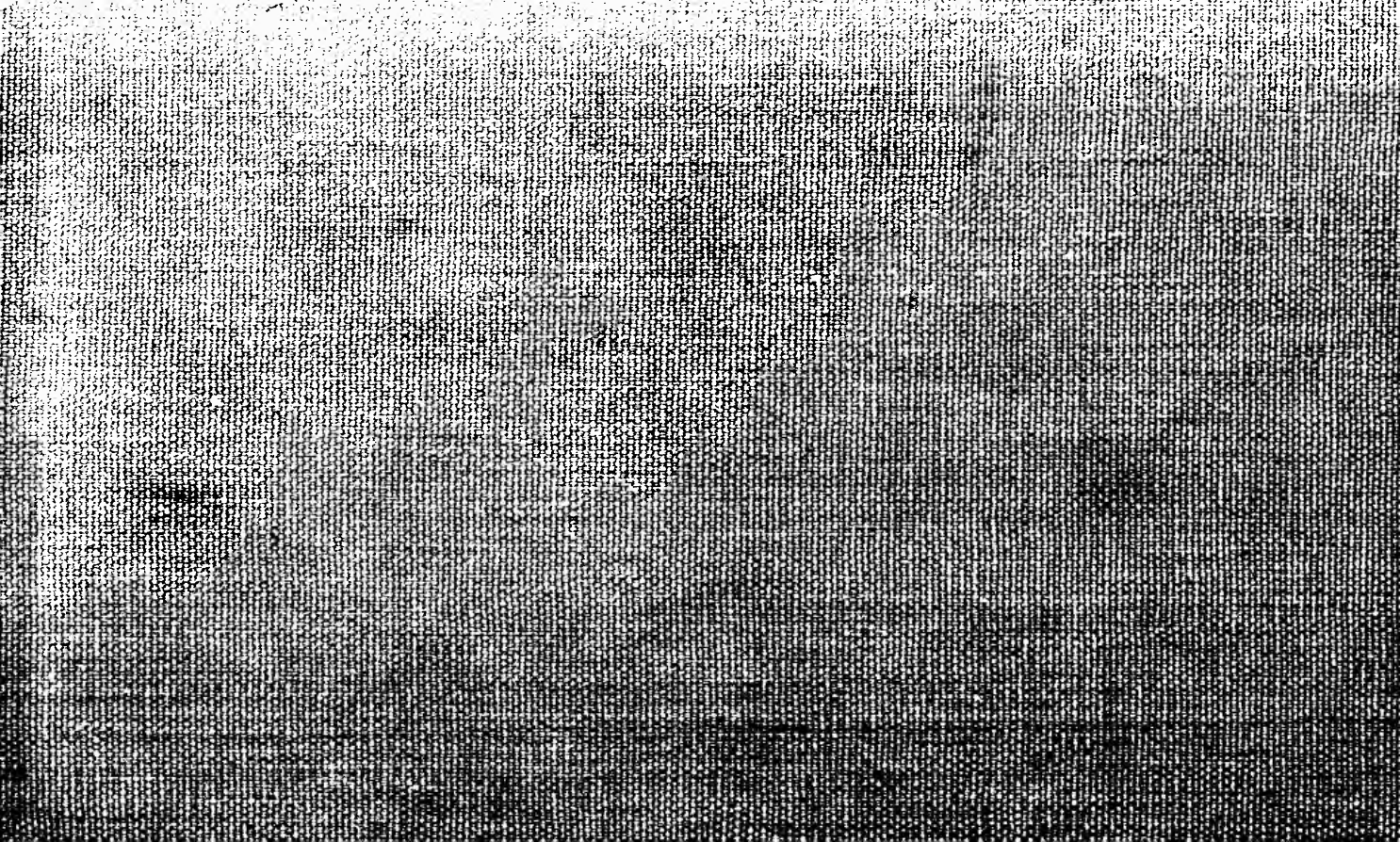

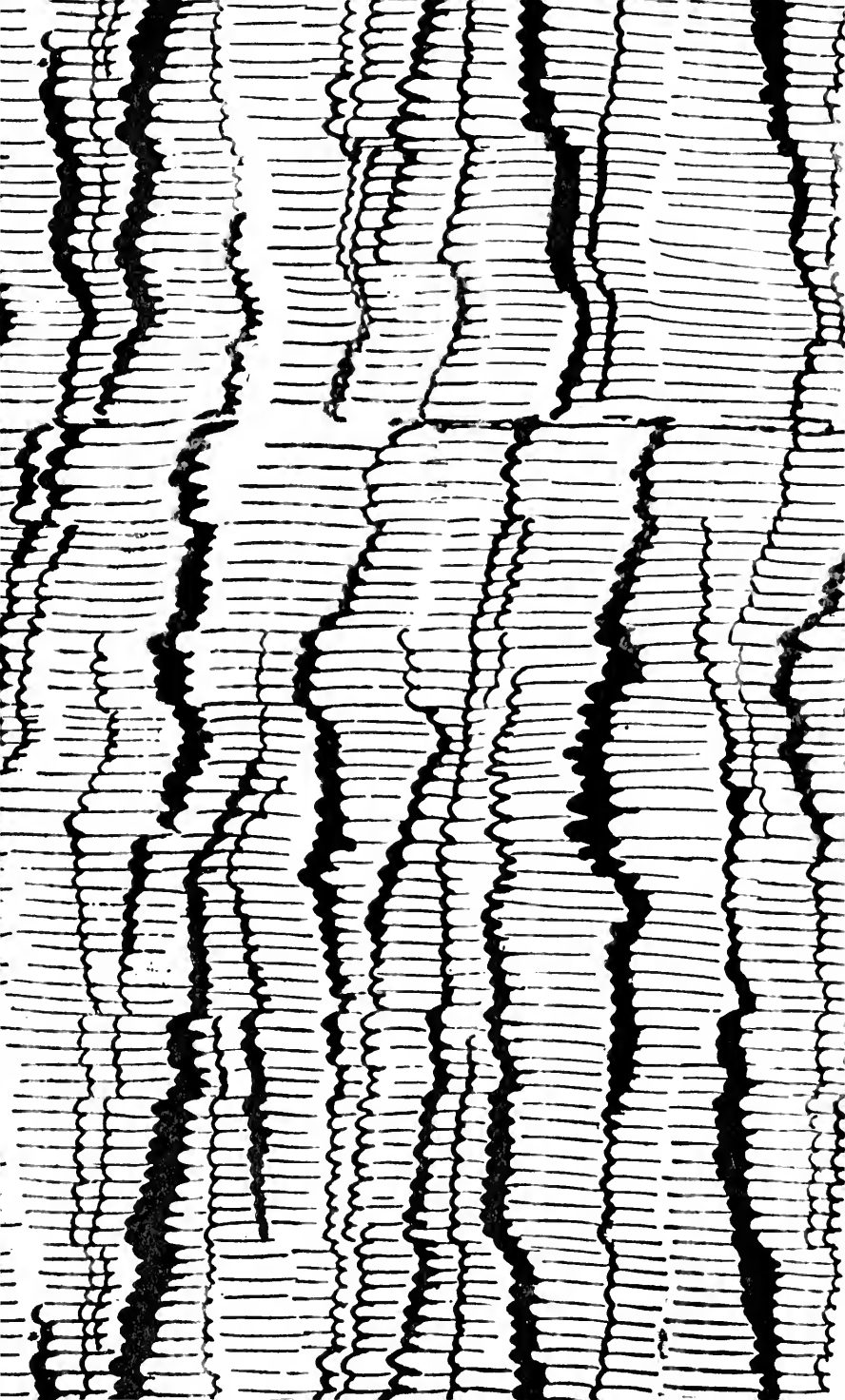

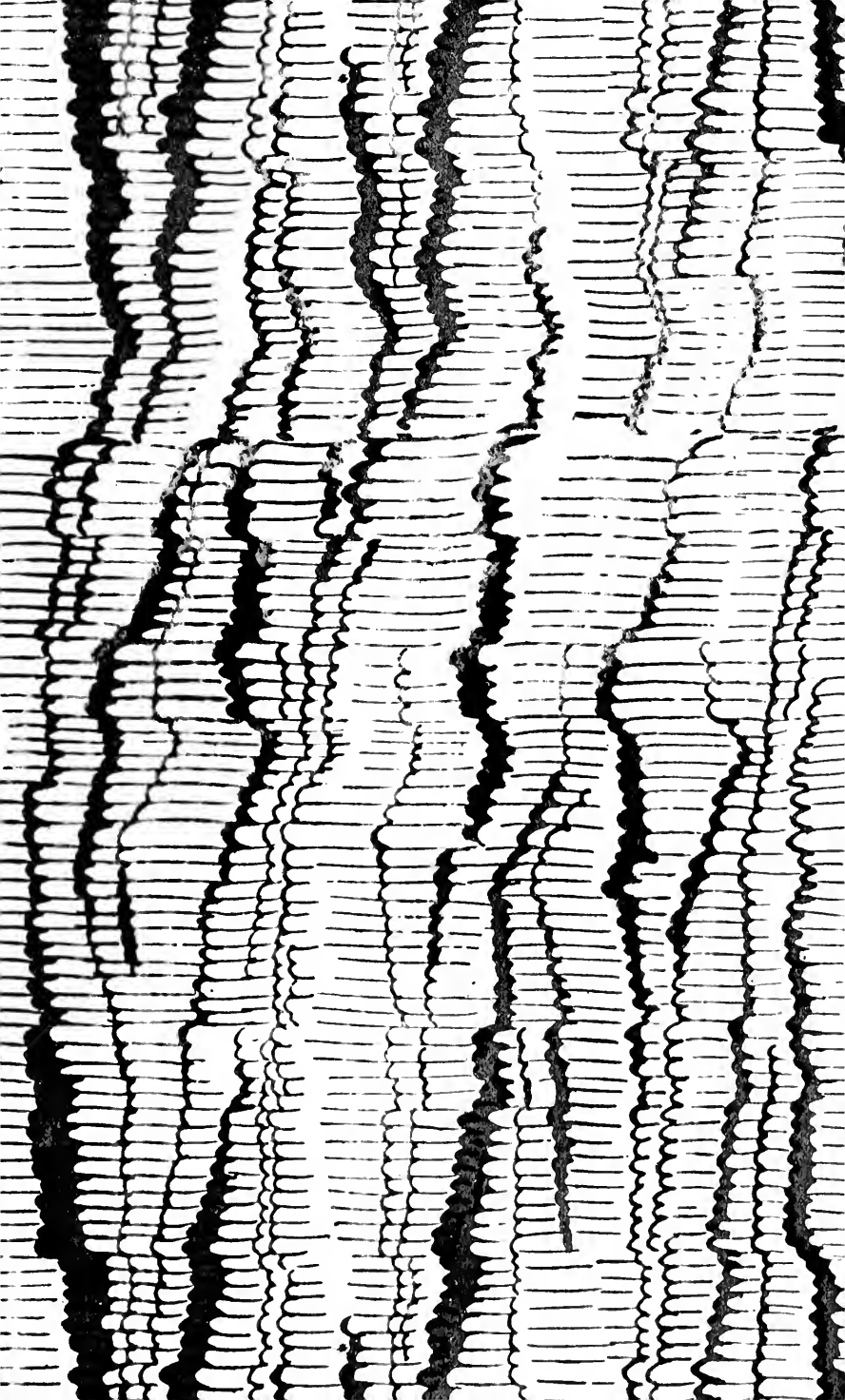

Proceedings

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ENTOMOLOGICAL & NATURAL HISTORY

SOCIETY

1918-19

WITH TWO PLATES

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Entomological & Natural History Society

(Established 1872)

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1886 ADKIN, B. W., F.E.S., *Council*, Trenowith, Hope Park, Bromley. Kent. *l*, *orn*.

1882 ADKIN, R., F.E.S., *Council*, Hodeslea, Meads, Eastbourne. *l*.

1901 ADKIN, R. A., Hodeslea, Meads, Eastbourne. *m*.

1907 ANDREWS, H. W., F.E.S., Shirley, Welling, Kent. *d*.

1901 ARMSTRONG, Capt. R. R., B.A., B.C. (Cantab), M.R.C.S., F.R.C.P., 55, Granville Park, Lewisham, S.E. 13. *e*, *l*.

1919 ASH, D. V., Ashleigh, Hook Road, Surbiton. *l*.

1895 ASHBY, S. R., F.E.S., 39, Park Lane, Wembley. *c*, *l*.

1895 ASHDOWN, W. J., *Council*, Belmont Road, Leatherhead. *l*, *c*, *he*.

1888 ATMORE, E. A., F.E.S., 48, High Street, King's Lynn, Norfolk. *l*.

1896 BARNETT, T. L., 19, Osmond Gardens, Wallington, Surrey. *l*.

1887 BARREN, H. E., 78, Lyndhurst Road, Peckham, S.E. 15. *l*.

1912 BATESON, Dr. W., F.R.S., F.L.S., F.E.S., The Manor House, Merton, Surrey. (*Hon. Member.*)

1911 BLAIR, K. G., B.Sc., F.E.S., *Vice-president*, "Claremont," 120, Sunningfields Road, Hendon, N.W. 4. *n*, *c*.

1911 BLENKARN, S. A., F.E.S., Burford Lodge Cottage, West Humble, Dorking. *l*.

1898 BLISS, M. F., Capt., R.A.M.C., F.E.S., 26, Woodville Gardens, Ealing, W. 5. *l*.

1909 BOWMAN, R. T., *Council*, 68, Mornington Road, Chingford. *l*.

YEAR OF ELECTION.

1919 BOX, L. A., Lieut., 80, Northampton Road, Croydon. *h.*

1891 BRIGGS, H. M., 8, High Street, Canterbury. *l, orn.*

1887 BRIGGS, T. H., M.A., F.E.S., Rock House, Lynmouth, R.S.O., N. Devon. *l.*

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

1900 BROWNE, G. B., Thorndene, S. Benfleet, Essex. *l.*

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

1915 BUNNETT, E. J., M.A., *Council*, 9, London Road, Forest Hill, S.E. 23. *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, Woodwark 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.*

1909 COULSEN, F. J., 17, Birdhurst Road, Colliers Wood, Merton, S.W. 19. *l.*

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.*

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.*

Year of Election.

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

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

1889 Dennis, A. W., *Council*, 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.*

1919 Dod, W. F. Wolley, F.E.S. *l.*

1901 Dods, A. W., *Hon. Librarian*, 88, Alkham Road, Stamford Hill, N. 16. *l.*

1912 Dunster, L. E., 44, St. John's Wood Terrace, N.W. 3. *l.*

1886 Edwards, S., F.L.S., F.Z.S., F.E.S., *President*, 15, St. German's Place, Blackheath, S.E. 3. *l, el.*

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, Irving Road, West Southbourne, Bournemouth, Hants. *l, e.*

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

1907 Fountaine, Miss M. E., F.E.S., 1727, Wilcox Avenue, Hollywood, Los Angelos, 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., Craven House, Northumberland Av., S.W. 2. *l.*

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

1912 Gardner, J. E., 204, Evering Road, Upper Clapton, N.E. 5.

1917 Gibb, E. M., Harebeating Farm, Harebeating Place, Hailsham, Sussex. *l.*

YEAR OF ELECTION.

1884 GIBB, L., F.E.S., *Council*, 38, Blackheath Park, S.E. 3. (*Life member.*) *l.*

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

1918 GREEN, E. E., F.E.S., Ways End, Camberley, Surrey. *hem.*

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.*

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.*

1905 HILL, E., Roseneath, 3, Dorville Road, Lee, S.E. 12. *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.

1910 HUMM, P. S., L.D.S., 56, Victoria Street, Westminster, S.W. 1. *l.*

1914 JACKSON, W. H., Holmfield, Plough Road, Purley, Surrey. *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.*

1911 LESLIE, J. H., F.E.S., 84, Huron Road, Tooting Common, S.W. 17. *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.*

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

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

YEAR OF ELECTION.

1881 MILES, W. H., F.E.S., 7, Church Lane, 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.*

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

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

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

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1887 ROUTLEDGE, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle. *l, e.*

1900 ROWDEN, A. O., 3, Archibald Road, Exeter. *l, b.*

YEAR OF ELECTION.

1904 ROWLAND-BROWN, H., F.E.S., Oxhey Grove, Harrow Weald. *l.*

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

1898 RUSSELL, A., F.E.S., Wilverley, Dale Road, Purley. *l.*

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

1908 STAUBYN, J. S., Tregothnan, Endlesham Road, Balham, S.W. 12. *l.*

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

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

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1913 STOREY, GILBERT, Dept. of Agriculture, Cairo, Egypt. *Econ. Ent.*

1911 STOWELL, E. A. C., B.A.

1911 SWEETING, H. R., M.A., Wilfruna, Alexandra Grove, Finchley, N.W. 3. *l.*

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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.*

1911 TODD, R. G., The Limes, Hadley Green, Barnet. *l.*

YEAR OF ELECTION.

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1887 TURNER, H. J., F.E.S., *Vice-President*, 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.*

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1911 WELLS, H. O., Inchiquin, Lynwood Avenue, Epsom. *l.*

1872 WEST, W., *Hon. Curator*, 8, Morden Hill, Lewisham Road, S.E. 13. *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.*

1905 WINKWORTH, J. T., 290, Burdett Road, E. 14. *l.*

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.

REPORT OF THE COUNCIL, 1918.

THE Council of the South London Entomological and Natural History Society, in presenting the forty-seventh Annual Report, are pleased to state that the Society continues in a satisfactory condition.

Seven new members have been elected, but the Society has to deplore the loss by death of five members, *viz.*, Messrs. J. Bateson, G. Brooks, C. P. Emmett, W. F. de Vismes Kane, and G. E. H. Peskett. There have been two resignations.

The Membership at present is as follows: 4 Hon. Members, 5 Life Members, 127 Ordinary Members, and 21 Country Members. Total, 157.

Since the last Annual Meeting the Council have elected Dr. F. A. Dixey, F.R.S., as an Hon. Member, bringing the number up to four.

The Balance Sheet, duly audited, is printed on pages xiv. and xv.

Owing to the train service being so much curtailed, your Council during the past year decided that the meetings should be held at 7 o'clock instead of 8.

On June 15th, a new feature of this year was the holding of a "Special Exhibition of Living Objects of Natural History."

The "Special Exhibition of Orders other than Lepidoptera" was held on May 9th, when several interesting exhibits of Coleoptera, Orthoptera, and of Birds, etc., were shown.

The Annual "Exhibition of Varieties and other Objects of Interest," was held on November 28th, and was a great success, the numbers attending almost approaching pre-war days, the varieties of *Lycænidæ*, especially those of *Agriades coridon* and *A. thetis*, were remarkably fine.

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

Mr. Ashdown still continues as Recorder of Attendances.

The following Papers have been read before the Society:—

On April 11th.—"The genus *Spilosoma*," a short paper and discussion, introduced by Mr. B. W. Adkin.

On May 23rd.—A short paper and discussion on "*Mimas tiliæ*," introduced by Mr. C. W. Sperring.

On June 27th.—A short paper and discussion on "*Ematurga atomaria*," introduced by Mr. H. J. Turner.

On July 11th.—A short paper, "A Beginner's remarks on the *Tortricina*," by Mr. A. Sich.

On July 25th.—"On *Lampronia quadripunctella* and its aberrations," by Mr. A. Sich.

