. Bunnett exhibited a specimen of *Mimas tiliæ* in which the usual transverse bar was reduced to a small triangular discal spot.

Mr. B. S. Williams exhibited two aberrations of *Rumicia phlæas* of the autumn brood, 1920, from North Finchley. One was the ab. *subradiata*, Tutt; the other was the same form with a series of copper patches between copper-marked nervures on the hindwings of the same shape and size as the blue patches in ab. *cæruleo-punctata*.

Mr. A. A. W. Buckstone exhibited several series of *Hygrochroa syringaria*, one consisting of fairly large and brightly coloured specimens bred from larvæ taken at Wimbledon in March last. Emergence took place in June. There was a fair amount of variation in breadth of wing. Another series, bred from two pairings of the above, consisted of smaller insects which emerged in August. They were more uniform in breadth of wing, but the colour was dull, and the pale blotch on outer margin of forewing was reduced in size.

A third series was bred from larvæ taken at Wimbledon in 1913 and 1915, the large, brightly coloured moths emerging in June each year. The ground colour of the wings of the females was yellow as compared with the greenish tinge of the wings of that sex in the previous two series. Two of the males had the centre line of the forewings duplicated. There were in addition specimens captured at Wimbledon, June, 1913, which were pale in colour and of small size as compared with the foregoing.

The larvæ of the first series were beaten from honeysuckle, but fed on privet, as were their descendants.

Of 263 ova obtained from these pairings 233 eventually became imagines, five larvæ hibernating after their second moult, the remaining larvæ dying from accidental injuries.

Mr. Buckstone also exhibited living pupæ and imagines of *Pyrameis atalanta*, from larvæ taken at Merton Park, and full-fed larvæ of *Abraxas grossulariata* (one spinning up) taken in the same locality where a considerable number were found equally precocious.

In the ensuing discussion it appeared that several members were obtaining a second emergence of *P. atalanta*, and it was claimed that they might be hibernated as pupæ if protected from frost. It was stated that a second brood of *A. grossulariata* could always be bred even out of doors. There were a few records of *P. atalanta* being seen wild in winter, but in the Scilly islands it appeared to hibernate regularly. If imagines were wintered indoors and fed regularly it was always possible to get them to pair in the spring.

Dr. Dixey, F.R.S., read a paper on "Sexual Dimorphism,"

illustrating his remarks with a large number of coloured diagrams and a series of lantern slides. (See page 12.)

NOVEMBER 25th, 1920.

ANNUAL EXHIBITION OF VARIETIES.

Mr. G. D. Morison, Bedford Pk., W. 4; Mr. D. Watson, Gravesend; Mr. G. W. Young, F.G.S., F.R.M.S., Barnes, S.W.; Mr. W. West, Brockley, S.E.; Mr. F. H. Simms, Stourbridge; and Mr. H. M. Simms, Stourbridge, were elected members.

Short series of *Acidalia* (*Leptomeris*) *immorata* and *Ino* (*Rhagades*) *globulariæ* from Sussex, were presented to the Society's collection by Mr. F. G. S. Bramwell, of Brighton, They were from Lewes and Falmer respectively. The donor in his letter referred to the bad season of the past summer for the rearing of larvæ, although there were plenty of imagines to be obtained, including *Colias edusa* with var. *helice*, *Theretra porcellus*, etc. Of 400 larvæ of *Sphinx ligustri* quite half went off when full fed, while last year (1919) practically all pupated and produced imagines.

Lord Rothschild exhibited the series of 1,277 specimens of *Abraxas grossulariata*, Linn., from the British collection of the Tring Museum. They consisted of the series from the Bright and Gibbs collection and those collected by himself. The larger number of the more extreme varieties, as will be well known to the members present, have been bred by the Rev. Gilbert Raynor. Most of the named forms were included, and some unnamed ones were indicated.

Mr. C. H. Williams exhibited a drawer of varieties of the same species, including ab. *lacticolor*, ab. *fulvapicata*, ab. *lutea*, and ab. *semilutea*.

Mr. Hy. J. Turner exhibited several store-boxes containing lepidoptera from all parts of the Palæarctic Region outside of the strictly European area. The insects exhibited were either extra-European forms of well-known species or were species closely allied to those in the European area, and were from Asia Minor, Transcaspia, Turkestan, The Altai, S. Siberia, Mongolia, The Amur, Palestine, Algeria, &c.