On August 8th.—"Species in the genus *Cerostoma*," by Mr. A. Sich.

On September 12th.—"Notes on the Butterflies of Japan," by Mr. H. J. Turner.

On October 24th.—"The Variation of *Epinephele tithonus*," paper and discussion introduced by the Rev. G. Wheeler.

Two special lectures were given before the Society.

October 10th.—"Sponges," by Prof. A. Dendy, F.R.S.

November 14th.—"The *Myectozoa*," by Miss G. Lister, F.L.S., President of the Essex Field Club.

Lantern slides, diagrams, and specimens were shown on both occasions.

The Hon. Curator, Mr. W. West, reports that additions to the Cabinet have been made by himself and Mr. Ashdown with Coleoptera and Neuroptera, and also mentions that the use made of the collections by the members is satisfactory.

The Hon. Librarian, Mr. A. W. Dods, reports that a fair number of books have been borrowed, and that the library has been well used for reference on meeting nights.

There have been five Field Meetings during the year.

May 25th, to Chingford, conducted by Mr. R. T. Bowman.

June 15th, to Horsley, conducted by Mr. W. J. Kaye.

July 13th, to the John Innes' Horticultural Institute, Merton. Owing to domestic bereavement, Prof. Bateson, F.R.S., was unable to conduct the members himself, but the staff showed those present the more interesting features of the experiments which were in progress.

July 20th, to the Zoological Gardens, conducted by Mr. F. W. Frohawk.

October 5th, Fungus Foray to Wimbledon Common, conducted by Mr. E. Step.

Reports of these meetings will be found in the "Proceedings."

Prof. Bateson was the Society's delegate to the Congress of Corresponding Societies of the British Association and the President and the Hon. Secretary represented the Society to the Annual Congress of the S.E. Union of Scientific Societies, which was held at Burlington House in June.

The volume of "Proceedings" published during the past year, consists of xv. and 85 pages with two plates.

The Additions to the Library (*by Exchange, unless otherwise stated*) are:—

Books.

"The Grapsoid Crabs of America."
"Ascidians of the Phillipine Islands."
"Fungi" (Int. Scien. Ser.), from R. Adkin.
"Canadian Bark Beetles," from Lachlan Gibb.
"Catalogue Raison. Lep. Alpes Maritimes," Milliére, from H. Rowland-Brown.

Magazines and Periodicals.

"Entomologist."
"Entomologist's Record."
"Entomologist's Monthly Magazine." By purchase.
"Irish Naturalist."
"Entomological News."
"Canadian Entomologist."
"Entomologisk Tidskrift."
"Phillipine Journal of Science."
"Bull. of the Entomological Society of France."
"Bull. of the Entomological Society of Spain."
"Essex Naturalist."
"Upsala Zoological Bidrag."

Reports and Transactions of Societies.

"Perthshire Natural Science Society: Proceedings."
"Smithsonian Institution: Proceedings."
"U.S.A. Museum: Ann. Report."
"South Eastern Naturalist" (Report of S.E.U.S.S.).
"Meeting of the Delegates of the Corresponding Secieties of the British Association Report," from R. Adkin.
"Torquay Natural History Society: Journal."
"Hastings and E. Sussex Naturalist."
"Entomological Society of London: Transactions," from Lachlan Gibb.
"London Natural History Society: Transactions."
"Bournemouth Natural Science Society: Proceedings."
"Entomological Society of Ontario: Report."

Pamphlets and Separata.

"Biology of the Phillipines, Contributions to."
"*Peronea cristana*" (Ent.), by W. G. Sheldon, from the author.
"Coal, Resources and utilization."
"Entomological Notes on the Surrey Pine District," by B. W. Adkin, from the Author.
"List of Contributions to the U.S.A. National Herbarium."
"Catalogue of E. African Mammalia in the U.S.A. Museum."
"Petroleum Resources."
"Catalogue of the Lep. of Loire and Marne."
9 Separata ("Entomologist") by H. Rowland-Brown.
"The genus Parnassius," Elwes.
"Phyllogeny of the Orthobiante."
} from H. Rowland-Browne.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1918.

REVENUE ACCOUNT.

Expenditure.	£	s.	d.	*Income.*	£	s.	d.
To Debit balance from 1917	44	13	1	By Subscriptions, 71 at 10/-	£35	10	0
,, One Year's rent	25	0	0	,, ,, 7 ,, 7/6	2	12	6
,, Insurance (Fire)	0	14	0	,, ,, 1 ,, 6/-	0	6	0
(Aircraft)	0	5	0	,, ,, 4 ,, 5/-	1	0	0
,, Attendance one year	2	10	0	,, ,, 8 ,, 2/6	1	0	0
,, Subscription to South-Eastern Union	0	10	0	,, ,, paid in advance ..	4	15	0
,, Postages, Stationery, and sundries:—				,, Arrears of Subscriptions received	14	5	0
S. Edwards 5 5 0				,, Entrance fees, 7 at 2/6	0	17	6
H. J. Turner 10 0							
T. W. Hall 1 13 6							
	7	8	6				
,, Entrance fees carried to Suspense Account ..	0	17	6				
,, Vote to Publication Fund	26	0	0				
,, Vote to Library Fund	5	0	0				
	£112	18	1		£112	18	1

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

(Held in Suspense.)

	£	s.	d.		£	s.	d.
To Balance	50	17	0	By Balance from 1917	49	19	6
				,, Entrance fees, 1918	0	17	6
	£50	17	0		£50	17	0

LIBRARY FUND.

	£	s.	d.		£	s.	d.
To Subscription to E.M.M., 1918 and 1919.. ..	0	18	0	By Balance from 1917	0	7	11
,, Binding—Andrews	3	7	6	,, Fines, 1918	0	1	0
,, Balance	1	3	5	,, Vote from General Fund	5	0	0
	£5	8	11		£5	8	11

PUBLICATION FUND.

	£	s.	d.		£	s.	d.
To Archer's Account printing Transactions.. ..	39	17	0	By Credit Balance, 1917	4	0	11
,, Press Etching Co.—Half Tone Block	0	11	7	,, Sales of Proceedings	0	2	8
,, Balance	1	2	7	,, Donations	11	7	7
				,, Vote from General Fund	26	0	0
	£41	11	2		£41	11	2

BALANCE SHEET.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.
To Debit Balance Revenue Account	52	12	1	By Amount to Credit of Suspense Account	50	17	0
,, Balance, being excess of assets over liabilities ..	20	10	11	,, ,, ,, ,, Publication Fund	1	2	7
				,, ,, ,, ,, Library Fund	1	3	5
				,, Subscriptions in arrear, say £50 valued at £20 ..	20	0	0
	£73	3	0		£73	3	0

Audited and found correct, *January* 1918.

F. B. CARR,
A. E. TONGE, } *Auditors.*

Ematurga atomaria, L.

By Hy. J. Turner, F.E.S. *Read June 27th*, 1918.

Original description.

Linné. "Systema Nat." Ed. X., p. 521. 1758.

"140. *P. Geometra* pectinicornis, alis omnibus lutescentibus: fasciis atomisque fuscis." "Faun. Suec.," 840. "Frisch. Ins.," 13, p. 12, t. 5. "Alb. Ins.," 42, f. 69 ?* "Habitat in Tilia."

Subsequent descriptions.

Scopoli. "Ent. Carn.," p. 228. 1761.

569. Phalaena *pennata*, long. lin. $6\frac{1}{4}$. lat. $4\frac{2}{3}$.

"*Diagn.* Antennæ amplæ, deflexæ, ubique pectinatæ: pectinibus pilosis. Alæ pallide ferruginæ; fasciis obsoletis lineolisque plurimis confluentibus nebulosæ. Inter *Quercus* and *Corylos*.

"Alarum fimbria albida obscurioribus punctis variegata. Anticæ utrinque limbo obscuriore. Antennæ fuscæ: rachi pallidiore. Alæ posticæ utrinque fasciis tribus obscurioribus."

[The male of *atomaria*.].

Scopoli. "Ent. Carn.," p. 225. 1761.

558. Phalæna *isosceleta*, long. lin. 6, lat. $3\frac{1}{2}$.

"*Diagn.* Alæ supra albæ; fasciis (4) lineolisque parvis transversis fuscis; subtus flavescentes.

"In subsylvestribus Carnioliæ.

"Fascia baseos arcuata, alia huic proxima cum tertiæ apice in margine inferiore unita in triangulum isosceles, fascia quarta abrupta: flavedo etiam aliqua circa has fascias observatur. Fimbria terminalis albo fuscoque varia. Alæ posticæ tres fascias fuscas obsoletas habent, subtus binas. Antennæ setaceæ."

[The female of *atomaria*.].

Fabricius. "Sp. Ins.," II., p. 248. 1781.

Copies Linné, but altering "fasciis" to "strigis," and adds references, etc., as follow:—

"Syst. Ent.," 625, 26. "Linn. Sys. Nat.," 2, 862, 214. "Fn. Suec." 1215.

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* As Mr. R. Adkin has pointed out to me this reference of Linné is not correct. Hence probably his (Linné's) query. Albin's work was not in his library, and he no doubt accepted the reference without personal verification.

"Phalæna antennis pectinatis, alis horizontalibus dentatis luteis, strigis atomisque fuscis." "Degeer Ins. Vers. Germ.," 2, 1, 249, 2, tab. 5, fig. 14.

"Phalæna *isosceles*. Scop. Carn., 558, ♀. Phalæna *pennata*. Scop. Carn., 569, ♂.

"Geoff. Ins.," 2, 133. 50. "Kleman. Ins." 1, tab. 34, mal. Habitat in Europæ Tilia.

"Larva laevis grisea, lineis numerosis ferrugineis interruptis, postice tuberculis duobus."

Lister. De Geer. "Gen. et Sp. Ins.," p. 41. 1783.

"*Ph. atomaria*, spirilinguis, antennis pectinatis, alis dentatis planis aurantiis punctis lineolisque transversis griseis numerosis. Vol. II., p. 344, pl. 5, fig. 14."

Fuessly. "Archives." Trans. Fr., 1794, p. 31, plt. 10. 1794.

Herbst. Ph. Geom. *atomaria*. (In the original edition, 1782, it was named *artemisaria*.)

"The larvæ I have found on *Artemisia sylvestris* in August and September.

"In its young stage, one has difficulty in finding it, because its greenish colour and red-brown spots on the sides show much resemblance to the plant upon which it is found. But after several moults, it becomes more brown; a dark line runs along the back, and each segment is marked right and left by an obscure triangular spot; between these spots, particularly above the forefeet the colour is much lighter and of a brown-red; the stigmata are edged with black. Full grown at the end of five or six weeks, it then goes into the ground, where without forming a cocoon it passes to the chrysalis state. In the following May the moth emerges.

"The designs and colours of the wings are difficult to determine on account of the numerous varieties of this species. The ground colour is of all shades, from pure white to brown. The transverse lines are more or less expressed, but the whole of the wings are always powdered with atoms. The fringes are always of the dominant colour of the wings, chequered pale and dark.

"If one observes so many varieties in the perfect insect, one meets with no less variation in the larva. This varies from a brown-green to a pale green, from those marked with a small amount of red, with different shades of red, to red-brown. All these changes are perhaps due to the plants on which the larva feeds."

Food Plants.—Herbst is the first to deal at length with the larva (see above). He says, it is not delicate in its choice, *Hypericum perforatum*, *Polygonum persicaria*, *Medicago falcata*, *Lytrum salicaria*, *Spiræa aruncus*, *Artemisia sylvestris*, etc., are equally to its taste."

St. John, "Larv. Coll. and Breed.," gives the following list

of food-plants of *E. atomaria*, "*Lotus corniculatus*, *L. pilosus*, *Centaurea nigra*, and various plants on heaths."

C. G. Barrett adds "*Calluna vulgaris*, *Erica*, and *Myrica gale*" to these, and as substitutes, "bramble, dock, clover, trefoils, sainfoin, broom, and rest-harrow." (Lep. Br. Isles).

Variation.

Alpheraky. "Hor. Ross.," Vol. xvii., p. 181. 1883 ?

Var. *iliaria*.

"Var. minor, multo pallidior, ♂ ♂ alæ sæpissime unicolores flavæ, non atomatæ, vel fasciis paucissimis brunescentibus signatæ.

"The variety of the valley of the Ili is smaller than the typical form, and particularly than its var. *orientaria*.

"The males are, for the most part, very uniform, not covered with brown atoms above and almost, or wholly, without markings. Several individuals are of a pale Naples yellow, unicolorous with the central point scarcely perceptible on the forewings, or unseen. Others have two or three brownish transverse rays towards the middle of the wing, differently distributed in different specimens.

"It is true that one or two males are almost as certainly typically pure individuals (non var. *orientaria*), but their number was negligable in comparison with that of those that flew in the same places by hundreds. The females hardly differed from typical females. In April and May."

Staudinger describes it, "Cat.," Ed. iii., p. 351.

"♂ uniformly yellow, no dusting. It is from the Thian Shan (Ili.)"

He further suggests this form as another species.

Staudinger. "Cat.," Ed. i., p. 74. 1861. Ed. iii., p. 351.

Var. *orientaria*.

"Larger, ♂ bright ochreous yellow, with dark brown marginal band." Referred to figures of H.S. It is from the S. Tyrol, Greece, Istria, and Asia Minor.

This form was figured by Herrich-Schäffer in "Bearb. Schm. Eur." Vol. iii., figs. 322, 323. In the figure of the ♂, the only definite marking, the marginal band of the forewings, is very wide, dark, and well defined, but interrupted by a large blotch of yellow ground colour about midway. There is little or no band on the hindwing. The ♀ has a much paler yellow ochreous ground, much irrorated with fuscous and remnants of dark banding, and is certainly dark for this sex. The specimens came from Constantinople. l. c., p. 91.

There are several specimens of this form in the British Museum collection from the Orient. They are very large, the transverse lines are very indefinite, obsolescent or absent, especially on the hindwings. There is a certain amount of dusting by darker scales.

The form could not be classed as var. *iliaria*, which is "unicolorous yellow with no dusting." The B. M. specimens are from Syria.

Haworth. "Lep. Brit.," Part ii., p. 280. 1810.

Var. *glarearia* ♀.

"G. (The yellow Heath) alis luteis præatomosis strigis fimbriaque obscuris communibus fuscis anastomosantibus." Hüb. 131.

He states that it scarcely differs from fig. 128, except in colour, which is yellow, more obscure, and with very diffuse strigæ. Both Dr. Chapman and I agree with later critics, *e.g.*, Staudinger, in considering *glarearia* not a form of *atomaria*, but probably a separate species. The figure is certainly that of a ♂, and not as Haworth says, a ♀. The antennæ are not setaceous as in the ♀, and the abdomen is that of a ♂. Staudinger even puts it in a separate genus, *Phasiane*, with *clathrata* and other species to which it bears much more resemblance in configuration of wing-form than to *atomaria* and *Fidonia* species generally.

I have since visited the British Museum and find there a long series of *glarearia*, and feel sure that it is a separate species.

The earlier stages of this species have been described by Habick, in 1901, "Verhand zoo-bot. Gesell. Wien.," p. 646.

Haworth. "Lep. Brit.," Part ii., p. 280. 1810.

Var. *roseidaria* ♀ = *roseidaria*, Hüb. "Verz.," p. 296.

"G. (The light heath) alis albis fusco atomosis, strigis subquatuor subanastomosantibus fuscis." Hüb. 128.

He states that it is smaller, whiter, no powdering, four strigæ.

Staudinger takes this figure as a form of our northern species, *Fidonia carbonaria*. I am of opinion, so far, that Haworth was right in his statement, and that *roseidaria* is our British light form of female *atomaria*, which I have taken to be comparatively scarce on the continent of Europe.

Zetterstedt. "Ins. Lap.," p. 957. 1840.

Var. *obsoletaria*.

"Alis nigro-fuscis: fasciis obsoletis griseis fusco-irroratis ♂ (al. exp. 1¼ poll.)

"Hab. in Lappon. passim: ad pagum Pello Lappon. Tornensis, et ad Lycksele Lapp. Umensis d. 2-5 Jun. specimena mascula illæsa inveni. (Lapponia Suecica).

"♂ Similis *F. atomaria* (No. 2), sed vix ejus varietas obscurior. Nigro-fusca. Fasciæ (nec strigæ) rectiusculæ, in alis anticis subtres, in posticis duæ, omnes fere in medio, nec in parte posteriore, alarum locatæ, griseæ, et ita crebre fusco-pulverulentæ, ut tantum in bene conservatis a reliqua superficie obscura discerni possint. Limbus posticus late nigrofuscus, fimbria grisea nigro intersecta. Antennæ nigræ."

Staudinger. "Cat.," Ed. iii., Pt. i., p. 350.

"Smaller, darker, dark bands on forewings broader and confluent. From the high North."

Staudinger. "Cat.," Ed. ii., Pt. i., p. 171. 1871.
Ab. ♂ *unicoloraria*.
"Al. totis fuscis, ciliis flavido interruptis."
Unicolorous black-brown, only the fringes chequered light and dark. The ground, where it is indicated, is yellowish.
The British Museum specimens of this form are almost uniformly brown, and the fringes are chequered.

Haworth. "Lep. Brit.," Pt. 2, p. 281. 1810.
Carbonaria.
"The Black Heath) G. alis omnibus saturate piceo-fuscis, punctis vel maculis paucis albidis, ciliis albis fuscisque.
Ph. G. carbonaria. L. "Fn. S.," 1246 ?
"Habitat apud nos rarissime. Exemplarium unicum fœminæ solum vidi. Imago m. Jun. Ericetis.
"Expansis alarum 11 lin.
"Descriptio. Præcedenti, nimis affinis, at longe minor. Antennæ nigræ albo irregulariter annulatæ. Vix Ph. G. carbonaria, Linn."

Stephens, "Illus.," Vol. iii., p. 149. 1831.
Fidonia carbonaria.
"Alis omnibus saturate piceo-fuscis, punctis parvis albidis, ciliis albis fuscisque."
"Dull-brown, with minute paler irrorations: wings deep pitchy-black, with a few whitish spots or blotches: cilia, whitish and fuscous: antennæ black, irregularly annulated with white.
"Probably a mere suffused variety of the preceding (*atomaria*.)
"Taken on heaths near London, in the middle of June."

Wood. "Index," p. 78, pl. 18, fig. 455. 1839.
Fidonia carbonaria. (Black Heath.)
This figure does not agree with either Haworth's or Stephens' description. It is a dark female *atomaria*, but not "pitchy-black, etc."

Var. ? or new species ? from N. Syria.
In the British Museum series, are four specimens under the label *E. atomaria?* which are absolutely uniformly rich brown, without the slightest trace of light ground, not even in the fringes, in which there is no trace of chequering. They are not of the ab. *unicoloraria* character at all.

Kolenati. "Mel. Ent." Fas., v., p. 106. Insecta Caucasi." 1846.
Fidonia iberaria.
"Sulphurea, subtilissime in alis sulphureis fusco-conspersa, in

alis superioribus pone marginem posticum fasciis duabis fuscis interruptis.

" Habitat in Iberia."

(Placed between *piniaria* and *atomaria* as a var. of the former.)

Staudinger considers this as the form *orientaria* with a query. The description does not seem to agree with *piniaria*. It is possibly an *atomaria* form.

Hübner's figures.