Mr. H. S. Leeds exhibited aberrations captured during the present year of the following species:—*Melanargia galathea*, heavily marked with black, rich cream-coloured ground and others; *Coenonympha pamphilus*, pale and dark bordered forms; *Rumicia phlaeas*

var. *eleus*; *Polyommatus icarus* var. *striata* and others; *Aricia medon* and *Agriades bellargus*, with the orange lunules unusually heavily marked; many interesting forms of *Plebeius aegon* and *Agriades coridon*; a specimen of *Strymon pruni*, in which the markings of the underside of the right wings approached those of the female, and those of the left wings followed those of the male; also a remarkable form of *Epinephele jurtina* heavily scaled with white (not bleached) on costa.

Mr. W. G. Sheldon exhibited his collection of about 1,400 specimens of *Peronea cristana*, Fab., including the series of the late Sydney Webb, examples of all the 72 named forms, and the original type specimens of 39 of them. He also showed about 250 specimens of *Leptogramma literana*, L., including ab. *romanana*, Fab., *tricolorana*, Haw., *irrorana*, Hüb., *squamana*, Fab., and several unnamed forms.

Mr. Percy M. Bright exhibited a long series of *Epinephele tithonus* containing some remarkable varieties, many with additional eye-spots of varied development, one without spots on the forewings above, white suffused forms, and a gynandromorph taken at Swanage this year; also a very varied series of *Argynnis aglaia*, including several magnificent melanic varieties, and one extraordinary scaleless aberration with the fringes perfectly developed on all four wings. Mr. Bright called attention to the almost complete destruction of the famous Monk's Wood, the home of *Strymon pruni*.

Mr. B. W. Adkin exhibited ten aberrations of *Satyrus semele*, including a male specimen with four spots on the forewings, taken in North Kent in 1920.

Mr. T. H. Grosvenor exhibited British species of Rhopalocera which occur in India and Thibet, including:—*Papilio machaon*, race *sphyrus* from the N.W. Himalaya, and race *sikkimensis* from Thibet; *Pieris brassicae* and *Pontia daplidice* from the Punjab Plains; *P. rapae* from the N.W. Himalayas; *Gonepteryx rhamni*, race *nepalensis*, from the Nilgiri Hills; *C. fieldii* from the Punjab hills and plains; *Argynnis lathonia*, race *issoria*, from the Punjab Hills; *Apatura iris* from Thibet; *Vanessa cashmirensis* from the Punjab Hills; *Pyrameis cardui* from India, generally; *Polyommatus icarus*, race *persica*, from the N.W. Himalayas; *Aricia medon* from the Punjab Hills; and *Rumicia phlaeas* from the N.W. Himalayas; and a series of *Sarbaria polyctor* showing slight variation in the amount of green scaling, those from the Kulu district being greenest.

Mr. Pickett exhibited long series of aberrations of *Agriades coridon* taken in 1918, 1919 and 1920.

Mr. L. W. Newman exhibited series of the variation shown in the races of *Melitaea aurinia* from Ireland, Cornwall, Wales, Hants, etc.; a hybrid of *Selenia bilunaria* (*illunaria*) and *S. tetralunaria* (*illustraria*); extreme light and dark forms of *Melitaea cinxia* from the Isle of Wight; yellow forms of *Gonodontis bidentata* from Cheltenham; a suffused *Argynnis aglaia*; a *Colias edusa* with one wing bleached; melanic examples of *Zygaena trifolii*; a series of the extreme development of the ab. *varleyata* of *Abraxas grossulariata*, including specimens with forewings almost entirely black; and an extremely varied series of *Mimas tiliae*.

On behalf of Mr. L. A. E. Sabine, Mr. Newman exhibited a long and very varied series of *Polyommatus icarus* from Co. Sligo, including females of intense blue coloration and very large, brilliant red lunules; series of *Epinephele jurtina* from Co. Kerry, including aberrations with very large ocelli, with bipupillate apical spots, and great variation in the amount of fulvous colour on the upperside; *Rumicia phlaeas* from the same county, one having the right forewing almost wholly silvery white (*alba*); short series of *Leptosia sinapis*, *Epinephele tithonus*, and *Pararge megera*, with *Sesia formicaeformis*, all taken in Co. Kerry in 1920, the last-named being new to the Irish fauna.

Mr. A. A. W. Buckstone exhibited aberrations of *Hipparchia semele*, including small, richly-coloured undersides from Sidmouth, small dark forms from Purbrook, and others from the N. Downs.

The Rev. Geo. W. Wheeler exhibited a box of *Melitaea phoebe*, mostly from Central Europe, showing a wide range of variation over a limited area. He drew special attention to the extremely variegated form from the Pfynwald in the Rhone Valley and the varied series of the ab. *cinxioides*.

Mr. Riches exhibited a short series of *Cossus ligniperda*, in which the lower wings were considerably suffused with dark scaling.

Mr. C. W. Sperring exhibited *Colias edusa* and var. ♀ *helice* from Eastbourne, August, 1920, minus the usual yellow blotches in border of the hindwings; *Brenthis euphrosyne*, with heavily suffused hindwing and curiously-banded forewing, upperside, Chislehurst, May, 1920, and a specimen with striated upperside hindwing, Lincoln, June, 1920; *Vanessa io*, with the yellow

ground of ocelli on forewing replaced with dark buff and blue-grey instead of the usual metallic blue, Folkestone, August, 1914; *Pyrameis atalanta*, female, pale underside hindwing variety, bred S.E. London, August, 1920; *P. cardui*, female, bred ex-Bexley pupæ, August, 1920, in which the usual underside fulvous coloration is replaced with deep olive brown, and an underside female, aberration ex-Bexley pupæ, August, 1920, similar to that illustrated in *South's British Butterflies*; *Pararge aegeria*, bred ex New Forest larvæ, April, 1920, with central spot enlarged and extended to outer margin; *Agriades coridon*, male, upperside of extremely dull leaden appearance, Portsmouth, August, 1920; *Hamaearis lucina*, pale yellow-buff ground coloration with all the usual black markings almost suppressed, Hants., May, 1920; *Amorpha populi*, an almost unicolorous melanic example, bred ex Bradford larvæ, 1919; and *Aphantopus hyperantus*, from brood of which 50% had sandy-coloured underside, and 30-40% were assymmetrical in shape and number and size in the spotting.

Mr. H. M. Edelsten exhibited the yellow form of *Cybosia mesomella* and the black and grey form of *Nisoniades tages*, both taken in Chippenham Fen by Mr. Bowles.

Mr. B. S. Williams exhibited a series of *Dysstroma* (*Cidaria*) *truncata* from Finchley, including the usual black form of the district, the new form which had more recently appeared and the cross between the two forms.

Mr. A. W. Mera exhibited the following species of the genus *Oporabia* (*Epirrita*) with various hybrids which he had obtained:— *O. filigrammaria*, *O. autumnaria*, *O. dilutata* and its pale race *christyi*: hybrids (A) of *filigrammaria* ♂ from Bolton × *autumnaria* ♀ from Enniskillen; and further hybrids obtained as follows: (1) hybrid A × *autumnaria*, (2) *christyi* ♂ and hybrid (*dilutata* × *christyi*) ♀, (3) *dilutata* ♂ Enniskillen × *christyi* ♀, (4) *christyi* ♂ Enniskillen × *dilutata* ♀, (5) *christyi* ♂ Enniskillen × *dilutata* ♀ Lancashire, and (6) ¾ *autumnaria* ♂ × ¼ *filigrammaria* ♀.

Dr. Leonard Hopper exhibited a specimen of the rare *Leucania extranea* (*unipuncta*) taken at Penryn, Cornwall, in September, 1920.

Mr. A. E. Tonge exhibited a series of the Royston forms of *Agriades coridon*; aberrations of *Coenonympha pamphilus* from Reigate and Deal, including a female without apical spot on the underside; *Rumicia phlaeas*, a female from Delamere with the left side normal and the right side bleached; *Hesperia malvae*,

with confluent spots; a *Polyommatus icarus* male without orange lunules beneath, Deal; *Agriades thetis* male with extra orange lunules on the right hindwings, Deal; *Epinephele jurtina*, a ♀ with bipupillate apical spots, a ♂ uniformly bleached all over, and a ♂ with additional spots on the hindwing; a rose pink form of *Mimas tiliae*; an *Arctia caja* with very small black spots on the hindwings; a ♀ *Cosmotriche potatoria* dark banded on the outer half of all wings; a melanic ♂ of *Boarmia consortaria* from Crowthorne, Berks; *Hibernia marginaria* var. *fuscata* from Cheshire, and a cross between var. *fuscata* ♀ and a Reigate ♂; *Zygæna trifolii*, (1) with heavy marginal hindwing band, (2) with scaleless area on right of the forewing, (3) with forewing spots entirely confluent.

Mr. L. E. Dunster exhibited *Epinephele jurtina*, bleached forms, from Chipstead, Lyme Regis, Princes Risboro', and Ranmore; and undersides with large eye spots, from Crewkerne. *Argynnis aglaia*, with all marginal spots white and rather pale ground colour, from Mickleham. *Euchloë cardamines*, male with small discal spots, from Crewkerne. *Aphantopus hyperantus* ab. *cæca*, ab. *arete*, and minor vars., all undersides, from Mickleham. *Agriades coridon*, male varieties in ground colour from greyish blue to the bright blue approaching *adonis*; females, ab. *semi-syngrapha*; male, ab. *obsoleta*; males, minor vars., all from Royston; male, ab. *semi-obsoleta*, from Princes Risboro'; and males with the extra large spots on underside, from Cerne Abbas, Dorset. *Aricia medon* (*astrarche*), male, without orange markings on the upper wing.