It is always both necessary and interesting to consult the figures in the works of the illustrious Hübner.

Of *Ematurga atomaria* there are five figures all of the female. (" Samm.," " Geom.," figs. 128, 131, 136, 526, 527.)

136. Of the average Continental size, not the small British ♀ size. Ground colour dark, no yellow tinge apparent, the lighter ground subdued by minute powdering. Transverse lines well defined and comparatively dark.

[131. Named *glarearia*, has yellowish ground, transverse lines (not bands) well defined, of somewhat larger size than fig. 128, especially the hindwings.]

526. Has lighter ground than fig. 131, but not white as in fig. 128, and about one third of line 4 on the forewings, and of line 3 on the hindwings are obsolescent.

128. Named *roseidaria*, has white ground as in many British examples and the size and shape of wings also accords with British specimens.

527. Is an underside.

British Museum Series.

In the British Museum series only two named races are recognised, *viz.*, var. *orientaria* and var. *unicoloraria*. The Continental specimens are from the Zeller, Frey, and Leech collections mainly.

The specimens are all larger than those of the British races, especially so are the females, which more approach the males in size, in marking, and in shade of ground colour. While none of the males are as dark as the average males taken in Britain. Thus the sexual dimorphism in colour and size is much less conspicuous in Continental races.

The series from the Amur varies but little from the European forms, except that the individuals are somewhat larger, and that the males are all on the light side and the markings are not cleanly cut but very fuzzy.

There are a few examples from Norway which are remarkable as differing so diametrically from the high northern dark race *obsoletaria*, Zett., being very light and having only line 4 on the forewings and line 3 on the hindwings which are practically the only markings. A quite striking aberration, or local race.

Guenée's Remarks.

Guenée's remarks on the variation in *atomaria* (1857), "Sp. Gen. Lep.," Vol. II., p. 154 are that he was unable to establish races; intermediates were so abundant as absolutely to preclude such a treatment. He however notes that examples from the mountains were small and white.

I suggest that his knowledge of *atomaria* was very limited, and that his last statement requires a qualification. In neither Zeller's, Frey's, Leech's, nor Tutt's collection containing specimens of mountain races are there any such small and white female examples as are so easily obtainable and prevalent in Britain.

Lines of Variation.

In 1901, C. G. Barrett ("Lep. Brit. Isles," Vol. VII., p. 8) sums up the lines of the more prevalent form of aberration in British examples as follows:—

In the males: ground colour typically yellow and brown, varying from a paucity of brown dusting to almost black-brown from the intensity of the dusting, and further to a smooth even dull black without speckling.

Bands, colour typically deep brown, 4 on the forewings and 3 on the hindwings with a wide similarly coloured hind marginal band on both wings. These vary extremely in width, definition, shade of brown, and coalescence. The 2nd and 3rd are often coalesced from the discal area to the dorsal margin, the point of junction being at all distances from the margin. The 4th and marginal band are very frequently coalescent, so that either only a few or no traces of the intermediate ground space remain.

In the females: ground, never unicolorous dark. Transverse lines practically always present. Degree of dusting very variable, from nearly destitute of speckling through every degree of duskiness to a dusky white appearance.

Barrett (l.c.), who had unprecedented opportunities for the examination of aberrations existing in the various private collections throughout the country, gives the following summarised list:—

Males.—1. Bright orange, black blotches, no transverse stripes.

2. Pale ochreous, stripes very faint.

3. Orange-brown, markings absent except at outer margin, dusted brown.

4. Dark stripes very broad.

5. Wholly smooth pale ochreous buff, no trace of markings.

6. Unicolorous dark brown.

7. Wholly smooth smoky black-brown, cilia spotted paler.

8. Ditto with the costa deeper black and having one white dot only on each forewing.

Females.—1. Yellow-white, no markings except faint brown shade near the hind margin.

2. Silvery-grey, no markings except a slender black submarginal line and the usual dusting.

3. Stripes massed in the inner half of the wing, outer half silvery-white.

4. Stripes reduced to mere threads, except the 4th, which is broad and black, and forms a striking submarginal band from contrast.

5. The base clouded black.

6. The 2nd and 3rd stripes joined.

7. The 1st and 4th stripes nearly obliterated.

GYNANDROMORPHS.—1. R. hindwing smooth smoky-black, the rest normal.

2. Apparently male, wings narrow like those of the female and tinged with the same blacker markings.

3. R. side female dark and small, L. side male typical in size, colour and marking. Antennæ intermediate, both with short pectinations.

In the short time at my disposal during the past fortnight, I have gone through some of our Society Proceedings and Transactions for striking aberrations with the following results.

Mr. G. Brooks exhibited ("Proceed. S. Lond. E. and N. H. S.," 1917, p. 66). (1) Pale forms from marshy ground in Berkshire. (2) Deep yellow forms from the Downs near Ashford. (3) Yellow forms from the coastal area near Folkestone. (4) Dark forms from the Downs above Brighton. (5) Dark forms from the heaths near Croydon, near Midhurst, Sussex, at Christchurch, Hants, and in the New Forest.

Aberrations have been exhibited as follows.

1. Male with coloration of the female.
2. A unicolorous dark fuscous brown. Presumably a male.
3. A specimen with six wings, 4 on one side, 2 on the other. (C. P. Pickett, "Proceed. S. L. E. and N. H. S., 1906-7, p. 88.)
4. A female with the marginal dark band obsolete.
5. A female with the male coloration and marking.
6. A unicolorous chocolate form. Presumably a male.
7. An almost entirely black form. Again presumably a male.
8. A female with the two inner transverse lines on the hindwings completely missing.

ADDITIONAL ITEMS.

In going through the series in the British Museum Collection, and those in my own cabinet, I have recorded the following facts which are not expressed by previous observers, so far as I have been able to search.

In the MALES, the ground colour is never white, and rarely whitish yellow; the yellow of the hindwings is, at times, somewhat deeper in tint than that of the forewings; lines 2 and 3 are less frequently

coalescent in the males than in the females and to a somewhat lesser extent; the transverse lines are practically always present in full number, although expansion and coalescence may make their definition obscure; the dominant colour in some examples is yellow and in others dark-brown; there is often complete or almost complete coalescence between the outer marginal band and transverse line 4, only a few dots of the intermediate ground space being in evidence; the third transverse line generally has both the outer and inner sides extended in sharp pointed teeth along the veins which cross it; there is considerable difference in the relative position of the transverse lines in different specimens, especially between 1 and 2 and between 3 and 4; transverse line 4 is usually interrupted in the middle by a light blotch of ground colour which either indents or almost cuts it asunder; the so-called dusting or powdering is scarcely so, it consists of a series of very fine, short, curved "scratches" of dark colour, running parallel to the hind-margin.

In the Females, the white is often tinged with yellow; the "scratches" (or powdering) are much more of a black-brown than in the males; the transverse lines, although they may be extended, never even tend to monopolise the whole wing; transverse line 4 very rarely expands to include the marginal area; this line is usually the widest, and is generally emphasised in definition by a pure white margin on the outer side in both fore- and hindwings; as in the male transverse line 3 is usually extended in teeth along the veins; there is only very rarely a dark marginal band; the variation of interlineal space is less than in the males; the light ground indentation of line 4 on the outer side is always conspicuous, and in some cases even completely breaks through; in the hindwing line 1 near the base is occasionally absent and line 3 is occasionally obsolescent.

Genus.

The species has been placed in various genera by different systematists.

In 1819 Leach included it in his genus *Bupalus* with a large number of other Geometers.

In 1825 Treitschke, "Schm. Eur.," vol. v. (2), p. 435, placed it with a large number of other Geometers in his genus *Fidonia*.

In the same year Hübner, "Verz.," p. 296, restricted the genera of his predecessors and put nine species only in his genus *Perconia*, *atomaria* being the sixth in order.

Finally Lederer, in 1853, "Verhand. z.-b. Wien.," vol. iii., p. 179, 231, established the genus *Ematurga*, in which he placed *atomaria* alone.

This genus is that in which *atomaria* is placed at the present time in the British Museum series, and as this is probably accepted as the result of Mr. Prout's study, we may take it as being so far up-to-date.

List of named forms.

The following is a summary of the named forms with references:—

atomaria, L. "Sys. Nat.," ed. x.,p. 521.

♂ *pennata*, Scop. "Ent. Carn.," p. 228.

♀ *isoscelata*, Scop. "Ent. Carn.," p. 225.

(*artemisaria*, Herbst. "Fuess. Arch.," ii.)

(♀ *carbonaria*, Wood "Index.," p. 78, pl. 18, fig. 455.)

(var. *glarearia*, Hüb. ♀ "Schm.," 131 = ♂ of a distinct species.)

Continental races.

var. *roscidaria*, Hüb. ♀ "Schm.," Geom., 128 = *roscidaria*, Verz., p. 296. British race mainly.

var. *obsoletaria*, Zett. "Ins. Lap.," p. 957. The high North.

ab. *unicoloraria*, Staud. "Cat.," ed. ii., pt. i., p. 371. May occur in all the W. European races.

ab. *carbonaria*, Steph. "Ill.," vol. iii., p. 149.

var. , in B. M. North Syria.

var. *iliaria*, Alph. "Hor. Ross.," xvii., p. 181. Thian Shan.

var. *orientaria*, Staud. "Cat.," Ed. I., p. 74. The Orient.

A Beginner's remarks on the Tortricina.

By Alfred Sich, F.E.S.—*Read July 11th*, 1918.

In bygone years I made one or two attempts to study the highly interesting and entertaining insects that constitute the well-marked family known as the *Tortricina*, my main object then being the discovery of what species inhabited my home district. With the kind help of Mr. South, Mr. Robert Adkin, and Mr. Turner, the names of the moths I caught were ascertained. During the last twelve months I have been studying this family again and especially the available literature concerning the British species. The books I read were Wilkinson's "British Tortrices," Stainton's "Manual," Meyrick's "Handbook" and the 10th and 11th volumes of Barrett's "Lepidoptera of the British Isles."

Wilkinson's book was published in that famous year 1859, and, though now out of date, it was most conscientiously written and contains many shrewd suggestions. There is a certain amount of science in it, but owing to the tiresome method of separating the genera by the different lengths of the joints of the palpi, which can only be seen properly by denuding these organs of their scales, the book is not a convenient one to work with for the identification of species. When however one knows the moths the work becomes very useful, and it also forms an epitome of the knowledge possessed by the collectors of that period.

Stainton's "Manual" is, as regards the Tortrices, a condensed edition of Wilkinson's book, but in the short descriptions of the "Manual," the points of difference between the species are sometimes more directly brought to the readers notice.

Meyrick's "Handbook" is the only really scientific book on the British species, but owing to the classification being based only on the structure without regard to the appearance or habits of the insects, it upsets many of our preconceived notions of affinity. Again his classification is not that of the British or European species only, but is founded on the Tortricina of the whole world. This basis is of course absolutely right, but it makes chaos at first of our ideas derived from the older writers, or from the study of the British species only. Thirdly this "Handbook" is not a volume that we can open at first sight and gain the knowledge we seek. The lucid introduction must first be mastered, but once we have done that we shall find the book truly handy and of great use.

Wandering about in the 10th and 11th volumes of Barrett's "Lepidoptera" of the British Isles," we pick up far more knowledge of the habits and habitats of the various species than we can from the other three books, and, as far as my own experience goes, I have found Barrett very accurate in his remarks under these heads. He also tells us more of the range of variation. With one or two exceptions he gives a coloured and enlarged figure or figures of every species; like most sets of figures, they are not all of the same excellence, some species offering the artist a better subject than others. They are however of immense value to the beginner, as he gets a good idea of the appearance of the species, and it is often impossible to obtain a mental image of a species from even the best description, and the possession of a mental image of a species is a great advantage to a collector when he goes after his quarry for the first time. Broadly speaking then we have Wilkinson for history, Meyrick for identification, and Barrett for the habits and figures, the three books together form a very fair guide for the student of the British Tortricina.

These moths do not seem to have suffered unduly from changes in their specific names, so that one soon gets accustomed to the alterations that have been made. Far otherwise is it with the generic names, which are so bewildering that the novice devoutly wishes he could do without them altogether. For instance the common little *lundana* is sometimes found in the genus, *Anchylopera*, at another place it belongs to *Ancylis*, or we find it under *Phoxopteryx*. The genus, *Cheimatophila*, in one work only contains *mixtana*, one of the *Peronidae*, in another book, the same genus only includes *hyemana*, a quite different insect. Again we find in one author's volume the above *Cheimatophila mixtana*, *Oxygrapha literana*, *Peronea cristana*, *Paramesia aspersana*, *Croesia holmiana*, and *Dictyopteryx contaminana*, six different genera, and yet these six species I have just mentioned are by another author all included in the one genus, *Acalla*. These differences in the use of generic names are highly perplexing to the beginner, his want of knowledge hindering him in arriving at a right solution of the difficulty. After being lost in this wilderness for a time I decided to cast my hopes on Meyrick's "Handbook." Firstly, because I had proved its utility when studying the *Tineina*, and secondly, because the genera are well defined and one can see why the various species are placed in their respective genera. With regard to the still more thorny question of the classification of the Tortrices, I am of course far too ignorant even to hazard an opinion. I do not even know all the British species and have not the slightest idea of the species found in the hotter parts of the world. Still the most ignorant do have opinions. Wilkinson brings into one family all those species which have costal folds in the male. This leads him to place in one genus, *Holonota*, the species *brunnichiana*, *tetragonana* and *inopiana*, three insects easily separated by their structure. He also

widely severs *saturnana* and *plumbana* (*ulicana*) from the genus *Dichrorampha*, though not belonging to this genus they appear very closely allied to it. Again he places *fractifasciana* and other species in the same family as the *Eupœcilia*, though they are distinctly separated from these.

I have already alluded to Meyrick's classification. Here it appears strange to me that species like *pruniana*, *lacunana* and *antiquana* should all belong to the same genus, *Eucosma*, and still more surprising that such species as *bergmanniana*, *forsterana* and *virgaureana* are all placed in the same genus, *Tortrix*. I cannot help thinking that structure may not be the sole arbiter in deciding the descent of a species. Though on the other hand one can conceive the case of two species originally derived from the same ancestor gradually by adaptation to quite different surroundings becoming quite distinct in habit and even in appearance.

The moths themselves all seem closely allied; we do not find those distinctly separated families, which we meet with in the Tineina. Yet there appear to be three different types at least. Those species with an ocellus such as *penkleriana* and *ulicetana*, which rest with their wings like a "mansade" roof, or with the forewings pinched in at the apex. Secondly, those often larger species without any trace of the ocellus, like *ribeana* and *cristana* that rest with their wings flat; both the first and second types have the central fascia, when present, running diagonally across the forewing. The third type comprises those species which have a central fascia running parallel with the hind margin. What species I have met with of this type rest with wings held like a sloping roof, such as *smeathmanniana* and *curvistrigana*. One of the most interesting features is the tendency of perhaps the majority of species to variation. One can understand a species varying in different localities, but here we find a moth, like the common elm-feeding *trimaculana*, in great variety flying round the same tree, or we obtain four quite different forms of *contaminana* from the same hawthorn hedge. Then again some species run into each other so closely that Mr. Pierce says he cannot be sure of them till the genitalia have been examined. The *Cnephasiæ* give us an example of this. There is frequently a very great difference between the sexes and apart from the costal fold the markings are sometimes distinct, as we see in *angustiorana* and *longana*.

Though the larvæ appear to have some specific characters yet they often seem hard to describe because they have no definite points. The appearance of the anal shield and the disposition of the hairs upon it appear to me worthy of attention, while on the other hand the colour or markings of the head vary in the same species. Owing to the delicacy of the skin the testes of the larva may frequently be observed, thus enabling us to ascertain the sex, which is often useful. When we take up a new study we often make great progress at first, but as we go on we find the advance

becomes slower and we get landed in difficulties which may almost drive us to despair. By working steadily we overcome some of the troubles and others seem to solve themselves. Then we become highly optimistic, and when we have really just touched the fringe of the subject we are apt to think we know all about it. This is where I imagine I have now arrived with the Tortricina, and hence these remarks. I shall be very glad of any hints that will help to lead me beyond the fringe.

Variation in the genus Cerostoma (auct).

By Alfred Sich, F.E.S. *Read August 8th*, 1918.

The species forming this group are of considerable interest. They are undoubtedly closely allied but show certain differences in structure which have led some authorities to split up the species into different genera, while others have been content to gather them all into one genus under the name of *Cerostoma*, Latreille. If we do this we must also include in the genus the species known as *Theristis mucronella*, as it only differs from the rest in degree. This arrangement we find in Meyrick's "Handbook." If we prefer to make use of separate genera, we may break up the British species in the following manner. I am indebted to Mr. Durrant's kindness for the generic names here employed.

**Hypsilophus*, Fab.
vittella, L.
sequella, Cl.
radiatella, Don.
parenthesella, L.
Abebaea, Hb.
sylvella, L.
alpella, Schiff.
lucella, F.
Trachoma, Wallgn.
asperella, L.
scabrella, L.
horridella, Tr.
Harpipteryx, Hb.
memorella, L.
xylostella, L.
Theristis, Hb.
mucronella, Sc.

The species which exhibit great variation are *H. vittella*, *H. radiatella*, *H. parenthesella* and *T. mucronella*.

Hypsilophus vittella, L. "Sys. Nat." ed. X., 264.

Usually this species is grey or brown grey, much mixed with white and spotted with dark grey. A black or very dark brown irregular streak runs along the basal half of the dorsum. This

*For the genus containing the species, *marginellus*, *juniperellus*, etc., the name *Dichomeras* should be employed instead of *Ypsolophus* (*Hypsilophus*).

streak is sometimes broken up into spots. In some specimens the white marbling is suppressed and the whole forewing is brown while the dorsal streak is only a shade darker than the ground colour.

Ab. *fissella*, n. ab.

The type is in the Stainton collection at the British Museum. It is pale brown with the dorsal streak deep brown, and characterised by a median undulating black brown streak running the whole length of the forewing from the base to the apex. It is a parallel form to ab. *fissella* of *H. radiatella*.

Ab. *carbonella*. Hb. "Samm." 421, *maurellus*, Stph. Wood. In this the whole forewing is nearly black, without markings. Specimens approaching this form are not uncommon, and often have the costa broadly dark brown.

H. sequella, Cl. "Icon." 10, 14.

A white black spotted species with chequered fringes. It varies somewhat in the extent of the spots. In some specimens certain spots coalesce giving a greater amount of black on the forewings. The faint clouding noticeable towards the costa and termen is ochreous in some examples while in others this is grey.

Ab. *leucophaea*, Zell. "Isis," 1839., p. 188.

In this the white ground colour is much invaded by dusky clouding. This species is attached to maple and sycamore.

H. radiatella, Donovan. Wood, "Index," fig. 1539, (1839).

This species is, I think, the most variable Tineid that we have in Britain. The only constant point about it is its shape, it varies extremely in colour and in the type of its markings. The ground colour ranges from nearly white to dark purple brown and probably to black. The markings are rarely absent altogether, they may be in the form of slight or dark clouds, small or large spots, transverse bands or longitudinal streaks. The same specimen may exhibit more than one type of marking. Typical examples of these various aberrations are sufficiently distinct and it is convenient to have names denoting them. In so protean a species many specimens will be found which do not strictly conform to any named aberration, it seems therefore necessary to take a broad view of these forms, otherwise one might be compelled to name a confusing mass of minor aberrations. Most of the forms named were so treated under the impression that they were separate species. It seems now generally accepted that they are merely variations, as the forms run more or less into each other, but I am unaware that any attempt has been made to settle this point of breeding different forms from the same parents.

Donovan's figure of this species ("Nat. His." vol. iii, pl. 77, fig. 3) exhibits a yellow moth with dark red longitudinal markings. In his description he says, the moth is buff with dark purple rays. This

is the type of the species. The special feature of this form lies in the radiating lines running from the base, or near it, across the disc of the forewing and ending in the costa, apex, or termen. The ground colour is usually ochreous of a paler or darker shade, but the colour of the rays varies much. They may be dark ochreous, dark brown, red brown or fuscous. In some specimens the rays are mere lines little darker than the ground colour while in the opposite extreme they are broad solid bands, leaving only thin streaks of ground colour between them. Among the rays one may generally be traced extending from the base to the apex. This is the most persistent and is the ray which alone survives in ab. *fissella*.

Ab. *bysinella*, Hb. "Samm." Fig. 380.

Forewings whitish with a dark ochreous median ray, costa and dorsum broadly ochreous. The whitish ground colour is thus split up into a fine pale subcostal ray and two broader pale rays, the one above and the other below the dark median ray. Mr. Durrant kindly showed me one nearly typical example from France and others belonging to this form, but with brown or reddish rays, from England. *Bysinella* differs from typical *radiatella* in having only about three pale rays whereas that has alternate pale and dark rays.

Ab. *fissella*, Hb., Fig. 108. Wood, 1538.

This is the form with a broad dark streak running through the middle of the forewing from the base to the apex, thus dividing the wing into two parts. Huebner's figure shows a whitish example with a broad blackish median ray. The more handsome specimens show a uniform white or pale ochreous ground colour and a deep red-brown stripe. The ground colour varies through ochreous, reddish-brown to fuscous, and the stripe from red-brown to blackish grey. The paler portion of the wing is sometimes mottled as in ab. *variella*.

Ab. *aspersa*, n. ab.

Forewings dark, uniformly covered with short pale longitudinal strigulæ. This is probably an extreme development of one of the directions of *radiatella* in which the rays are broken up into short lengths instead of being continuous. The general appearance of *aspersa* is so distinct from the other aberrations that I think it ought to bear a name. My specimen (ex. Sam Steven's coll.) is red-brown thickly sprinkled with short ochreous grey streaks.

Ab. *unitella*, Tr. "Schmett," vol. 9, part 2, p. 30.

"Forewings uniform ochreous brown or light nut brown." Treitschke adds to this description that sometimes there is also a dark median streak and a black dot before the hind margin. He seems to have been under the impression that he had the *unitella* of Huebner before him. This is an *Oecophora*. Later (vol. 10, part 3, p. 187.) he recognises the moth as a variety of *fissella*, and after describing the latter he says "very seldom the median streak is absent and all the wing is ochreous with the discal spot very faint, thus is constituted the variety, *unitella*." To take a broad view all

unicolorous specimens, without markings, whether they are ochreous, brown or red-brown, may be considered as belonging to this aberration. Some examples, obviously belonging here show the merest trace of the median streak or a median row of minute white strigulæ.

Ab. *rufimitrella*, Stephens, "Ill." vol. iv., p. 340. Wood, fig. 1542. Stephen says, "Wings dusky black, shining, more or less variegated with fuscous or darker clouds, forehead red. Some examples more varied than others. Not very uncommon in the Metropolitan district in autumn." The type specimen in the British Museum is now deep brown, lighter towards the costa, and showing an ochreous suffusion along the dorsum and before the termen. Specimens with a red head, darkly mottled forewings with a paler dorsum and termen may be allocated to this aberration. I have one specimen resembling the type. This form though difficult to describe is distinct and rather handsome.

Ab. *quinquepunctata*, Haw. "Lep. Brit." 544. Steph., vol. iv. "Forewings ochreous red with a black spot on the dorsum at the base and four other spots on the disc." The four other spots I take to be one near the base, one on the disc beyond the middle which is the usual discal spot, and two spots placed obliquely above these. I have one specimen and also an ochreous brown example which in spite of its ground colour I am inclined to place under this name. This is a richly marked, 5-spotted form, quite distinct from the rayed forms. Sometimes the upper and lower discal spots approach each other and give the wing a fasciated appearance, like that possessed by *A. sylvella*.

Ab. *variella*, Hb. "Samm." fig. 106. Wood, "Index." fig. 1540. *lutosa*, Haw., 545. *fulvella*, Dup. "His. Nat." vol. xi.

Huebner's, figure shows an ochreous insect with a dark costa and dark spots. Stephens (vol. iv.) writes, "Rufous or fuscous, sometimes luteous, ochreous or whitish, most frequently varied and spotted with fuscous, with a short black streak at the base on the inner margin and a black dot towards the apex; they are rarely immaculate." The black streak at the base is absent in *lutosa*, Haw. Duponchel's figure of *fulvella* shows an ochreous insect with a dark mark near the apex of the forewing. *Variella* is quite distinct from all the other forms already mentioned but nearest to ab. *quinquepunctata*. The ground colour ranges from grey through ochreous and brown to deep purple brown. The spot at the base of the dorsum and that towards the apex are often well marked, from the latter a dark transverse mark frequently runs to the costa. This mark is often very conspicuous and extended to the dorsum. There is occasionally a similar mark, composed of spots, between this and the base of the wing. Such examples when with an ochreous ground colour might be taken for a form of *A. sylvella* but for the shape of the forewing. Besides these marks dark spots or strigulæ may occur on the costa or dorsum and various parts of the wing

may be clouded with fuscous. *Variella* is distinctly the spotted and clouded form of this species, and there is good excuse for the older writers who considered it a separate species from the radiated insects.

Ab. *flaviciliata*, Haw., 545, Steph.

The forewings are white with a pale ochreous tint and the cilia ochreous yellow. In some specimens the wings are unicolorous, other examples may have a few dark dots on the disc. This is an albescent form. It is parallel with the ab. *ochroleuca* of *H. parenthesella*, and care is required in separating these two. The broader forewing and the more distinctly ringed antennæ of the latter are points to be observed.

It appears to me that the ancestral form of this species was ab. *unitella*, a plain unmarked insect, from which all the other aberrations have arisen. In a long series of ab. *unitella* we can trace the first faint beginnings of all the rayed forms and of ab. *variella*. The abs. *rufimitrella* and *quinquepunctata* evidently take their origin from *variella* and these two probably represent the most modern development of the species. It would be exceedingly interesting to rear this species on Mendelian lines. I have no doubt that all the forms and perhaps others might be so obtained. The imago hibernates, but if copulation takes place in the spring the selection of parents and the rearing of the offspring should not be difficult.

Hypsilophus parenthesella, L. "F.S." 1435. *costella*, Fab. Wood., fig. 1537.

The usual form of this species has the forewings reddish ochreous with a broad white patch just below the costa extending from the base to the middle of the wing. The ground colour ranges from pale golden ochreous to deep purple brown and may be almost spotless or may bear numerous black dots and strigulæ. The white costal blotch may be quite absent or may be represented by a lighter shade of the ground colour in that area. Sometimes it is a mere white streak. Huebner's figure of *costella* (107) shows a narrow but rather deep notch at the termination of the white patch, but this margin is more often entire. On the other hand the white patch may include the costa and extend to three fourths of the wing towards the apex. It is sometimes bordered by a dark shade, occasionally the border below the spot is extended as a dark line to the apex of the wing. Many specimens show the second smaller white blotch mentioned by Stephens as lying at the anal angle. Some examples exhibit distinct rays on the costal half of the forewing. However, in all these minor variations and gradations we can easily recognise the insects as *parenthesella* and there seems to be no necessity for special names.

Ab. *fissella*, Dup. (non Hb.) "His. Nat.," vol. xi., pl. 293, Fig.7.

Duponchel's figure depicts the insect with a second white patch along the basal half of the dorsum and a central dark streak. I

have one specimen in which the white patch is extended along the costa, and the whole of the dorsum is also white, while an ochreous brown streak runs along the centre of the wing from base to apex. This is a parallel form to ab. *fissella* of *H. radiatella*. Of the two following aberrations I have not seen any examples.

Ab. *ustulata*, Haw. 542. Stephens.

Wings whitish with various reddish ash streaks, cilia umber brown but fulvous at the anal angle.

Ab. *erminea*, Haw. 542. Stephens.

Wings white, thickly spotted with fuscous or black, with a dark spot beyond the middle and a short golden streak from the base to the middle.

Ab. *ochroleuca*, Haw. 542. Steph.

Wings ochreous white with an immaculate oblong white patch at the base. This is an albescent almost unicolorous form. I have two worn examples, ex. coll. S. Stevens. It is parallel to ab. *flaviciliata* of *H. radiatella*.

It will be seen that this species does not show so large a range of variation as *H. radiatella*, nevertheless it is difficult to obtain two specimens exactly alike.

Abebaea sylvella, L., "Sys. Nat." ed. xii., 893. Wood, 1541.

The species of this genus show very little variation in comparison with those of the last. The present species varies in the depth of colour and in the number and completeness of the fasciæ. I have one specimen which is almost unicolorous as the fasciæ are scarcely traceable. Normally there are two oblique bands on the forewing, one before and the other beyond the middle. Some examples exhibit a third fascia lying between the base and the first band (as I call it for convenience) while in others a third fascia lies between the second band and the hind margin. Wood's figure shows a specimen bearing all the four fasciae, I have mentioned, and also an additional fascia on the hind margin. This last I have never seen in any example.

Abebaea alpella, Schiff. "Verz." 135. *persicellus*, Steph. Wood, fig. 1536.

This is a smaller and greyer insect than *sylvella* and does not seem to vary much. Some examples are more ochreous than others and in some the reticulations of the forewing are more strongly expressed. The dorsal fasciae may be mere spots lying on the margin or they may be extended upwards beyond the fold. At one time it was a belief, especially among continental collectors, that *alpella* was the male and *lucella* the female of one and the same species. Of *alpella* I have both sexes. This is the *persicellus* of Stephens and Wood but not of Schiffermiller. That species is a sulphur yellow insect which has not occurred in Britain.

Abebaea lucella, Fab. "Sys. Ent." 667. *antennella* Schiff., Steph. Wood, fig. 1535.

This seems to be the most constant of the group and is also one of the less common members. Perhaps in a very long series some appreciable variation might be shown, but all the specimens I have seen appear extremely alike.

The larva of *H. vittella* feeds on elm and is also stated to feed on beech. It is well known. Lime, sallow and maple are given as the foodplants of *H. sequella*, the first two I believe erroneously. All the other species I have treated of are attached to oak, but their larvæ have not been adequately described. They are superficially much alike. I once gathered half a dozen from young leaves of the same oak in Richmond Park. One of these larvæ appeared different from the rest, but I was surprised to breed from these *H. radiatella*, *A. sylvella*, and *A. alpella*. The imagines of these three together with *H. parenthesella*, may be beaten from oak in late summer. They are also fond of hiding in fir trees when these grow near oaks. *H. radiatella* has been found under loose bark in winter and I have seen it on the wing in late spring.

With the exception of *T. mucronella*, the remaining members of this group do not vary to a great extent, but I hope on a future occasion to call attention to some points of interest with which they are concerned.

A few Notes on Japanese Butterflies.

By Hy. J. Turner, F.E.S.—*Read September, 12th*, 1918.

The Japanese Islands occupy a very similar position on the eastern shore of the great Eurasian continent to that of the British Islands on the western, except that they are about sixteen degrees further south, and having a greater extension in latitude, enjoy a more varied as well as a more temperate climate. Their outline is also more irregular and their mountains loftier, the volcanic peak of Fusiyama being over 14,000 feet high. Their soil is very fertile and their vegetation in the highest degree varied. Like our own islands they lie on a marine bank connected with the continent less than a hundred fathoms below the surface, although a portion of the intervening space is very deep, suggesting that the land connection is of more remote date. A southern warm current flowing a little to the eastward of the islands ameliorates their climate much in the same way as the Gulf Stream does ours, and enables them to support a more tropical vegetation and more varied forms of life.

As we might expect from the above remarks, the forms of animal life found in Japan show a close resemblance to those of the adjacent mainland, the Amur district, Corea, Manchuria, and N. China. The fauna presents strong indications of there having been two or more lines of migration at different epochs. The majority of its animals are related to those of the temperate or cold regions of the continent, either identical or allied species. A minority have a tropical character, either identical with or allies of species in China, Formosa, and even the Malay. A few again occur in North China and even in North India (a temperate belt on the Himalayan slopes) to Kashmir and Chitral. There is also a slight American element, no doubt a relic of the period when a land communication existed between the two continents across what are known as the shallow seas of Japan, Okutsh and Kamschatka.

We, who have been studying Lepidoptera for many years, are well aware that there is a large amount of local variation in a considerable number of species, and we may be sure that were it not for the constant intermingling and intercrossing of the individuals inhabiting adjacent localities, this tendency to local variation in adaptation to slightly different conditions, would soon form distinct races. But as soon as the area of the distribution of any group of species is divided into two portions, such as occurs with the

separation of islands from the mainland, this intercrossing is stopped, and the usual result would be that two closely allied races are formed. Possibly each of these pairs of forms under altered conditions goes on varying, and segregate in course of time into two species. The amount of divergence of these two races or two allied species becomes a measure of the length of time which has elapsed since the more or less permanent separation of the two areas.

The distribution of insects is determined largely by climatic and general physiographical conditions, as well as also to a great extent by the nature of the food supply, many forms as we all know being dependent for their sustenance in one stage or another upon the development of a particular vegetable product just at a particular period of its existence. Indeed, localisation or restriction of its area of distribution of a species appears to be more frequently brought about as the result of changes in the vegetation, than by the interposition of physical barriers, which by their power of flight insects can in a great measure overcome. The effect of climate is, however, well-marked, as is seen in the general restriction of numerous forms to particular climatic zones. A broad horizontal or latitudinal distribution characterises the insect fauna of the North temperate zone. A large proportion of European species, for example, are spread over the far interior of the Asiatic continent, and some reappear in America. Pryer tells us, in 1885, that not less than 123 species of Macro-lepidoptera are common to both Japan and Great Britain, about 16% of the entire British fauna.

The Japanese Islands lie in the Palæarctic Region, and before discussing the various species it would be as well to know what this area is generally accepted as comprising. I cannot do better than quote Wallace's words;—"This very extensive region comprises all temperate Europe and Asia, from Iceland to Behring's Straits, and from the Azores to Japan. Its southern boundary is somewhat indefinite, but it seems advisable to comprise in it all the extra-tropical part of the Sahara and Arabia, and all Persia, Cabul, and Beloochistan to the Indus. It comes down to a little below the upper limit of forests in the Himalayas, and includes the larger northern half of China, not quite so far down the coast as Amoy." This enormous area more or less naturally falls into subdivisions. They are the European, the Mediterranean, the Siberian, and the Manchurian sub-regions. Japan and N. China, with the lower Amoor and a narrow strip along the Himalayas, just below the upper limit of trees, comprises the Manchurian sub-region. Japan then forms the insular portion of this sub-region, just as the British Isles form the insular portion of the European sub-region.

Papilionidæ.

Papilio machaon. The whole Pal. Reg.
hyppocrates. Jap. race.
hyppocratides, g.v. *hyppocrates*, g.a.
septentrionalis. S. Jap.

Papilio xuthus. E. Pal.; E. China; Amur.
londensis. Jap. race.
xuthulus, g.v. *londensis*, g.a.
Parnassius stubbendorfi. E. Pal.; Amur; Altai; W. and C. China.
citrinarius. Jap. race.
[Possibly a derivative of the older *P. mnemosyne.*]
Luedorfia puziloi. Am.; China.
japonica. Jap. race.
[*Luedorfia* is narrowly restricted in the West as *Thais* is in the East.]

Papilio alcinous. Jap. E. Pal; China; Thibet.
Papilio helenus. Whole Ind. Malay Reg.
nicconicolens. Jap. race.
Papilio sarpedon. Whole Ind. Malay Reg.
nipponus. Jap. race.
sarpedonides, g.v. Jap. *nipponus*, g.a. Jap.
Papilio protenor. N. Ind.; China.
amaura. Jap. *demetrius.* Jap.
Papilio bianor. E. Pal.; S. China.
dehaani. Jap. race.
japonica, g.v. *dehaani*, g.a.
Papilio polytes. Whole Ind. Malay Reg.; Thibet; W. China.
borealis. Jap. race.
Papilio maackii. Jap. E. Pal.; China.
tutanus. N. Jap.
raddei, g.v. *tutanus*, g.v.

PIERIDÆ.

Aporia crataegi. Whole Pal. Reg.
niphonica. Jap. race.
Pieris melete. E. Pal.; N. Ind.
aglaope, g.v. Jap. race. *melete*, g.a. Jap.
megamera, g.v. N. Jap. race.
Pieris rapæ. Whole Pal. Reg.
orientalis. Jap. race.
metra, g.v. *orientalis*, g.a.
niphonica. Jap. race.
yokohama, g.v. *niphonica*, g.a.
Midea (Euchloë) scolymus. Jap. W. and C. China.
Leptosia amurensis. Amur; N. China.
japona. Jap. race.
vibilia, g.v. *japona*, g.a.
[Possibly a derivative of the W. *L. sinapis.*]
Colias palæno. N. Europe; Alps; Siberia; Amur.
europome. *aias.* Jap. sub-race.
Colias hyale. Whole Pal. Reg.; Persia; China.
poliographus. Jap. race.
pallens, g.v. *poliographus*, g.a.

Gonepteryx aspasia. E. Pal.; China; Amur; Turkistan.
niphonica. Jap. race.
Gonepteryx rhamni. Whole Pal. Reg.; N. Ind.; Amur.
maxima. Jap. race.

Terias lata. N. Ind.; China; E. Pal.
lata, g.v. *bethsheba*, g.a. Jap. race.
Terias hecabe. Ind. Malay Reg.; China.
hecabe, g.v. *mandarina*, g.a. Jap. race.
Catopsilia pyranthe. Ind. sub.-Reg.; China.

Danaidæ.

Danais chrysippus. Cosmopolitan.
Danais plexippus. Cosmopolitan.
Danais limniace. Indo-Malay Reg.; S. China.
Danais tytia. N. Ind.; Cash.; W. China.
niphonica. Jap. race.
[No *Euplœa* indigenous.]

Erycinidæ.

Libythea celtis. Whole Pal. Reg.
lepita. Jap. race. E. Pal.; China.
[Now considered a race of the wide-spread *L. celtis.*]

Satyridæ.

Mycalesis perdiccas. Jap. Kash.; China.
Mycalesis gotama. Jap. China.
Lethe diana. Jap. W. China.
Lethe sicelis. Jap.
Erebia sedakovii. E. Pal.; Altai; Amur.
niphonica. Jap. race. *scoparia.* Jap. race.
Erebia ligea. Whole Pal. Reg.
takenonis. Jap. race.
Satyrus dryas. Whole Pal. Reg.
okumi. Jap. race. *kawara.* Jap. race.