Mr. Johnson exhibited aberrations of *Dryas paphia* and *Limenitis sibilla*, taken this season in the New Forest.

Captain Riley exhibited the *Epinephele jurtina* he had obtained in the Scilly Isles, and pointed out how much they resembled the southern form, race *hispulla*, in the coloration of the females. Mr. B. Adkin said that the race appeared to have similar characteristics on all the islands of the Scilly group.

Mr. H. E. Garrett exhibited *Euchloë cardamines* with unusually dark hind margins to forewings, Joyden's Wood, Bexley, May, 1920; *Epinephele jurtina* with left hindwing white, same place in July; an unusually dark underside of *Coenonympha pamphilus*, Bexley, June, 1920; *Pyrameis atalanta* with pale marks in the red band of forewings, bred from Bexley, 1920; and *Rumicia phlaeas* with the row of black spots on the forewings confluent and almost uniting with the marginal border, Joyden's Wood, August, 1920.

Mr. Hy. J. Turner exhibited two folio-coloured plates with

figures of the various forms of the larvæ of *Eupithecia assimilata* and *E. abbreviata*.

Mr. G. Talbot, on behalf of Mr. J. J. Joicey, exhibited lepidoptera from the mountains of Central Ceram, Dutch New Guinea, French Guiana and Hainan; also the following aberrations of British Lepidoptera:—*Pieris napi*, gynandromorph; *Colia edusa*, ♀, with left forewing *helice*; *Pyrameis cardui*, rayed form, Margate; *Aglais urticae*, pale form, Chilterns, taken by G. B. Oliver, 1918; *Argynnis paphia*, very dark, New Forest, taken by Ford, 1915; *A. cydippe* (*adippe*), very dark, Burnt Wood, ex. Coll. Webb.; *A. aglaia*, Brockenhurst, taken by Rev. Wolseley, 1888; *Melitaea euphrosyne*, form with obsolete markings, Abbots Wood, ex. Madison Coll.; *M. euphrosyne*, very dark, asymmetrical form, ex. Coll. Noakes, 1905; *Arctia caja*, forewing entirely brown, hindwing black, bred by Batty, Manchester; *A. caja*, asymmetrical aberration, York, bred by Jackson; *A. caja*, very light form, ex. Gibbs Coll.; *A. villica*, asymmetrical dark aberration, Bexley; *Parasemia plantaginis*, very dark form, bred by Jackson from larvæ found in Wales; *P. fuliginosa*, large form with unusual colouring on hindwing, Kent; *Diaphora mendica*, streaked form, New Forest; *D. mendica*, form with marginal lines, bred by Tutt; *B. quercûs*, dark ♂ form, Aberdeen: *B. quercûs*, unicolorous ♀ form, ex. Capper Coll.

Professor E. B. Poulton, F.R.S., exhibited a series of butterflies (*Delias* : *Pierinae*) which had been captured migrating from one valley in Selangor, F.M.S., to another in the evening and back again next morning, accompanied by moth mimics (*Dysphania* = *Euschema* : *Geometridae*), and these again by their mimics (*Psaphis* = *Canerkes* : *Chalcosiinae* : *Zygaenidae*). They were observed and captured during March, 1920, by A. R. Sanderson, (See "Proceed. Ent. Soc. Lond.," 1920).

Messrs. O. R. and A. de B. Goodman exhibited the following British species showing graduation in coloration and markings:—*Papilio machaon* from Wicken, showing increase in markings, including presence of orange in lunules of lower wings, with ova, larva and pupa; *Euchloë cardamines*, showing variation in size of discoidal spot on forewing; *Colias edusa* var. *helice*; *Pararge aegeria*, showing increase in pale areas; *Pyrameis cardui*, a dark var.; *Aglais urticae*, a diminution in dark areas: *Melitaea aurinia*, forms from Carlisle and Dorset; *Bithys quercûs*, male, showing female coloration; *Rumicia phlaeas* ab. *semi-schmidtii*; *Plebeius aegon* and *Polyommatus icarus*, females, with blue scales; *Agriades coridon*

var. *fowleri* from Swanage; *Nisoniades tages* and *Hesperia malvae*, light and dark forms, and a Hesperiid taken in Surrey on June 1st, 1919, which could not be placed under any British species (but was subsequently identified by Mr. Riley as *H. syrichtus*, an American species); *Dryas paphia*, showing intermediate forms between type female and ab. *valesina*; *Argynnis aglaia*, showing graduation in colouring to ab. *suffusa*, both female and male; *A. cydippe*, showing absence of spots; *Brenthis selene* and *B. euphrosyne*, showing increase in black in basal areas. They also showed the following series taken in July, 1920, in the Rhone Valley, Switzerland, and in the Italian Alps, containing:—*Parnassius apollo*, a series showing variation in the size of the red spots; *Melitaea didyma*, *M. trivia*, *M. phoebe*, *M. cynthia*, *Brenthis amathusia*, *B. ino*, *B. daphne*, *Issoria lathonia*, *Argynnis niobe* and var. *eris*, *Satyrus alcyone*, *Syntomis phegea*, and *Zygaena carniolica*.