Melanitis leda. Whole Ind. Malay Reg.
ismene, g.v. *leda*, g.a.
Neope goschkeritschii. Jap.
Ypthima baldus. Ind. Malay Reg.
argus. Jap. race.
[No *Coenonympha*, *Epinephele*, *Pararge*, nor *Melanargia.*]

Nymphalidæ.

Apatura ilia. Whole Pal. Reg.; Burm.
substituta. Jap. race.
Diagora subviridis. N. Ind.; China.
japonica. Jap. race.

Limenitis sibilla. Whole Pal. Reg.
japonica. Jap. race.
Limenitis sydyi. Jap. E. Pal.
latefasciata.
Limenitis helmanni. E. Pal.
pryeri. Jap. race.
Pyrameis indica. N. Ind.; China.
Pyrameis cardui. Cosmopolitan.
japonica. Jap. race.
Vanessa io. Whole Pal. Reg.
geisha. Jap. race.
Aglais urticæ. Whole Pal. Reg.
connexa. Jap. race.
Eugonia xanthomelas. E. Pal.; China; Himalaya; As. M.
japonica. Jap. race.
Euvanessa antiopa. Whole Pal. Reg.; Nearct. Reg.
Euvanessa canace. Ind. Malay Reg.; E. Pal.
japonica. Jap. race.
Polygonia l-album. Pal. Reg.; Amur.; Cash.
Polygonia c-aureum. China.
Polygonia c-album. Whole Pal. Reg.; Cash.
hamigera. Jap. race.
Araschnia burejana. E. Pal.; China; Amur.
Melitæa phœbe. Whole Pal. Reg.
scotosia. Jap. race.
Melitæa athalia. Whole Pal. Reg.; Kamschatka.
Brenthis ino. Whole Pal. Reg.
tigroides. Jap. race.
Brenthis daphne. Whole Pal. Reg.; China.
rabdia. Jap. race.
Argynnis aglaia. Whole Pal. Reg.; N. Ind.; As. Min.; Cash.
myonia. Jap. race.
Argynnis adippe. Whole Pal. Reg.; N. Ind.; As. Min.; Cash.
pallescens. Jap. race.
Argynnis nerippe. Jap. China.
chlorotis. Jap. race. *megalothymus.* Jap. race.
Argynnis laodice. Whole Pal. Reg.; China.
ariana. S. Jap. *japonica.* N. Jap.
Argynnis sagana. E. Pal. Reg.; China.
liane. S. Jap. *iliona.* Jap.
Argynnis paphia. Whole Pal. Reg.
paphioides. Jap. race.
Argynnis niphe. E. Pal. Reg.; India; China.
Argynnis anadyomene. Jap. China; Thibet; Amur.

Hypolimnas bolina (?). Whole Ind. Malay; China.
Cyrestis thyodamas. India; China.
mabella. Jap. race.

Neptis cænobita (*lucilla*). Europe; N. Asia.
insularum. Jap. race.
Neptis hylas. Europe; E. Pal. Reg.; India; Cash.
intermedia. Jap. *oda*. Jap.
passerculus. Jap. *luculenta*. Jap.
Neptis alwina. China.
kæmferi. Jap. race.
Kallima huegelii. Ind.; C. and W. China.
eucerca. Jap. race.
Junonia almana. Indo-Malay Reg.; Malay Isles.
almana, "dry." *asterie*, "wet."
Junonia orithya. Indo-Malay Reg.; China; Australia.
isocratia, "dry." *orithya*, "wet."
[No *Charaxes*.]

LYCÆNIDÆ.

Thecla w-album. Whole Pal. Reg.; E. Asia.
fentoni. Jap. race.
Chrysophanus phlæas. Cosmopolitan.
daimio. Jap. race.
Lampides boticus. Whole Pal. Reg.; Ind.-Malay Reg.
Everes argiades. Whole Pal. Reg.; China; N. Ind.
amurensis. Jap. race.
Plebeius agon (*argus*). Whole Pal. Reg.
micrargus. Jap. race. *insularis*. Jap. race.
Celastrina argiolus. Whole Pal. Reg.
ladonides. Jap. race. *kobei*. Jap. race.

Niphanda fusca. E. Pal. Reg.
Satsuma friraldszkyi. E. Pal. Reg.
ferrea. Jap. race.
Zephyrus orientalis. E. Pal.; China.
suffusa. Jap. race.
Zephyrus taxila. E. Pal. Reg.
japonica. Jap. race.
Zephyrus saphirina. Jap. E. Pal.
Zephyrus enthea. E. Pal.
Zephyrus attilia. E. Pal.; China.
Zephyrus butleri. Jap. Amur.
Zephyrus orsedice. Jap.
Zephyrus jonasi. Jap.
Zephyrus lutea. Jap. E. Pal. Reg.; N. China.
Zephyrus sapestriata. Jap. E. Pal.
Arhopala japonica. Jap.
Arhopala turbata. N. Ind.
Arhopala ganesa. Jap.
Curetis acuta. China.
japonica. Jap. race.

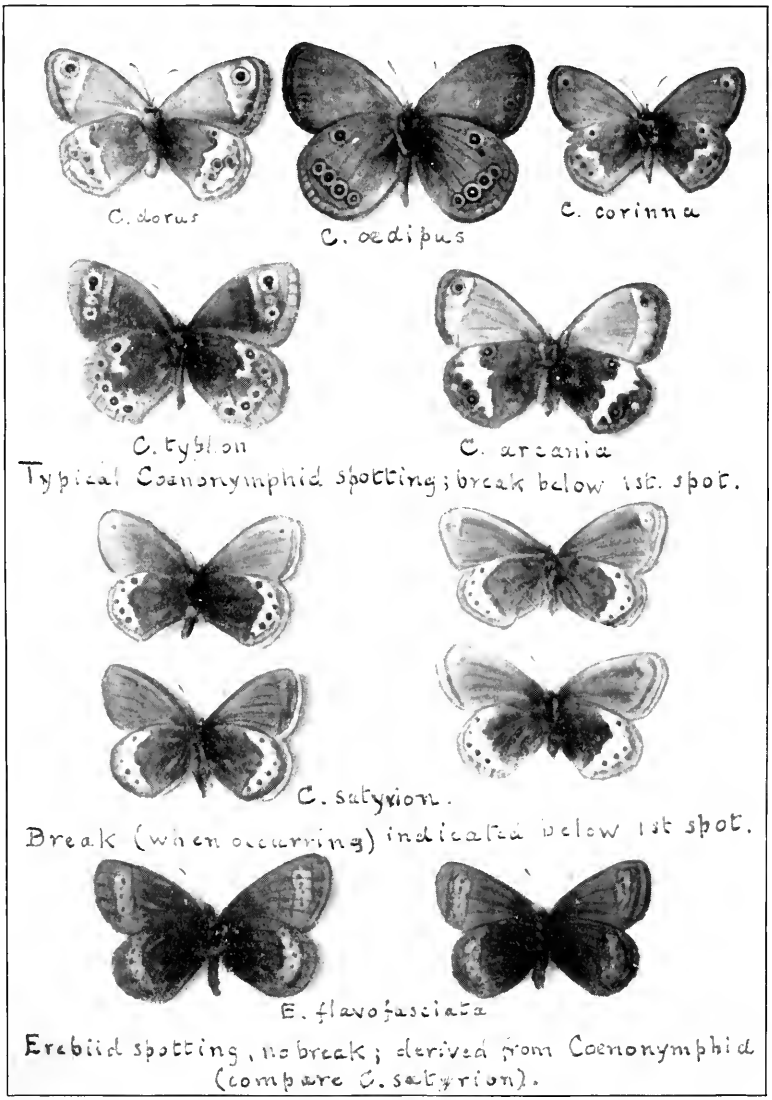
Zizera maha. N. Ind.
argia. Jap. race. *japonica*. Jap. race.
[No *Polyommatus*, no *Agriades*, no *Lycæna*.]

HESPERIIDÆ.

Nisoniades montanus. Jap. Amur; N. China.
Heteropterus morpheus. Whole Pal. Reg.; E. Asia.
Adopæa sylvatica. Jap. E. Pal.
Adopæa leonina. Jap. E. Pal.; N. China.
Augiades sylvanus. Whole Pal. Reg.; E. Asia.
selas. Jap. race.
renata. Jap. *amurensis*. Jap.
Augiades ochracea. Amur; E. Pal.
rikuchina. Jap. race.
Augiades subhyalina. Jap. China; Siberia.
Erynnis floriuda. Jap.
Parnara mathias (?). Ind.; China; Asia Min.
Parnara guttatus. Jap. E. Pal.; China; Ind.-Malay.
Parnara pellucida. E. Pal.; China.

Satarupa tethys. Jap. Amur; China.
Rhopalocampta benjaminii. India; China.
japonica. Jap. race.
Ismene aquilina. Jap. Amur.
Aeromachus inachus. Jap. Amur.
Isoteinon lampropsilus. Jap. China.
Leptalina unicolor. Jap. Amur; China.
Halpe varia. Jap.
Padraona flava. Jap.
[No *Hesperia* and no *Pamphila*.]

In addition many stragglers from the Indo-Malay Region occur sporadically in Japan, as there exists no strong geographical feature across China of sufficient emphasis to form a definite line of demarcation between the Eastern Palearctic and the Indo-Malay Regions. These stragglers I have not enumerated.



Half Tone Eng. Co., Ltd. *Photo, F. D. Morice.*

COMPARATIVE SPOTTING OF UNDERSIDE HIND WING IN SEVERAL SATYRID GENERA.

The Variation of Epinephele tithonus, L.

By Rev. G. Wheeler, M.A., F.Z.S., F.E.S. *Read October 24th*, 1918.

The directions of variation in *Epinephele tithonus* are few in comparison with those of many other species, but in one of these directions, *viz.*, the number, size and position of the spots, both on the upper and underside, the extent of variation is somewhat unusual. It is moreover so much more variable in this matter in England than elsewhere, that this gives an added interest to the subject for an English Society. The variation in size is much less than in many other species and it is distinctly rare to find a specimen either abnormally large or abnormally small. Nor does its size vary greatly in other parts of its range, though the average size in N. Italy and in its one locality in the Rhone Valley is perhaps a trifle larger than that of English specimens; Central Italian and Spanish specimens are, on the other hand, rather small. The variation in colour is, however, within somewhat narrow limits, considerable. The extreme form, ab. *miucki*, Seebold, has the usual orange brown replaced by pale yellow, a form which was originally described from the coast of Spain and Portugal, but which, so far as I have been able to trace, is somewhat less scarce in England than elsewhere. A further development of this aberration, in which the ground colour is silvery white has also been found in this country. Short of this extreme coloration, which is sometimes found in only part of the area covered by the ground colour, there is a decided variation in shade even amongst English specimens, while the ground colour tends to become lighter as we advance south, at any rate in Central Europe, the Swiss specimens being lighter than the English, and the central Italian again markedly lighter than the Swiss. Specimens however in the S. Kensington Collection from Sardinia and Corsica are not lighter than those from the Rhone Valley. The dark portion of the colouring, especially of the border of the hindwing is sometimes replaced by a sort of mouse-grey; specimens may be seen in my own series and in Mr. Stiff's, doubtless also in many others. The extent of the basal suffusion on the upperside also varies considerably; on the forewing it occasionally invades almost the whole inner portion of the wing, giving the insect a distinctly *Erebia*-like appearance. This aberration is said by Tutt ("Brit. Butt.," p. 408) to be very scarce; the specimens in Mr. Stiff's series from Tavistock exhibited this evening are the only ones with which I am acquainted.* On

* Others were exhibited the same evening.

the hindwing of the ♂, this suffusion, combined with unusual breadth of border, occasionally leaves only a minute area of the ground colour visible. On the other hand it will be seen, in the series I exhibit this evening, that in Swiss and even more markedly in Italian specimens, the ground colour, especially in the ♀s, fills the larger part of the area of the wing, an effect enhanced by the much lighter colour of the suffusion itself. With regard to the underside, the only noticeable colour-variation on the forewing is the greater or less extent to which the *Erebia*-like band just inside the margin is visible. In some specimens there is no trace of it, in others it is clearly visible just round, or just above, the eye-spot, while in some it is clearly indicated all down the wing; in one specimen of my series (unfortunately slightly damaged) it is very pronounced. On the hindwing the presence or absence of strong contrast between the light and dark portions gives rise to wide variation. In the Tavistock specimens it is very marked, whilst in the Italian it is very slight, the normal dark colouring being only a shade or two darker than the lighter portion. In the little Spanish specimen exhibited, this approximation of the two shades is carried still further. In the ♂s from near Lake Maggiore the darker colour so far invades the area of the lighter as almost to obliterate it. By far the most remarkable mode of variation is however the spotting of both wings and on both surfaces. Normally there is on each side of the forewing a single black double-pupilled spot, and on the upper side of the hindwing a single-pupilled spot near the anal angle, not unusually accompanied, especially in the ♀, by another small spot in the next inter-neural space above it. On the underside of the hindwing is a variable number of white points, the most conspicuous of which are usually those in the 2nd, 5th and 6th interneural spaces counting from the costa. The variation in spotting may be either in the direction of addition or diminution. The double-pupilled eye-spot on the forewing frequently has the lower pupil almost, and sometimes quite, obliterated both above and below; occasionally the upper pupil also disappears, forming the ab. *caeca*, Tutt; the anal eye-spot on the hindwing is not infrequently wanting in the ♂; sometimes also the black spot disappears leaving a conspicuous white pupil. Instances may be seen in the series I exhibit, and more pronounced instances of the conspicuous white spot are in the collection exhibited here by Mr. Stiff.

When extra spots appear on the forewing it is remarkable that two are considerably more frequent than one. These appear in the two interneural spaces next below the usual spot; they vary in size from the smallest dots to large well-pupilled eye-spots, but very small spots are sometimes pupilled and fairly large ones occasionally blind; generally speaking the lower spot is the larger if there is any difference in size, but this, which might, for reasons referred to later, have been expected to occur almost universally, is by no means an invariable rule. When only one extra spot occurs it may be either

the upper or the lower, the former appears to be slightly the commoner in the ♀ s, the latter predominates largely in the ♂ s. Occasionally a small additional spot is found *above* the ordinary apical spot, as so often occurs in *Pararge megera*, *P. hiera* and *P. maera*, but this is very rare. It by no means follows that because extra spots are to be seen on the upperside they also appear on the underside, or *vice versa*, nor are the two wings always homogeneous, especially when the spots are very small, nor, if they are the same in number, are they always of similar size on the right and left wings. On the upperside of the hindwing one spot may be considered normal (this always corresponds to no. v of the series on the underside), but two occur very frequently especially in the ♀, the second appearing in the next interneural space above the usual spot, and corresponding with no. iv of the series on the underside; when a third spot appears it is generally near the costa and corresponding with no. ii of the underside series; very rarely however the 3rd spot in the ♀ is *below* the usual one and corresponds with no. vi beneath. If a 4th spot appears it will usually correspond with no. iii, and in all ♂ specimens I have seen this is the case, but a ♀ specimen with ii, iv, v, vi, is in Mr. Stiff's series. As many as five spots may be seen on the upperside of the hindwing; in one of Mr. Stiff's specimens the spots iv, and v, are black and pupilled, while spots i, ii, iii, exhibit the pupils only. When 5 spots occur these are the 5 to be expected, but the combination ii, iii, iv, v, vi, also occurs in Mr. Stiff's collection. All these variations in the direction of extra spotting, except the 2nd spot on the hindwing, are very uncommon except in the south-west of England and Wales; they are on the other hand by no means scarce in Devon and Cornwall, and in the neighbourhood of Dartmoor are so far from being rare that one may reckon on obtaining a dozen or more any morning during the season, provided the weather be warm; actual sunshine is a matter of indifference to this species, as it is to *E. jurtina* and *Aphantopus hyperantus*.* The only other locality in which similar variation seems to occur in any numbers is in Germany, from which there are several examples in the national collection; one only of these has any more exact label and that is from Frankfort. Even these however do not compare with British examples, the spots being, except in one ♀, very small, and even in this example though both are pupilled they are of rather small size. The only other examples showing even traces of extra spotting that I have seen are a ♂ from Corsica and a ♀ from Sardinia in the National collection; one of my ♂ Italian specimens (from Orvieto) will also be seen to show slight traces of the spot next below the regular one. One can hardly help speculating on the cause of this. It is often supposed that extra spots in the Satyrids

*The specimens from the Pembrokeshire coast are less pronounced, the extra spots being generally confined to the upperside, and being mostly small.

are specially connected with hot areas, but this will not hold good in the present case, since this form of variation only occurs in the Southern portion of the insect's range as a very rare aberration. From the slight data as yet at my disposal I should be prepared to look for the predisposing cause in a combination of heat and damp; I have, however, taken a specimen (exhibited to-night), one out of 4 seen, on the Wiltshire downs not far from Devizes, on dry chalk soil, and not in an exceptionally hot locality. It would be an interesting experiment to breed the species through a series of years under artificial and varied conditions, from ova both from Dartmoor and other localities, with a view to seeing whether the Dartmoor strain would tend to lose its extra spotting under dry or cold influences, and whether the strains from other localities would tend to approximate to the Dartmoor strain under the influence of combined heat and dampness. The experiment, to be of any value would require great care and a long period of time. In South-West England much is now doubtless owing to heredity, but it must be remembered that some outside influence (some stimulus from environment) must have been needed to set this tendency in motion.

I said that when both extra spots were present on the forewing, the lower might have been expected always to be the larger, and in the same way when only one is present it might have been expected to be the lower, and for this reason. Among the Satyrids there are occasional examples of species in which the ♂ generally has one spot on the forewing (the apical), and the ♀ an additional one in the space corresponding to the *lower* of the extra spots in *E. tithonus*, which we are now considering; one such species is *E. lycaon* of which I exhibit specimens, others are *Hipparchia semele* var. *aristaeus*, and *H. arethusa*, there are also some Indian species of *Epinephele*, near to *E. lycaon*; there also exist numerous cases of species where both sexes frequently possess this second spot, the ♀ however more often than the ♂, such as *Satyrus circe* and *H. briseis*; and others where both sexes almost always possess it, such as *S. hermione*, *S. ellena*, *H. semele*, and many more; again, among the Erebias when there is only one eye-spot beyond the two apical ones it is that which corresponds to the lower extra spot in *E. tithonus*, and this is the first to appear and the last to go. It would therefore seem to be the prevailing spot beyond the single or double apical one. To set against this there is only this fact, that in species of the genera *Epinephele* and *Pararge*, which normally possess only the apical spot, the *upper* one is generally the first extra one to appear, and that in such cases as have normally two spots, *i.e.*, in which the lower is normally present, the next to appear is always the upper of the two now under discussion. To illustrate this point I am exhibiting the nearest neighbour of *E. tithonus*, *viz.*, *E. ida*, the only specimen I have ever taken with an extra spot (though this appears to be not uncommon in Dalmatia,

and there is another in the S. Kensington Museum from Morocco). I also exhibit specimens of *E. pasiphaë* where the extra upper spot is *very* common in the ♀s. In *E. jurtina* extra spotting rarely occurs beyond the division of the apical spot, but is sometimes found in var. *hispulla*, as exhibited, and a similar variation occurs in *E. janiroides*. In the genus *Pararge*, I exhibit *P. megera*, *P. maera* and *P. hiera*, with extra spots, which will serve to illustrate the former part of this statement, while I must content myself with *E. lycaon* as an illustration of the latter, though it would be easy to produce a dozen common species in support of it. The inference I draw from this is that the genera *Epinephele* and *Pararge* are more closely connected than is generally supposed; they are moreover two of the most generalised of the Satyrid genera, *e.g.*, in the pupal state, so that a near connection between them is not surprising. I will give further indications of this connection later.

We have still to consider the variation in the spotting of the underside hindwing. Variation in this matter occurs throughout the range of the species, but the spots become generally less conspicuous, and often fewer, as we proceed south. The largest numbers of spots in the series with which I am acquainted is 7 (though 8 might be possible), the 7th, which is very rare, being close to the anal angle of the wing; the spots almost always present are ii, v, vi (counting from the costa), though the whole series from i-vi, is fairly frequent, and this with the omission of iii, or of iii and iv, is probably the most usual form of all. Many other combinations however are found; I have made a careful analysis of my own specimens and of Capt. Graves' from Bude; these show 13 different combinations. The first to disappear is almost always spot iii, followed by iv, in the rare cases in which iii is left when any other has disappeared it seems always to be present on one side only, and there is generally something abnormal about the other markings. Some of these spots are sometimes surrounded by a dark ring, and occasionally some of them are slightly lanceolate. Spots i and ii, occur in one patch of dark colour, and iv, v, vi, in another; between these the light colouring is pushed outwards and joins another light coloured patch of not quite the same shade, the actual central light band of which the lower portion is really a part, being interrupted in *E. tithonus* by the upper patch of dark colouring containing spots i and ii, and this is occasionally (I think always when spot iii is present and any other absent) prolonged so as to include spot iii. This is the typical Epinephelid spotting, and is best illustrated by *E. pasiphaë*, by far the most constant species, in fact I have only seen one specimen of this species in which there was any variation in the spotting of the underside hindwing, where the two upper spots were almost entirely suppressed. Here the real light central band, the second light patch which it joins, and the break below the second spot are all plainly visible. This is what I mean by the typical Epinephelid marking, and it applies even to those species in

which spots are rare, such as *E. ida*, or even the one in which they are I believe unknown, *E. lycaon*. The Indian species which closely resemble *lycaon* on the upper side are almost as conspicuously spotted as *Pararge achine* beneath, and follow the same scheme exactly. I have only found traces of the spotting of *tithonus* in one specimen of *ida*, from Tetuan, but there are some in the S. Kensington collection from the neighbourhood of Florence in which these spots are almost conspicuous. These also follow the Epinephelid scheme. The upper dark patch is as a rule so obsolete in *E. jurtina* that the scheme is difficult to trace, and indeed, when the spotting is absent, all that can be said is that there is nothing to contradict it, but the spots when present do follow the Epinephelid scheme, and I have placed next to the typical *E. pasiphaë* a ♀ *jurtina* of the Spanish *hispulla* form in which the whole scheme is quite distinguishable. In *E. janiroides* it is readily discoverable. I have only seen one specimen of *E. murray* in which these spots occur, and in that one they resemble *jurtina*.

I was led to the study of the question by an observation in Tutt's "British Butterflies" (p. 408), which, from one whose strongest point was accuracy, was fairly astounding. It runs thus:—"the arrangement of these spots on the hindwing [of *E. tithonus*] is very different from the arrangement of those in *E. janira* (when present), but bears a marked resemblance to the arrangement in the *Cœnonymphidi* and *Erebiidi*." As a matter of fact the very reverse is the case. The scheme of spotting in the Cœnonymphids is essentially different. The break there occurs immediately after the costal spot, as is clearly seen in such species as *C. dorus*, *C. corinna* and *C. oedipus*, where it is most conspicuous, being scarcely less so in *C. tiphon*, *C. arcania*, *C. iphis*, and *C. hero* (see Plate II.); in others, such as *C. satyrion* and *C. iphioides*, where the whole row appears less broken, the identity of the scheme is brought out by the fact that the spot immediately below the costal is the first to become obsolescent, and that when a break does occur it is at the same point as in other Cœnonymphids, and is not in the least Epinephelid, (see Plate II.). The Erebiid scheme is more difficult to place; when spots occur in this tribe they are generally continuous, but they are in many species entirely absent; in the species however in which they are most conspicuous, *E. flavofasciata*, they bear a very close resemblance to *C. satyrion*, the first spot to disappear (when any do so), being the next below the costal. The two examples of this species here exhibited should be compared with the half dozen specimens of *C. satyrion* immediately above them (see Plate II.). In other cases the series frequently ends above no. iii, and I know of no instance in which a break occurs at the same point as in the Epinephelids. On the other hand, the spotting of the underside of *Melanargia* is characteristically Epinephelid (see Plate I.); I exhibit as examples *M. galathea*, *M. lachesis*, *M. arge*, *M. syllius*, and *M. ines*, but the whole genus bears out this

connection. In some species, *e.g.*, *M. syllius*, spot iii occasionally appears as in *E. tithonus*. The spotting of the underside of the hindwings of *Pararge* is also essentially, though far less conspicuously, Epinephelid. This is very clearly seen in *P. achine*, but the break occurs in the same place in other species also. *P. megera*, which is exhibited, shows up this point (see Plate I.); *P. maera* and *P. hiera* are so identical with it in this respect that I have not thought it worth while to show them. The spotting of *P. aegeria* is generally difficult to see, but in the example shown the scheme is fairly easy to trace. *Aphantopus hyperantus*, which bears a resemblance to *C. œdipus*, and is generally regarded as a Cœnonymphid, verges more towards the Epinephelid scheme, and towards the Epinephelid rather than the Parargid form of it; the 3rd spot, when it occurs, being connected with i and ii, as in *Epinephele* (when not completely isolated), and not with iv, v, vi, as in *Pararge*.

It may be said that I am laying too great stress on mere wing-markings, but in most Rhopalocera the underside of the hindwing is the part chiefly exposed when at rest, and its colouring, and yet more its pattern, is often a matter of literally vital importance to the insect. Again, pattern, especially in the matter of spots, is closely connected with neuration, and further, the points which I am urging this evening depend not on superficial resemblance, but on essential derivation. I may add that I have not pressed any, and indeed have only alluded to some, of the conclusions I am myself inclined to draw from the facts here set forth, and I am quite satisfied merely to suggest a line of investigation from which I think more important information may be obtained with regard to phylogeny than is usually supposed to be the case.

[Note.—An accident unfortunately occurred to the specimen of *E. jurtina* exhibited, which rendered it unavailable for the plate, and the specimen figured does not show the dark shade at the costa separating the two light portions, though the arrangement of the spots is characteristic. The spotting of *E. pasiphaë* in Plate I. and the break in the spotting of the second figure of *E. flavofasciata* in Plate II. do not come out very distinctly, but are sufficiently clear under a hand-glass.—G.W.]

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

Read January 28th, 1919,

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

GENTLEMEN, having heard the Council's Report I think that notwithstanding the difficulties created by the war, we may congratulate ourselves on the work of the Society during the past year. The weather of last summer was disappointing for collecting; several insects were more or less abundant, especially *Tortrix viridana*, and *Hibernia defoliaria*, whose larvæ played havoc with the trees in spring, but many good varieties of *Agriades coridon* and *A. thetis* have been captured.

Obituary for 1918.

F. de Vismes Kane, born in 1840, died in 1918, had been a member of our Society since 1886, he was also President of the Royal Academy of Science of Dublin and a Fellow of the Entomological Society of London. He published an up-to-date guide to the butterflies of the western Palaearctic Region in 1885, also the Catalogue of the Lepidoptera of Ireland, continued from 1893-1901. He was a frequent contributor to the "Irish Naturalist." His work on "European Butterflies" has been some time out of print, but he had given permission to our member Mr. Rowland-Brown to revise it and bring it up to date.

R. S. Standen, who had been a Life-member since 1873, was very seldom at our meetings during the past few years on account of the distance of his residence from town, but formerly he was a very regular attendant, and was President in 1879.

A. C. Vine, who had been a member since 1889, lived at Brighton, and had made a fine collection of Lepidoptera from that district.

George Brooks was elected a member in 1913, he was an excellent field entomologist, a frequent attendant at our meetings, and a member of Council at the time of his death.

C. P. Emmett, who had been a member since 1914, was killed in action.

Outside our own ranks but familiar to many of you I must mention:—

The Rev. Frank E. Lowe, born Nov. 27th, 1853, died July 21st, 1918, at St. Stephen's Vicarage, Guernsey, where he had lived since 1880. Entomology is the poorer by his death, and he did much to add to our knowledge of the Lepidoptera of the Channel Islands.

Gaston Allard, one of the doyens of the Entomological Society of France, died at the age of 81, at La Maulevrie, near Angers, in January, 1918: he made a study of the Coleoptera and Orthoptera, chiefly from Algeria, and was engaged on the fauna of that country with M. René Oberthür. He was famous as a dendrologist and as a founder of a great arboretum, which he has bequeathed to the Pasteur Institute of Paris.

W. H. Harwood died at Sudbury, Suffolk, on December 24th, 1917. Born at Colchester, July 25th, 1840, he from an early age developed a taste for entomology, and he was one of the first to adopt the method of "sleeving" larvæ on food-plants. Of late years he had studied Coleoptera and Hymenoptera-aculeata, and the "neglected Orders" in general.

The war has naturally curtailed the issue of new works on Natural History, but amongst those recently published a few may be mentioned.

"Memoir of the Rev. O. P. Cambridge, F.R.S.," a small volume, by his son, A. W. P. Cambridge. As you all are aware, the late O. P. Cambridge was a great arachnologist, and one of his best known works is the "Spiders of Dorset," in which were described about 500 species; he also worked out the spiders for Godman and Salvin's, "Biologia Centrali Americana," and for the Yarkand Mission.

The "Wonders of Insects," by J. H. Fabre, translated by A. T. de Mattos and B. Miall is another of this fascinating writer's works.

"Études de Lépidopterologie Comparée," fasc. xiv., by C. Oberthür, with pp. 469, and 19 col. plates, dated September, 1917. This is a wonderful publication, not merely for the magnificence of the plates, and the scientific value of the contents, but because in this fourth year of the war, such an addition to our libraries is possible at all.

The "Biology of Dragonflies," by R. J. Tillyard, M.A., B.Sc., pp. xii.+398, with 4 plates and 188 text figures; for those interested in the Odonata or Paraneuroptera, it is invaluable, as it provides a trustworthy guide to the external and internal structure of dragonflies, at various stages of their life-histories.

Dr. R. C. L. Perkins has discovered several new species of *Stylops*, and describes the changes brought about by stylopization. See "E. M. M.," 1918, March, April and May.

Mr. R. A. S. Redmayne mentions the flying of a ♀ *Saturnia paronia* in the daytime; authors had previously mentioned that it only flies at night.

Mr. R. S. Bagnall has found, at Torquay, a new Campodea (*C. devoniensis*).

Dr. Chapman, F.R.S., has succeeded in breeding through all its stages *Lycaena alcon* in ants' nests. This is another triumph for him. He has also added two new species of *Lycaenidæ* to the fauna of Europe.

In the "Trans. Ent. Soc. London," for 1917, Pt. 1, a former member of our Society, Mr. P. A. Buxton, has written on the "Protocerebrum of *Micropteryx* (*Eriocephala*) *calthella*," the smallest insect of which the brain has been investigated in any detail. As is well known, most entomologists regard *Eriocephala* as a primitive Lepidopteron, though there is really quite as good ground for regarding it as a Trichopteron.

Dr. Chapman has raised *Micropteryx* to ordinal rank (Order *Zeugoptera*). "Trans. Ent. Soc. Lond.," 1916, pp. 310-14.

There has also been read before the same Society, a very good Paper on "The Eyes of Butterflies," by Dr. Eltringham, which no doubt will be studied with great interest when it is published.

I now come to the chief part of my address. I thought as a subject, that would not be unacceptable in the times we are passing through, that Economic Entomology and its bearings on our nation, would be an interesting as well as a profitable topic to take, so many of us, especially those who have taken allotments, having been compelled to notice the depredations caused by the various insects that damage our crops and garden produce.

The late Andrew Murray was one of the first to write on the subject, and his volume "Aptera," published in 1878, on Economic Entomology is useful, but describes wingless forms of insects only.

The late Miss Eleanor Ormerod, whose writings were from 1878-1901, did more to give an impetus to the study of noxious insects in this country than any previous writer, and her "Manuals of Injurious Insects," vols. i. and ii., dealing chiefly with crops, and vol. iii. with trees, are very useful.

The late Frederick Enock, in his popular lectures, did much to assist, especially with regard to the depredations of the Hessian Fly on corn, in this country.

Economic Entomology is a subject which, I suppose, most of us have often wished that we knew more about, and that we knew of some specific which would have kept certain irritating pests from us. Often times when eating fruit, which appeared quite perfect from the outside, our palates have been quickly marred by coming across the work of a larva, such as that of the Codling-moth. Or again, our roses which some of us take such an interest in, how often have we had to lament the loss of fine blossoms, by various larvæ, chiefly of *Tortricidæ*; and when we look at our fruit and vegetables, what a wide field is open, to find out the best methods of combating pests.

As a country we have to rely on immense supplies of food from abroad, this is not an unmixed blessing, as we have imported with the produce many insect pests.

Some idea of the importance of this subject may be gained from the following figures. The *Phylloxera* on the vine causes an annual loss in France which a hundred millions would not cover, and in this country the annual loss caused by the ox warble-fly *Hypoderma bovis*, has been estimated on good evidence at seven millions sterling; in Aberdeenshire the diamond-back moth, *Plutella cruciferarum*, causes an annual loss to root crops of £90,000.

In New York State the loss caused by the codling-moth, *Cydia pomonella*, amounted to three million dollars; yet these figures are nothing compared to the losses caused by scale insects, locusts and other pests. In 1881, the turnip flea (*Phyllotreta nemorum*) caused more than £500,000 loss in England and Scotland alone by eating young seedling turnips, cabbage and other *Cruciferæ*. The Mexican cotton boll weevil (*Anthonomus grandis*) if unchecked entails an annual loss of 250,000,000 dollars.

The literature of the subject, especially from the United States,

is vast. There no pains nor expense is spared in combating the noxious pests by various chemicals, traps, etc.

Prof. T. B. Smith, in 1896, published in Philadelphia, a work on Economic Entomology dealing, in Pt. I, with classification and structure of insects. With the different Orders of Insects in Part II., and in Part III., with various Insecticides, Preventives and Machinery. This is perhaps the best general treatise on the subject so far published.

In this country we have at last stirred ourselves, and the Imperial Bureau of Entomology, with Viscount Harcourt as Chairman, and a powerful committee among whom Prof. Poulton and Mr. J. C. F. Fryer are our own members, issue in monthly numbers the "Review of Applied Entomology," which deals chiefly with the Medical and Veterinary aspect of the subject, and the "Bulletin of Entomological Research," which deals with insects injurious to mankind as well as to crops, etc., in Africa and other foreign possessions.

T. V. Theobald, of the Wye Agricultural College in Kent, has written several volumes on the subject.

"A Text book of Agricultural Zoology," by the Trustees of the British Museum, and three Reports on Economic Zoology, *viz.*, "Diseases caused by Horse Worms," "The parasitic Diseases of Poultry," and "Animal Parasites of Man," are similar works which are worthy of note. C. A. Ealand's, "Insects and Man," 1915 (Grant Richards) is full of useful information. Patton and Cragg's "A Text Book of Medical Entomology," Published in 1913, by the Christian Literature Society of India; G. S. Graham-Smith's "Flies and Disease" Non-Bloodsucking Flies; E. Hindle's "Flies and Disease" Blood-sucking Flies; both published in 1914; Aeneas Munro, "The Locust Plague and its Suppression," 1900; "Trypanosomes and the Trypanosomiasis," by A. Laveran and and F. Mesnil, translated by David Nabarro, M. D. Lond., a work dealing with man and disease propagated in many cases, in the first instance, by flies; "Insects and Pests of the Farm and Garden," by F. Martin-Duncan, are all valuable additions to the subject. Then there are the large number of leaflets issued by the Board of Agriculture, now more than 300 in number, which have been found of great use by allotment holders during the past three years.

As Dr. Folsom well says:—"The subject matter of this branch of science is not concerned with insects alone, nor with plants

alone, nor with farming alone. One may be a most excellent entomologist, or botanist, or he may have the whole theory and practice of agriculture at his tongue's end, and yet be without knowledge or resource, when brought face to face with a new practical problem in economic entomology. The subject is essentially that of the relations of these things to each other, of insect to plant, and plant to insect, and of both these to the purposes and operations of the farm, and it involves some knowledge of all of them.

"The life-histories of insects lie at the foundation of the whole subject of economic entomology, and constitute in fact the principal part of the science, for until these are clearly and completely made out for any given injurious species, we cannot possibly tell when, where, or how to strike it at its weakest point. Besides this, we must also know the conditions favourable and unfavourable to it, the enemies which prey upon it, whether, bird or insect, or plant parasite, the diseases to which it is subject, and the effects of the various changes of weather and season; we should make in fact a thorough study of it in relation to the whole system of things by which it is affected.

"Without this we shall often be exposed to needless alarm and expense, perhaps in fighting by artificial remedies an insect already in process of rapid extinction by natural causes, we may even for lack of this knowledge destroy our best friends under the supposition that they are the authors of the mischief which they are really exerting themselves to prevent, and we must also learn where strictly artificial measures can be used to advantage to destroy or prevent them; it is obvious that of the life-histories of insects, close, accurate and continuous observation is necessary."

Injurious insects occur among the following orders, Coleoptera, Hymenoptera, Lepidoptera, Diptera, Hemiptera (both Heteroptera and Homoptera), Orthoptera, Neuroptera, Thysanoptera and Aptera.

But whilst there are many injurious insects, there are also many beneficial ones, and Folsom quotes a case in which the fluted-scale has been nearly exterminated in California, by the lady-bird beetle, *Novius cardinalis*; and how over 3000 specimens of a Hymenopterous parasite, *Copidosoma truncatellum*, were reared by Giard from a single *Plusia* larva.

Beneficial insects must be also considered. The most important friends of the farmer and gardener are the Hymenopterous families

Ichneumonidæ and *Braconidæ*: the Dipterous families *Syrphidæ* and *Tachinidæ*; and the Coleopterous families *Coccinellidæ* and *Carabidæ*.

Munro mentions that a fungus *Empusa grylli* inoculates locusts and is very destructive; and the Cape Government Bacteriologist supplies locust fungus; the fungus belongs to the Entomophthorea group.

The two chief insecticides advocated for spraying, which must be done twice, with a short interval to be at all efficacious, are arsenate of lead and Paris green; and for root-feeders bisulphide of carbon.

Birds such as Fly-catchers, Tits, Wrens, Rooks (destroying the larva of the crane-fly *Tipula oleracea*), insects such as the larvæ and imagines of Lady-bird beetles (*Coccinella*) (feeding on Aphides), the larvæ of Syrphid flies (help to keep down Aphis), larvæ of *Chrysopa*, and many other Hymenopterous and Dipterous insects keep in control our noxious pests.

Messrs. J. Hartley Durrant and Col. W. W. O. Beveridge, in their interesting "Report on Army Biscuits, and the temperature* necessary to be obtained in the destruction of the imported Flour-moth, *Ephestia kühniella*," show that it is the ova that are so difficult to destroy in this and in weevils generally. In this case it was found that *E. kühniella* has five parasitic species of Hymenoptera that prey upon it.