Mr. Stanley Edwards exhibited some mimetic species of *Papilio* and several species of *Parthenos*.

Mr. Douglas H. Pearson exhibited Rhopalocera from Biarritz, Gavarnie, Luchon, etc.:—*Parnassius apollo*, showing very fine red spots; *Pararge maera*, race *adrasta*; *Coenonympha oedipus*, a var., upper wing without ocelli; *Lycaena arion*, one unspotted, with var. *obscura*; *Melitaea didyma*, ♂ ♂, strongly bordered with black; ♀ ♀, var. *alpina*, or nearer to *meridionalis*?; two ♀ ♀, very dark, nearly black, forewings of most of them grey-green, with no sign of the normal ground colour; two light specimens from Northern France for comparison; *Loweia* (*Chrysophanus*) *dorilis* var. *caeruleopunctata*; *Argynnis cydippe* (*adippe*) strongly spotted, with one var. *cleodoxa*; *A. aglaia*, large ♀, one pale hindwings (Dorset); *A. niobe*, large and strongly marked; *Polyommatus hylas* and *P. escheri*, small; *C. argiolus*, dwarf; *Lampides boeticus*; *A. coridon*, pale undersides, and vars.; *M. dictynna*, very pale forms, etc.

Mr. Robert Adkin exhibited an aberration of *Melitaea cinxia*, in which on the upperside of all the wings the black markings of the basal area were much intensified, and the margins of the hindwings clouded with black. On the underside the central portion of the hindwings was occupied by a row of strongly-defined black streaks, and the black submarginal line was considerably broader than in typical forms. The specimen was bred in June last from an Isle of Wight larva. He also exhibited a black form of *Zygaena filipendulae*=ab. *chrysanthemi*, bred in August last from a Lancashire larva.

Mr. Leonard Tatchell exhibited a photograph of a gynandromorph of *Amorpha populi*, bred June 4th, 1920, from a Wanstead larva. Right side male left side female, fore and hindwings of male pair larger than the female pair, rufous tornal markings on the male side much suffused, all the margins strongly crenulate. The outstanding feature is the precision with which the sexes are arranged on either side of the median line. The antennæ and legs retain their respective sexual characters. Also larvæ of *Dysstroma* (*Cidaria*) *truncata* from Devon ; a male *Sphinx ligustri*, which had paired with a female *Smerinthus ocellata*, with a batch of resulting unfertile ova.

Mr. K. G. Blair, on behalf of Dr. C. J. Gahan, exhibited a larva of a *Nemoptera* sp. from Syria (near Rehoboth), " Always found in dens, on sand, together with grey ticks called in Arabic ' Delm ' " (J. Aharoni).

Mr. F. D. J. Jackson exhibited a curious gynandromorph of *Cosmotriche potatoria*, bred in 1911 from an Oxford larva. The body was ♂, the antennæ ♀, the general coloration ♀ with streaks of ♂ colour on the upperside left forewing, the underside being wholly ♂ in colour.

Mr. F. W. Edwards exhibited a male and a female of the rare British gnat *Orthopodomyia pulchripalpis*, reared from larvæ found in water in a hollow beech in Epping Forest, July, 1920.

Mr. R. J. Bowman exhibited a series of the forms of *Cosymbia pendularia* and *C. pendularia* var. *subroseata*, extreme forms, several showing distinct white spots along outer edge of marginal bands. Also *C. pendularia* var. *nigro-subroseata* in varied series : (*a*) examples with heavy white striation in marginal bands; (*b*) examples heavily suffused with white over whole wing areas ; (*c*) purple black examples with very definite white lines and broad white fringes; (*d*) an example in which the inner white lines are deleted ; (*e*) an example in which the inner and outer white lines are deleted and the wing areas suffused ; (*f*) a unique aberration, in which all markings are completely missing, with the exception of faint white spots in the central areas of the wings—all wings entirely covered with black scaling—black fringes ; (*g*) two examples with bleached hindwings.

Mr. J. J. Joicey, F.E.S., Witley, Surrey; Mr. G. Talbot, F.E.S., Witley; Mr. A. J. Wightman, Lewes; and Mr. L. Ford, Bexley, were elected members of the Society.