It was Le Baron, in 1870, who recommended syringing an apple-tree with Paris-green for canker worm, and what a revolution the use of that has brought about in the control of pests in America.

An ant, *Solenopsis molesta*, is both a scavenger and a pest, as it preys on chinch-bug eggs, and on the larvæ of the codling moth, but it also feeds on saccharine substances, and the tender leaves of corn.

Lights for attracting the moth *Peridroma margaritosa* = (*saucia* of Hübner) have proved very successful in America, where this species is a great pest; 96,046 were captured by the Arnold Dump-trap light at a cost of 20 cents a thousand. Of the beetle genus *Lachnosterna*, 40 lamps, from the first flights in May until late in June, succeeded in capturing no less than 1,036,400.

Nematode worms were so efficacious in destroying the elm pest

*The temperature was 60C = 140 F; it was found necessary to invent some form of instrument, which would indicate only the heat of that portion of the biscuit with which it was in direct contact, and to ensure other sources of external heat were entirely excluded. A special form of Thermo-couple was brought into use.

Saperda tridentata, that the death rate was 100%; the experiments were made in placing Termites in soil known to contain Nematodes, and in 12 days all the Termites had died, due to this artificially induced parasitism. The injection of cyanide of potassium, into the tissues of plants (*Coleus*) and trees, as the elm, apple, pear, plum, apricot, willow and pine, as an insecticide against borers and plant parasites, has been tried in Kansas with success, and the trees treated with cyanide, seemed to have a darker, healthier foliage than their neighbours.

The larvæ of a Coccid-feeding moth, *Holcocera iceryaella*, feed on *Lecanium persicæ*, *Saisettia oleæ*, and *Aspidiotus camelliæ*.

In the May number of the "Bulletin of Ent. Research," 1918, our member, Mr. C. B. Williams, details the injury caused by the Sugar-cane Froghopper (*Tomaspis saccharina*, Distant) in Grenada. A Trinidad Syrphid fly (*Salpingogaster nigra*), might be a control, but no maggots of this were found; if present, they were too rare to be of any value as a control; the Green Muscardine Fungus (*Metarrhizium anisophæ*) was also too rare to be of any value. Attid spiders, were very scarce in the canes. A few examples of the predaceous grasshopper, *Xiphidium fasciatum*, which is known to eat froghoppers, were found in Grenada, but it does not appear to enter canes. The probable native natural controls seemed to him inadequate. He took with him to Grenada 2 or 3 lbs. of artificially prepared spores of the Green Muscardine Fungus, mixed with rice flour; the spores were distributed over the canes, and although he was unable to see the result himself, Mr. Berkeley, the Manager, reported that a number of dead infected hoppers were found. The froghoppers appeared in 1917, but not to the same extent they did in 1916.

R. S. Bagnall, in the same "Bulletin," mentions and describes two species of *Physothrips* (*Thysanoptera*) injurious to tea in India, and also a Rubber Thrips (*Physothrips fuentumiæ*, Bagn.) and *P. marshalli*, the former from Uganda, the latter from the Gold Coast, and *P. kellyanus* from N. Queensland.

Captn. Davidson, D.Sc., discusses some practical methods adopted for the control of flies in the Egyptian Campaign. Flies are present in Egypt all the year round, although during the height of the hot weather and again about December they are not so numerous, but they were to be seen in hundreds on men's backs and on horses. When the troops arrive at a new camp area these flies soon lay eggs, and unless strict sanitary precautions are taken, a fly plague results. Special treatment of breeding-places

and destruction of flies by spraying, poisoned bait, traps, etc., were carried out. The three favourite breeding-places for flies of the house-fly type are horse manure, accumulations of camp and cook-house refuse, and latrine trenches, while those of the blue-bottle type favour putrefying animal matter. Close packing and spraying the manure with sodium arsenite killed the flies in enormous quantities Burning was of course quite efficacious where practicable.

The numerous items I have just cited will give some idea of the multifarious character of the damage caused by insect pests and of the ingenuity and study necessary to combat the evil.

Whether it is possible by methods of plant breeding to produce varieties having greater freedom from the attacks of insects than those now in use, is a field in which much still remains to be done. Fernald mentions one case where two New Jersey nurseries apparently spread the San José Scale over the country in their attempts to find a *Curculio*-proof plum; thus one has to be careful in attempting to combat one pest, to prevent another one taking its place.

Insect outbreaks and their causes are as yet almost entirely without explanation, except in such general terms as to leave us uncertain when to expect them, and how to prevent or prepare to meet them as before. We guess they may be due to climatic conditions beyond our control, or perhaps to an unusual absence of the natural enemies of the insects concerned, if climatic conditions are involved, we lack any knowledge of what these are. In 1917, the "Whites" especially *Pieris brassicæ* were very numerous, but the larvæ of the latter were so parasitized by the small ichneumon fly—*Apanteles glomeratus* to the extent of 90-95%,—that in 1918 *brassicæ* was comparatively scarce.

J. W. McCulloch, in "Journal of Economic Entomology," vol. viii., p. 245, gives further data on the parasite of the Chinch Bug, *Eumicrosoma beneficia*, Gahan, the egg of the former being largely parasitised, ranging from 20 to 40 per cent. In the experimental work it was shown that the period of oviposition of the Chinch Bug covered about 2 months, while the life-cycle of the parasite extended over a period of only 2 or 3 weeks. Thus the eggs of a single female Chinch Bug were exposed to about 3 broods of parasites, while the eggs of one brood of Chinch Bug were exposed to 4 or 5 broods of parasites.

From this data it is conservative to estimate the parasitism in the

field in Manhattan, Kansas, during 1913, to have been at least 50%. The parasite is a very small Hymenopteron.

The researches of Bachmetjew upon the temperature relations in insects, followed by those of others who have applied his discoveries to the preservation of life during the winter, are full of significance.

Insecticides are most essential, but the difficulty often arises, how far can one use them to the best advantage, so as to produce something which will kill the pests without damaging the plants; it is as well to remember that spraying should be done on the first appearance of Aphis, and not wait until the plant is smothered by them before commencing operations.

The possibility of successful introduction and spread of insect diseases through the agency of man has been given some attention for quite a long time.

Experiments in this way in combating Locust plagues in Arabia, although very few have been attempted, have not been without beneficial results; the introduction of bacteria into the locusts bodies, which spreads rapidly from one insect to another, has been fairly successful so far.

The terrible diseases to which so much attention has recently been drawn on the Continent of Africa there is only time left to mention. You are all aware how closely related they all are to insect life. Each one of them depends on a particular species of the Diptera.

Nagana or "Tsetse" fly disease, spread by a Dipteron of the genus *Glossina*, says Bruce, who discovered its parasite, is a specific disease which occurs in the horse, mule, donkey, ox, dog, cat and many other animals, and varies in duration from a few days or weeks to many months. It is invariably fatal in the horse, donkey, and dog, but a small percentage of cattle recover, and its ravages in Africa, have been, and are, very great. Westwood was of opinion, that the tsetse-fly was the cause of the fourth plague of Egypt, and the fifth plague (the murrain of animals) would thus have been the result of the fourth. The disease is caught chiefly during the rainy season. Stagnant water is a good deal responsible for the breeding of flies, especially that of *Stegomyia fasciata* the yellow fever host. Innoculation appears to be one of the chief preventives in some of these fly-spread maladies.

The spread of sleeping-sickness is due to the attacks of the Dipteron *G. palpalis*, and the dreaded Surra by those of *Trypanosoma evansi*.

James Waterston has succeeded in breeding several species of parasitic Chalcid from *Glossina morsitans*, which is also preyed upon by the Hymenopteron *Mutella glossinæ*, a fact which may lead to a future control of the disease.

In conclusion, I desire to thank you all for the honour you have conferred on me in again electing me your President, and to thank the Council and Members, and especially my Co-secretary, Mr. H. J. Turner, for the kind assistance given me during my past year of Office.

My thanks are also due to Mr. F. Martin-Duncan, Librarian of the Zoological Society, for kindly looking through this address, and making a few suggestions.

ABSTRACT OF PROCEEDINGS.

FEBRUARY, 14th, 1918.

Mr. STANLEY EDWARDS, F.L.S., President in the chair.

The death of Mr. G. Brooks, a member of the Council, was announced.

Mr. Bowman exhibited a series of female *Hibernia defoliaria* from Epping Forest in which the abdomen was jet black, while the head and thorax were still somewhat mottled. One specimen however had a black thorax like the abdomen and only traces of mottling on the head. They were taken in December last. He stated that out of the first 200 females taken he had met with only 4 black aberrations, *i.e.*, 2%, but reaching an area, where last year he had met with this form, he found 60 more females, of which 8 were of the dark aberration, thus bringing up the per centage to 4. In the previous year, 1916, he had only met with 1% of the aberration. They were all found in the daytime when it was almost impossible to meet with a male.

Mr. Main exhibited the burrow of the Coleopteron, *Nebria brevicollis*, with the insect, and stated that after the last frost the small mounds of the débris thrown from the holes were very conspicuous in every part of Epping Forest under trees, especially where the burrow was made in the red sand, which contrasted conspicuously with the grey general surface of the ground. The particles were at first placed about an inch from the mouth of the burrow, and gradually the opening was covered, after which further particles were pushed from below up into the mass. Mr. Blair remarked that the mounds were very common on Hampstead Heath in colonies, where the ground was clear of vegetation at the foot of hedge, wall and tree.

Mr. Robert Adkin exhibited an original copy of Christopher Merrett's "Pinax Rerum Naturalium Britannicarum," printed in London in 1667. He said it was a book of some interest as being, he believed, one of the earliest, if not the earliest attempt of an English author to compile a systematic catalogue of the British

fauna and flora. Upwards of two-thirds at the commencement of the book is occupied by the flora, arranged in alphabetical order under the generic (?) names, then follow, in the order named, the "Quadrupeda," "Aves" and "Pisces," which last mentioned order he divides into several sub-divisions or families, one of which, "Cetacei Generis" includes the whales and porpoises; another, "Crustacei," the crabs, sea-urchins, etc.; while yet another, "Testaceii" takes in the oyster, periwinkle and so forth. Then follow the "Insecta" and "Serpentes," and a few pages devoted to minerals, and a list of some dozen authorities, to which he refers in the body of the work, bring the book to a close.

Mr. West exhibited a large locust, *Schistocerca peregrina*, found on a ship coming from W. Africa.

Mr. Hy. J. Turner exhibited specimens of *Epinephele lycaon* from the French Alps of the typical coloration, the males nearly uniform dark yellow-brown with a small darker apical spot, the females with a conspicuous orange-brown disc and lighter antemarginal band on the forewings, with two (or more) large unpupilled black spots, and a pair of the form known as *lupinus*, from Cyprus, in which the ground colour in both sexes is of a deep blackish-brown, the scaling being much denser and rougher, especially on the hindwings. In the female the orange-brown colour is confined to a ring around the large black spots of the forewings. The Cyprus specimens are on the whole larger and more squarely shaped. The stripe or patch of androconial scales on the disc of the forewings in the *lupinus* is larger and more prominently furry.

Mr. B. Adkin exhibited a series of the males of *Agriades thetis* (*bellargus*) showing the gradation in colour, and contributed the following note:—"A month ago I exhibited specimens of *Agriades coridon* with the object of proving that blue-scaled forms could be found graduating through *semi-syngrapha* to ab. *syngrapha* in almost continuous succession. To-night I have brought some *Agriades thetis* with ab. *nigra* and intermediate forms, which would appear to indicate the possibility of a similar sequence. The left-hand row shows the paler form graduating to ab. *nigra*, and the third specimen, though grey, has many blue scales. The right hand row shows the darker form. In a good light the fourth and fifth specimens show some dark scales, while the last specimen is about half black and half blue, being one of several similar specimens taken by Mr. Newman in East Kent during 1916.

"The dark scaling of *Agriades thetis* is stated to be due to the

curving of the scales.* It is not impossible that this might occur when the wings were drying under certain conditions of atmosphere, or it might perhaps be induced in the pupa prior to the emergence of the perfect insect. Whether it can be artificially produced I am unable to say. It would seem that in certain seasons the dark-scaled forms are less infrequent than in other years."

It was remarked that when the "clouded" example was held sideways the scales appeared normal in colour, lending credence to the suggestion that they had somehow become curled.

The President exhibited various species and forms of the *helenus* group of the genus *Papilio*. Moore has placed these in the subgenus *Charus*.

In this group "tails" are almost always developed in the hindwings, and the sexes are similarly marked. The exhibit included *P. chaon* from N. India, *P. helenus* from India, *P. iswara* from Malacca, and its race var. *araspes* from Borneo, *P. fuscus* (*serenus*) from the Moluccas, with the race var. *prexaspes* from Malacca, var. *beccarii* from Dutch New Guinea, var. *indicatus* from British New Guinea, and var. *capaneus* from Australia, and *P. albinus* from Dutch New Guinea.

A short discussion took place on the "Introduction of non-indigenous species" into the country. It was generally considered that all introductions of this kind should be recorded in detail, so that full observations could be made of the experiments and their results.

FEBRUARY 28th, 1918.

EXHIBITION OF LANTERN SLIDES.

The President exhibited slides showing (1) the development of the wings in *Pieris brassicae;* (2) various forms of antennæ in Coleoptera and Lepidoptera; (3) tripectinate antenna of *Abantiades argenteus*, an Australian Hepialid; (4) the hyper-metamorphosis of *Epicauta* (Col.); (5) the antenna of *Talarocera nigripennis*, a Tachinid (Dip.); (6) wings and gizzard of the cockroach, *Panchlora orientalis;* (7) a pupa of *Micropteryx semipurpurella* showing the pupal jaws; (8) various androconial scales of Lepidoptera; (9) the neuration of *Castnia* with that of other Lepidopterous groups for comparison.

* E. A. Cockayne, "Trans. Ent. Soc. Lond.," 1917, p. 165.

He also showed a slide of "Pædogenesis" as exhibited in the larva of *Miastor*, a Cecidomyiid (Dip.), and communicated the following note :—

"In *Miastor* and some species of *Cecidomyia*, young are produced by the larva. This extraordinary form of parthenogenesis is termed 'pædogenesis,' and is limited apparently to the family *Cecidomyiidae*. The pædogenetic larvæ of *Miastor* develop before the oviducts have appeared, and escape by the rupture of the mother. After several successive generations of this kind the resulting larvæ pupate and form normal ♂ and ♀ flies. The pupa of a species of *Chironomus* occasionally deposits unfertilized eggs, which develop, however, in the same manner as the fertilized eggs of the species."—Folsom's *Entomology*.

Mr. Dennis exhibited slides showing various devices of plants for seed distribution, the sycamore, the wild geranium, the field forget-me-not, and the cleavers, with enlarged flowers of the butcher's broom ♂ and ♀, the figwort, bogbean, etc.

Mr. E. J. Bunnett exhibited lantern slides of the following British Orchids, of which he had found no less than nineteen species in the neighbourhood of Eastbourne.

Neottia nidus-avis, Bird's nest Orchis; *Listera ovata*, Tway-Blade; *Spiranthes spiralis* (*autumnalis*), Autumn Lady's-tresses; *Cephalanthera grandiflora*, Large White Helleborine; *Epipactis latifolia*, Broad-leaved Helleborine; *Orchis pyramidalis*, Pyramidal Orchis; *O. ustulata*, Dwarf Orchis; *O. morio*, Green-veined Orchis; *O. latifolia*, Marsh Orchis; *O. incarnata*, by some authorities considered a subspecies of the last; *O. maculata*, Spotted Orchis; *Aceras anthropophora*, Man Orchis; *Ophrys apifera*, Bee Orchis; *O. sphegodes* (*aranifera*), Spider Orchis; *O. muscifera*, Fly Orchis; *Gymnadenia conopsea*, Fragrant Orchis; *Habenaria viridis*, Frog Orchis; *H. bifolia*, Small Butterfly Orchis; and *H. virescens* (*chloroleuca*), Large Butterfly Orchis.

He also showed a group of Pollinia from seven of the above species; the Pollinia from *O. mascula* were much magnified, showing the elastic threads binding the grains of pollen together; and the Seeds of *Listera ovata*, × 20.

Mr. Hy. J. Turner exhibited a copy of Capt. Brown's "Butterflies, Sphinges and Moths," 1832, two volumes, with coloured plates remarkable for their crudeness both in colour and the shape of the figures. Mr. W. J. Ashdown said that there was a third volume which had been issued some years later than 1832.

Mr. Bunnett showed living clusters of the Liverwort *Junger-*

mannia bidentata, the acrocarpous moss, *Aulacomnium* (*Orthopyxis*) *androgynum*, and the golden saxifrage, *Chrysosplenium alternatifolium*, all from the London district.

It was reported that a swarm of bees had been seen at Balham to-day (February 28th), and that the hawfinch had been exceedingly common at Bromley this year.

MARCH 14th, 1918.

Mr. W. J. Ashdown exhibited a small collection of Cryptogams which he had recently acquired, preserved in an album, consisting chiefly of Mosses and Lichens, and drew attention to the specimens of Reindeer Moss (*Cladonia rangiferina*) and Iceland Moss (*Cetraria islandica*).

Mr. Hy. J. Turner exhibited a short series of *Colias edusa* var. *helice*, including three specimens from the Island of Cyprus, of which one was partly intermediate in colour, the ground of the forewings being tinged with pale orange and the hindwings suffused with the dusky orange, as in the female of *edusa*, but somewhat less intense.

He also showed a long series of *Luperina* (*Apamea*) *testacea* from Cornwall, all of the umbreous form, but showing much variation in depth and definition of markings. One or two specimens were nearly uniform without marking, and two specimens were only about two-thirds the average size. This form was afterwards found to have been named *rufa*.

Mr. Edwards exhibited a long series of *Gnophos glaucinaria*, taken by himself some years ago at Macugnaga. Several specimens were of the form called *plumbearia* by Staudinger. He also showed several species of *Setina* (*Endrosa*) from the same locality, including *S. irrorella* var. *andereggii* with confluent markings along the veins, and var. *signata*, the ≷ form, *S. kuhlweini* and *S. aurita*, and other insects.

Mr. Barnett exhibited a short series of *Hyria muricata* from Wanborough, near Guildford. They were of a very light ground colour compared with specimens obtained farther north.

Mr. K. G. Blair exhibited the larva of the Coleopteron *Nebria brevicollis* parasitised by a Proctotrupid sp. The parasite larvæ were full fed and had emerged from the back of their host, and were standing on their tails in a row ready to pupate.

Both Mr. Edwards and Mr. Blair had recently seen larvæ of a Syrphid fly, which had passed the winter in that stage. Mr. Blair had also seen a winter pupa.

MARCH 28th, 1918.

Mr. Ashdown exhibited a copy of Lister's edition of Goedart's "De Insectis in Methodum redactus cum notularum additione," published in 1685, and called attention to the plates, which contain early and mostly well-recognisable figures of many British species of insects in both larval and imaginal stages.