Mr. Sperring exhibited a Cassid beetle of the genus *Aspidomorpha* from Central Uganda, said to be very rare in that locality. It was of a brilliant golden hue when alive.

Mr. Main made a series of remarks on the life-history of ants, and illustrated the methods and difficulties met with in keeping them in artificial formicaria. For food he gave honey, flies, caterpillars, stick-insects, etc.

Mr. Buckstone exhibited further series of dwarf *Agriades coridon* from the Surrey locality in 1920, also examples of a second brood of *Euphyia* (*Cidaria*) *picata* bred in captivity.

Mr. Bowman exhibited aberrations of *Polyommatus icarus* from Folkestone, one specimen having exceptionally heavy spots, and spots united into an arc on the inner margin.

Mr. B. S. Williams exhibited two specimens of *Bithys quercûs* ab. *major* from Cornwall, and an asymmetrical example of *Coenonympha pamphilus*.

Mr. Goodman exhibited a pupa of *Hyles euphorbiae* from a full-fed larva taken on July 27th, 1920, in the Val Ferret, Courmayeur, N. Italy.

Mr. K. G. Blair exhibited a specimen of *Rumicia phlaeas* with the outer row of spots on the forewings much reduced in size; it had been named ab. *parripuncta*.

Mr. Robert Adkin exhibited a series of *Ptychopoda* (*Acidalia*) *dimidiata* (*scutulata*), together with the cocoons from which they had emerged, and contributed the following note:—"On July 9th, 1919, I happened to box a female of this species on the Parade at Eastbourne, and she deposited some two dozen eggs; these hatched on the 23rd, and the larvæ fed on dandelion and knotgrass, etc., until the end of September, when 22 were counted on the more or less dried-up food-plants, on which they were left in an airy cage for the winter, a dandelion leaf or a little piece of *Crepis* being added occasionally. On March 20th, 1920, the whole 22 larvæ being found to be alive, they were removed to a clean cage and supplied with dandelion, *Galium*, and hawthorn, the buds of which were just expanding. For a time, at any rate, they appeared to prefer the hawthorn. They were full fed by the beginning of May, and all pupated between the 2nd and 30th of that month.

"Such authors as deign to mention the subject appear to regard the pupa as subterranean, but in this case they were certainly not so. Of the 22 compact little cocoons that were spun ten were among the rubbish that had collected on the surface of the earth at the bottom of the cage, seven were formed on the sides of the cage, just at or above the surface of the earth, and all these had particles of earth liberally worked into them; two were constructed on the sides of the cage, from three to four inches above the earth, and the remaining three on the stems of the food plant. In confinement larvæ do not always follow their natural habits in regard to the positions selected for pupation, but the foregoing appears to suggest that in this species the natural position would be among rubbish on or near the surface of the ground, as is the case with many nearly related species.

"Between June 16th and 18th, 21 perfect imagines came forth, all of them richly coloured, heavily marked insects, in that respect contrasting favourably with series bred from the similarly chalky districts of Folkestone and a former Eastbourne brood."

Mr. H. J. Turner exhibited a number of species of butterflies from W. Java, among them being a finely marked form of *Papilio memnon* ♂ and several species of brilliantly marked *Pieris* and *Elymnias*.

Mr. R. Adkin, the Society's Delegate to the Conference of the Delegates of the Corresponding Societies of the British Association, read the following Report:—

"I attended the meeting of the British Association at Cardiff from 23rd to 28th of August, and the meetings of the Delegates of Corresponding Societies, as your delegate, on the 25th and 27th. The President of the Conference, Mr. T. Sheppard, gave an address on 'The Evolution of Topographical and Geological Maps,' and illustrated his remarks by the exhibit of a large number of rare and early dated maps. A 'Discussion on the Status of Local Societies —The Means of Developing their Objects, of getting New Members, of Making Announcements and Publishing Papers,' was introduced by Mr. William Whitaker, and many of the delegates present took part, but without, so far as I was able to gather from their remarks, elucidating anything very fresh or helpful.

"Section D., Zoology, presided over by Prof. J. Stanley Gardiner, and with Dr. F. A. Dixey as Vice-President, had a very full programme, and discussed various subjects that will be of interest to many of our members, and as I hope to present the official report

of them to the Society in due course it will be unnecessary for me to touch upon them now."

JANUARY 13th, 1921.

Lord Rothschild, F.R.S., of Tring, and Mr. F. W. Enefer, of Blackheath, were elected members.

Mr. Robert Adkin exhibited a specimen of *Margarodes unionalis*, taken in October last at sugar, in a garden at Arlington, a village on the borders of Abbott's Wood, Sussex, about seven miles inland from the coast. He said this was a very interesting species, and an undoubted migrant. It was apparently not an inhabitant of central and Western Europe, but bred freely in Turkey, Syria, Northern Africa, and occurred also in Southern Europe and at Gibraltar. When it was taken in Britain, as was occasionally the case, and then usually at an interval of several years, more than single specimens were generally met with, and it was therefore not surprising that two others were taken in October last on the South Devon coast, thus suggesting that, although the migration may have been a sparse one, it was wide-spread, and having regard to the natural habitat of the species tended to confirm the route of migration via Ushant already suggested at page 26 of Proceedings for 1914-15.

Mr. S. A. Blenkarn exhibited the following Coleoptera:— *Henoticus germanicus*, Moet and Chandon's cellars, Craven House, Strand, February, 1913; *Dytiscus dimidiatus*, Wicken Fen, September, 1920, one of the two localities where it has been found; *Hydroporus tristis*, October, 1912, *H. melanarius*, February, 1913, *H. morio*, October, 1912, and *H. ferrugineus*, July, 1913, all at Coatbridge, N.B.; *Rhantus notatus*, Steventon, Ayrshire, July, 1913; *Necrophorus interruptus*, Box Hill, September, 1920; *Cassida hemisphærica*, Chiswick, September, 1920 (the specimens of these two species are usually found singly); and a *Blaps* sp., from Salonica, which he believed was common there.

Mr. Hy. J. Turner exhibited a small collection of butterflies from California, sent to Mr. E. W. Sperring by our member Mr. G. B. Pearson, who is in Pasadena. They included *Papilio rutilus*, the western representative of the well known eastern *P. turnus*; *Pieris protodice*, a long series; *Anthocharis sara*, an "orange tip" of the Pacific coast, with its form ab. *julia*, in which the black margin of the orange spot is incomplete; *Meganostoma eurydice*, a "dog-face"

butterfly peculiar to the Pacific coast, of which the female does not have the intense large black area which the male has; *Colias eurytheme*, one of the summer forms of *eriphyle*, and a series of the beautiful race *ariadne*; *Cœnonympha californica*, the spring gen. *galactinus* of an almost white colour, another purely western species; a long varied series of the richly coloured *Melitæa chalcedon*, abundant in parts of California; *Dione vanillæ*, a species occurring throughout almost the whole of the United States, the West Indies, and South America to the Argentine, its silvered underside making it very conspicuous; *Pyrameis carye*, a "painted lady" with a very extended range, like its eastern ally *P. cardui*; *Lemonias virgulti* an Erycinid; *Brephidium exilis*, one of the smallest species of butterfly in the world, and much used for enclosing in jewellery in America; the very widely spread *Junonia cœnia*, another species with close allies in the West Indies and the Argentine; a rare "blue" (*Lycæna*) *avalon*, from the island of Santa Caterhina in Southern California; *Rusticus* (*Lycæna*) *acmon*, a species occurring right across the States; *Thanaos funeralis*, a black "skipper" with white fringes; *Pamphila brettus* and *Atrytone melane*, two other species of *Hesperiidæ*; with a pair of *Phryxus livornica* race *lineata*, also a very widely spread species.

He also showed the specimen of *Euranessa antiopa*, bred from a pupa exhibited by Mr. Hugh Main at a previous meeting, from the south of France.

Mr. Turner then read a letter of which the following is an extract:—

"812, Stevenson Avenue, Pasadena, California.
"5th Oct., 20.

"I am sending you a few of the common Californian butterflies in a cigar box. I have been unfortunate in many cases in not being on the spot when the insects first appeared, hence many of them are worn, but they give you a fair idea of what we have here. The most fruitful place for them is the mountains, but my health prohibits me from going up there, as they are from 2,000 to 10,000 ft. high, exceedingly rugged, and I have to trust to occasional visits in a friend's car, to be able to get there. There are a few good trails that are accessible by car, but too far to walk. My doctor has prohibited me from either going up the mountains or the glorious canyons, which are the great spots for collecting. One accustomed to our English moist climate can hardly understand the dryness of this—until the 24 Sept. we had not a drop of rain since about the

6th of May, and that consisted of a light shower at night—¼ of an inch of rain. In consequence the herbage on the plains is as dry and burnt up as possible, a scorching sun every day and all day, for months, and the thermometer touching 90° nearly every day. It is a bearable heat very much more pleasant than the West Indies. I have been wondering how successful you were with the cocoons last spring. I hope you were able to raise some of them, it would have been interesting. I understand that this last summer has been a very wet one with you, my brother assures me so. I suppose there would not be much doing in the insect way that being so.

"I have joined a Society here. The Lorquim Club of Nat. Hist. Dr. Comstock is the leading spirit, he is F.E.S., and a very fine fellow. I have handed over my English collection to them, as they had not any European species, their collection being nearly all Asiatic or South American. I have only retained a few duplicates for old times sake. I have travelled many thousands of miles in friends' cars in pursuit of "bugs," and have slept many nights under the stars in the great Mohave Desert, as well as on the mountains, until my doctor put his foot down. I am sending you some of what is known as the smallest butterflies in the world, *Brephidium* (*Lycæna*) *exilis*. They are much used for jewellery, being small; they are put into rings and tie pins. I am also sending the only specimen I have left of *Lycæna avalon*. They are entirely confined to the Island of Catalina, off the coast of Southern California. The only place in the world where they are found I believe. My friend went there in July and got about 200 of them, and he gave me a few to give away. I caught a lot of *chalcedon*. It was a little late for them, and I kept on catching them in the hope of getting some good ones. But you can perhaps pick out a few of those I send. *P. caryæ* is a smaller species than *cardui*, but very much like it. It is entirely a western species, and not uncommon. We had a migration of *cardui* last April that lasted nearly a month. I counted in five minutes 348 specimens that passed within 50 feet of each side of me. A very curious sight, and all going the same way home, N. West.

"There are over 400 species (on the books) that are supposed to be found here. But one would have to have an aeroplane to get them. One of our members, Mr. Malcolm, recently discovered a new *Argynnis*, which has been named after him. He got over 200 specimens, so it is a well recognised species. He found them in a kind of pocket on the eastern slopes of the Sierra Mudros range, 2,500 feet up, 350 miles from here.—G. B. Pearson."

Mr. T. H. Grosvenor exhibited *Papilio glycerion* from Sikkim and Thibet, with its races and allied forms, including *mandarinus*, *eurous*, and *tamerlanus*.

Mr. Tonge exhibited a number of photographs of the ova of Lepidoptera for which he had received the medal of the Royal Photographic Society.

JANUARY 27th, 1921.

ANNUAL MEETING.

A large number of members assembled to hear the Council's Report (see page xii.), the Treasurer's Report (see page xv.), the Balance Sheet (see page x.), and the Annual Address by the President (see page 24).

The President declared that the following members were elected Officers and Council of the Society for the ensuing twelve months:—*President*, K. G. Blair, B.SC., F.E.S.; *Vice-Presidents*, E. J. Bunnett, M.A., F.E.S., S. Edwards, F.L.S., etc.; *Treasurer*, A. E. Tonge, F.E.S.; *Librarian*, A. W. Dods; *Curator*, S. R. Ashby, F.E.S.; *Assistant Curator*, T. L. Barnett; *Editor of Proceedings*, H. J. Turner, F.E.S.; *Hon. Secretaries*, Stanley Edwards, F.L.S., etc. (*Corresponding*), H. J. Turner, F.E.S.; *Recorder of Attendances*, B. S. Williams; *Hon. Lanternist*, A. W. Dennis; *Council*, R. Adkin, F.E.S., T. L. Barnett, R. T. Bowman, L. E. Dunster, Lachlan Gibb, F.E.S., H. A. Leeds, Capt. N. D. Riley, F.E.S., Dr. G. C. Robertson, E. Step, F.L.S.

The Reports and Balance Sheet were adopted, and votes of thanks were passed to the Officers and Council for their services during the past year, and to the President for his address.

ORDINARY MEETING.

Mr. E. Step exhibited a living locust (*Acridium ægyptium*), found straying in Covent Garden with a small crowd of timorous watchers around it. He ascertained that it had emerged from a box of Mimosa imported from S. France.

Mr. Coppeard exhibited several species of *Donacia*, including a long series of colour forms of *Donacia sericea*.

Mr. Hy. J. Turner showed a box of Rhopalocera from near Port Elizabeth, S. Africa, including the cosmopolitan *Lampides bœticus*, another fine tailed Lycænid, *L. caffraria*, a nice series of the Satyrid

Leptoneura clytus, species of *Terias*, *Teracolus*, *Pieris*, *Mycalesis*, and *Pamphila*.

Mr. W. J. Lucas exhibited the Neuropteron, *Hemerobius stigma*, which he reported to be then very plentiful on Esher Common.

Mr. Leeds exhibited a series of male forms of *Polyommatus icarus*, named from the descriptions given in J. W. Tutt's "British Lepidoptera." The series included some 177 different forms.

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CORRECTIONS AND ERRATA.

1912-13, page 132, line 19. for "*cinxia*" read "*cinctaria*."
1918-19, page 8, line 21. for G. Brooks read C. W. Colthrop.
1919-20, page 65, line 14. for A. W. Butcher read A. A. W. Buckstone.
1920-21, page 44 *ante*, line 11. delete "especially so far north as Cheshire."
["I have found that these winter species are considerably earlier here than in the South."—F. M. B. Carr.]

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