Mr. Newman exhibited a very fine series of *Cosymbia* (*Ephyra*) *pendularia*, mainly of the form var. *decoraria* (*subroseata*), in great variety, bred from ova obtained from wild females taken in North Staffordshire, and forced to emerge in January and February of this year. Only a few of those bred were typical, the very large majority were distinctly of the var. *decoraria*, and scarcely one specimen which could be called intermediate in coloration. Two examples were very aberrant, with the ground colour very similar to the general coloration of *Ephyra orbicularia*. Included in the range of variation of this form were almost all combinations and permutations of the dark grey and rosy areas, both of which suffusions varied much in area and in intensity from a minimum of very pale pink on the forewings to a maximum of rich rosy colour on all the wings. Scarcely a specimen but had the post discal line wide and in strong contrast to the rest of the wing. A good proportion had the marginal area beyond this line lighter in the dark shade than the area inside the line. This marginal area had a tendency to be divided into two areas, a lighter (outer) and a darker (inner), especially on the hindwings, which culminated in one very pretty specimen with a practically white outer half by the extension of the usually very small white markings along the extreme outer margin. One cannot do justice in mere words to the beauty of this fine series.

Mr. Hy. J. Turner exhibited a long series of *Phigalia pedaria* (*pilosaria*) from Sherwood Forest and other localities, the former taken this year. They included (1) specimens of the form with greenish coloration, one of which had traces of yellow; (2) specimens of the soft grey general coloration, very much dusted with black, not brown, with strong costal clouds, and markings fairly well defined, only one being much devoid of markings; (3) specimens of an olive-grey with much brown powdering and markings of a deep brown, no ochreous colour, the brown powdering very fine and lines quite clear cut; (4) specimens with ground black or blackish grey, one example is probably ab. *monotonia*, thinly scaled and semitransparent, no markings, deep black veins and no costal

blotches, the others with blackish ground have obsolescent markings and differ in depth of coloration; (5) specimens ochreous in general colour, two being only grey with ochreous tinge, they differ in the presence and definition of the markings; (6) two rich ochreous specimens with obsolescent and ill-defined markings respectively; (7) a specimen of a deep rich uniform brown-black devoid of markings.

Mr. Stanley Edwards exhibited the following species and forms of *Papilio* from the Malayan Region, and contributed notes on the exhibit.

Papilio nox, a purely Malayan butterfly, with strongly developed scent-organ (fold) on the hindwing of the ♂, and without tail to that wing, with its form var. *noctis* from Borneo, and var. *noctula*, having yellowish-grey vein-stripes, from Java.

Papilio paradoxa var. *cannus*, a form of an extraordinarily variable butterfly, which mimics a *Euploea*, from Borneo.

Var. *amynthor*, the form of *Papilio ilioneus*, with markings narrower, from New Caledonia.

Papilio encelades from the Celebes.

Dr. Chapman, Mr. Hy. J. Turner and others stated that they had seen numbers of *Gonepteryx rhamni*, *Vanessa io*, *Aglais urticæ*, *Pieris rapæ*, and *Diurnea fagella*, during the spell of very warm and fine weather of the past week. Mr. Newman reported that he had seen *G. rhamni* depositing its ova, and that the blackthorns, although not yet out in leaf, were showing green buds. He also reported that larvæ of *Arctia caja* were abnormally abundant, over 800 had been taken in a few hours; larvæ of *Arctia villica* were very scarce indeed, but larvæ of *Eutricha quercifolia* were very common. For some years he had turned out ova and young larvæ of numerous species in various places, but he had subsequently rarely found any number of resulting imagines in those localities. In West Kent he had seen *Brephos parthenias* flying in profusion during the recent warm spell.

APRIL 11th, 1918.

The evening was arranged for a Special Exhibition and discussion of the genus *Spilosoma*.

The President, in introducing the discussion said that the species of the genus *Spilosoma* (*sens. lat.*) were found throughout the Palæarctic Region, and even running into the Nearctic Region, where one species, *Spilosoma isabella*, was of economic importance, becom-

ing a destructive pest in the larval stage under favourable conditions, He said that in Staudinger's "Catalog," ed. iii. (1901), where the genus was greatly restricted, nine species were enumerated, with a number of local races and aberrations. Some 50 species have at various times been placed in this genus, which is now much restricted. South, in his "Moths of the Brit. Isles," includes only *S. lubricipeda*, *S. menthastri*, and *S. urticæ*, while Hampson, on the other hand, drops *Spilosoma* and many other genera to lump some hundred and twenty-six species together in the omnibus and unwieldy genus *Diacrisia*.

Mr. Ashdown exhibited a very varied series of *S. mendica*, and series of *S. lubricipeda* and *S. menthastri*, including some nearly spotless forms, with an example of the ab. *unicolor* of *S. lubricipeda*, with only one slight dot on the costa. It was taken in the Wye Valley.

Mr. Robert Adkin's exhibit included *Spilosoma lubricipeda* from various localities from Yorkshire southwards, together with series of crossings between the type and var. *zatima*. Also long series of *S. menthastri* from Scotland, Ireland, and various English localities. The Scotch and Irish specimens were all of a yellowish-brown tinge, grading to a distinct dark brown in the extremes of the former, while among the more southern English series were some smoky specimens, and some with heavily spotted hindwings. There were also several specimens approaching var. *walkeri*. He also showed series of *Spilosoma urticæ*, *S. fuliginosa*, and *S. mendica* with its Irish var. *rustica*.

Mr. A. Mera exhibited a cabinet drawer containing the genus *Spilosoma*, including—

S. mendica.—Bred specimens from Wanstead, one female having somewhat smoky ground colour, and two intermediate males produced by a cross between the white Irish form and the English type.

S. lubricipeda.—A variable series bred from larvæ of the Barnsley stock, containing the form var. *radiata* and intermediates. A series of clearly marked var. *fasciata*, three of which appeared in a batch which otherwise were all fine var. *radiata*, these three being the only ones which showed an appreciable variation from the parent forms of var. *radiata*. Two specimens with a darkening of the thorax after interbreeding several times. Also a specimen with black fringes obtained from another race. Examples from Southend, London District and Sligo were also included.

S. menthastri.—Yellowish forms from Sligo, lightly spotted forms

from the London District, and very dark, almost brown, specimens from Elgin.

S. urticæ.—A bred series from Rainham, Essex.

In his remarks Mr. Mera said that var. *radiata* he understood to be the form found in Heligoland, and suggested that the coast of Lincoln, from whence came our British *radiata* originally, had practically a similar climate. The Rev. G. H. Raynor bred the original from wild collected larvæ, and some of his own specimens were bred from the larvæ sent him by Mr. Raynor.

Mr. W. J. Kaye exhibited the same species and called attention to the smoky forms of *S. lubricipeda* from Ireland.

Mr. Sperring exhibited specimens of the same species including two quite unusual examples of *S. lubricipeda*, having both fore- and hindwings strongly smoky.

Mr. Edwards exhibited some of the early bred forms of the *zatima* type before the *radiata* form was bred in such quantities.

Mr. Leeds exhibited many aberrations of the British species of the genus *Spilosoma*, including:—

1. *Spilosoma menthastri*: Spots minute, large, or elongated, all wings well spotted, only forewings well-spotted, slightly banded, white ground, cream ground, etc.
2. *Spilosoma lubricipeda*: ab. *radiata*, ab. *zatima*, ochreous buff ground, rich cream ground, forewings cream, hindwings blackish ground, ditto hindwings whitish, well marked, very slightly marked, ab. *fasciata*, etc.
3. *Diaphora mendica*: var. *rustica*, a smoky form ♂, slightly dotted, heavily marked, nervures creamy, varied cream and dark suffusion, etc.

Mr. B. W. Adkin then read his notes on

The Genus Spilosoma.

The suggestion by our President that this Society should make and exhibition of the genus *Spilosoma* was very pleasing to me, and in case other members should not have prepared remarks upon the subject, I have ventured to bring a short note, which, with your permission, I will read.

The genus *Spilosoma*, as arranged in my cabinet, appears to include five species, *fuliginosa*, *mendica*, *menthastri*, *urticæ*, and *lubricipeda*; but according to South's little hand-book the two first-named species belong to other families, and the genus *Spilosoma* is restricted to the three species, which we know as "Ermines."

It may be more strictly correct to sub-divide the genus further,

by putting *lubricipeda*, L., in the genus *Spilarctia*, Butl., leaving only *menthastri*, Esp., and *urticæ*, Esp., in the genus *Spilosoma*, Steph. (Curt.). Also to include all these species together with *Diaphora mendica*, Steph., in the sub-family *Spilosominæ* of the family *Arctiidæ*.

For the purpose of this paper I have adopted South's view, and have taken the genus *Spilosoma* as including *menthastri*, *urticæ*, and *lubricipeda*, and no others so far as Britain is concerned.

The genus as thus defined constitutes a most interesting group. Two of the species, *menthastri* and *lubricipeda*, are among the very commonest of Lepidoptera, while the third species, *urticæ*, though less so, and less variable, will always provide a pleasant outing in August over the marshes, where an occasional larva may generally be found, among the bedstraw and water mint, in company with *Charocampa elpenor*.

Taking the species separately.

Spilosoma menthastri, the synonym of which *erminea*, Marsh., perhaps gives the name of "ermine" to the group, possesses two leading forms of colour; a white form and a buff form, with any number of intermediate shades. The markings consist of black spots or dots, varying in size and number, and in some cases joining together into lines. The buff form is known as ab. *ochrea*; more extreme forms with brown forewings as ab. *brunnea*, Oberth., and forms in which nearly all the dots on the forewings merge together to form radial streaks, as ab. *walkeri*. Many other names have been given. Any shade of colour may take any variety of marking, and no entomologist need fear loss of interest in catching or breeding the species. Two of the best aberrations in my collection, one with spots almost absent and one asymmetrical specimen with some of the spots merging into lines, were captured by myself on fences in the London district, while a batch of ova will generally yield something of interest, and a number of insects of large size if sufficient fresh food be provided. I am showing a drawer full of this species, and have indicated therein the two captured specimens mentioned above, the buff parents from which Mr. Harrison of Barnsley bred large numbers of the buff form, four specimens with the costa more or less black and some of the spots merging into lines, and two specimens from the Isles of Scilly, one with large spot on hindwings and one with smoky edges to all four wings. I have bred many specimens from those islands, but have been considerably disappointed in the result. There are several specimens of interest in my drawer besides those referred to.

Spilosoma urticæ has proved of less interest to me from a varietal standpoint, but has given me more trouble to complete my series. I have never had the species in sufficient numbers to form a true opinion as to its range of variation, but as far as I have seen the spots are never numerous and are sometimes absent. It has occurred to me that the male is disposed to show more markings than the female. I have never seen a streaked British form such as is said to occur on the continent, and to which the name *radiata*, Spul., has been given. A very lightly marked specimen of *menthastri*, such as the specimen I captured on a fence at Brentwood, to which I have previously referred, might easily be mistaken for this species, but while *menthastri* is rarely, if ever, without spots on the hindwing, more than one spot on a hindwing of *urticæ* is rare, to say the least of it, and the antenna of *urticæ*, which is white almost to the tip, seems to distinguish it satisfactorily from *menthastri*.

Spilosoma lubricipeda is the most variable member of the genus. It varies from pale buff, with very few black markings, to an almost totally black form. The many different forms provide an excellent opportunity for the ingenuity of those who desire to render their own names immortal by inventing names for intermediate forms. Some of our entomologists, such as Porritt, Tugwell, and Harrison, worked wonders in breeding this species, and in crossing the forms, some twenty years or more ago. The liberality of those gentlemen caused many most interesting forms to be common in our cabinets.

In such a case as this nomenclature of aberrations is a difficulty, but most of us recognise the barred form, ab. *fasciata*, Tugw.; the black form with a central yellow patch on forewing, ab. *zatima*, Stoll.; and the black form with only the thorax and nervures yellow, ab. *deschangei*, Dep. I am not at all sure whether the name *zatima* should not properly be restricted to the specimens with a black fringe, which are rather uncommon, but of which I am showing a complete row of each sex. If that be the case the somewhat similar but yellow fringed form might bear Haworth's name of *radiata*, and there may be room for Tugwell's name of *eboraci*. I must leave such matters to others, who have studied the subject more deeply.

I am showing a complete drawerfull of this species, which I have selected from considerable numbers, and I would like to call attention to two smoky forms of the type, which I purchased from South's collection, and to one which I regard as *deschangei*. I have indicated these by pointers. I am hoping to see among the collec-

tions of others the form with a black thorax, which is absent from my cabinet. The name *totinigra* has been suggested for this entirely black form, as *unicolor*, Homb., under which name it is said to be sold, is said to apply to a form in which all black spots are absent with the exception of the costal marginal spot nearest the base.

Although I feel it incumbent upon me to apologise for not dealing with this interesting genus in a more comprehensive manner, I hope that what I have said may have been of some interest and will lead to a valuable discussion.

Mr. Hugh Main exhibited, in one of his special observation cages, the burrow of *Atypus affinis*, the British representative of the "trap-door spider," which is fairly common in some parts of Epping Forest, and was noted some years ago as occurring on Hampstead Heath by the late Mr. Enoch, who made many observations on the habits of the species. Mr. Main pointed out that the burrow was lengthened by a tube made of the débris, and often covered by lichen extending for several inches. This structure was held by guy-ropes of web attached to neighbouring objects such as blades of grass. He stated that all the work was done at night.

Mr. Turner exhibited specimens of a local spider from Dorking, *Epeira umbratica*, which was almost jet black in colour with two conspicuous light coloured spots on the underside of the abdomen. They were met with on their cocoons on a tarred close fence, facing south. These cocoons were of white threads covered with scraps of the tar, and thus rendered more or less inconspicuous, especially when the spider was resting flattened down on them.

Mr. Frohawk exhibited four females of *Lycæna arion* from three different localities, showing divergence in ground colouring. Two bred specimens from Cornwall of a much brighter silvery-blue, the hindwings having only two moderately-sized spots. One from the Cotswolds without spots on the hindwings, and one from Barnwell Wold having large spots on the forewings, large discoidals and four well emphasised spots on the hindwings. The two latter were of a dull purplish blue.

Mr. Frohawk also exhibited *Pieris brassicæ*, a specimen with white streaks crossing the black apical portions, similar to the specimens described and figured in the "Entomologist," March, 1918, p. 57; the butterfly was in perfect condition, and was captured in July, 1900, at Southend, by Mr. F. G. Whittle; he also exhibited a bred specimen with asymmetrical markings.

Mr. Frohawk reported a specimen of the eastern *Papilio bianor* from Welling, Kent; probably an escape.

APRIL 25th, 1819.

Mr. Ashdown exhibited a few Lepidoptera bred by himself this year in the house, including *Amphidasis betularia* var. *doubledayaria*, *Diaphora mendica*, a very dark *Asphalia ridens*, a dark *Amorpha populi*, *Hylophila prasinana*, *Dasychira pudibunda* with very well-developed transverse lines, *Drepana lacertinaria* and *D. falcataria*. They had emerged from February to April, and all were from Surrey larvæ.

Mr. H. Moore exhibited the South American Nymphalids *Catonephile acontius* and *Nessaea* (*Catonephile*) *batesii*, both of which exhibit much sexual dimorphism.

Mr. Stanley Edwards exhibited the larvæ of *Hepialus humuli*, which had been dug up at the roots of grass at Blackheath; and the larvæ of a species of *Geotrupes*, also dug up at the same place.

Mr. Hy. J. Turner exhibited a series of *Teras contaminana* with the named forms var. *ciliana*, var. *rhombana*, and var. *dimidiana*, and pointed out a much less common, but equally distinct, unnamed form, to which his attention had been drawn by Mr. Sich.

Mr. Edwards reported having seen *Lycia hirtaria* at Blackheath. Mr. Leeds had seen numbers of hibernated *Vanessa io*, in about a mile he had counted 89 settled on the sallow bushes on the Sunday morning before Easter. Mr. Frohawk said that both *V. io* and *Gonepteryx rhamni* were abundant near Southend, Essex, and remarked on the scarcity of birds so far this year. He had also heard of *Euranessa antiopa* having occurred in Aberdeenshire.

MAY 9th, 1918.

THE ANNUAL EXHIBITION OF ORDERS OTHER THAN LEPIDOPTERA.

Mr. E. E. Green, F.E.S., of Camberley, was elected a member.

Mr. Ashdown exhibited a large number of Coleoptera taken by him in Surrey and Hants during 1917, and including:—*Leptura nigra*, *L. sexguttata*, *Stenochorus meridianus*, *Conopalpus testaceus*, *Orsodacna cerasi*, *O. lineola* var. *humeralis*, *Limonius minutus*, *Serica brunnea*, *Cychrus rostratus*, *Crioceris asparagi*, etc.

Mr. Frisby exhibited two cases of Exotic Hymenoptera, one con-

taining large species of Solitary, Fossorial and other Wasps, including some formidable looking *Scolia*, the other containing Bees from many parts of the world, including a large species of *Megachile* from S. Africa, which uses the mounds of the Termites as the sites of its burrows, and some fine *Euglossa*, etc.

Mr. West exhibited cases containing his collection of British Coleoptera of the families *Dytiscidæ*, *Gyrinidæ*, and *Hydrophilidæ*, containing fine series of nearly all the British species. The very rare species *Spercheus emarginatus* was from West Ham.

He also showed his collection of British Orthoptera. Most of the species of *Blattidæ* included immature examples. The rare grasshopper, *Metrœoptera* (*Platycleis*) *roeselii*, and the common cricket, *Nemobius sylvestris*, both from the New Forest, were pointed out.

Mr. Hugh Main exhibited the living larva of the tiger-beetle, *Cicindela campestris* from Epping Forest, in a burrow constructed in one of his observation cages. He also again showed the cage containing the British trap-door spider, *Atypus affinis*, and pointed out the now much lengthened aerial tube which the spider had since constructed.

Mr. Priske exhibited three sinistral specimens of *Helix nemoralis* from Bundoran, Co. Donegal, and also a collection of British freshwater shells, showing the considerable variation in *Limnæa peregra*.

Mr. H. Moore exhibited a number of species of Orthoptera, and contributed the following note:—

Colours of Orthoptera.—"Primarily the purpose of my exhibit is to show the diversity of colours found amongst the Orthoptera, but the motive that prompted it was to see how far they could be arranged in the order of the spectrum. The resources of a small collection, however, have not been sufficient for the purpose, but the selection I have been able to make supports the possibility of the idea, and, though of no scientific value, is at least a pretty and interesting way of demonstrating the attractiveness of the Order. The misfortune is, many of the colours are so evanescent, that after a few years in the cabinet very little remains of their former beauty, so that I have been unable to use some I intended. Other colours are fairly permanent, at least such I conclude from the fact that most of those I show are 20 and more years old, a little altered perhaps, but still far from shabby. We have no conspicuously coloured species in our fauna, but to those who care to look, a great diversity of colouring may be seen in several, for instance, *Stenobothrus elegans* is very varied, and as to *S. bicolor*, '*multicolor*' would be a truer name. But that is in reference to everything but their wings,

and my present purpose is with the wings only. In those with transparent wings, the colour is sometimes a mere flush, becoming in others more pronounced as opacity increases, but every dried specimen lacks the brilliancy of a living one. It will be apparent to all, that the specimens exhibited only show in a general way the colours designated, no pretence at exactness is claimed, though I do not doubt Nature can show examples through every grade of colour, shade, and tint.

"For RED.—I show the well-known European *Œdipoda miniata* (Pall.), Jura, *Acrotylus insubricus*, S. France, *Psophus stridulus*, Savoy, and *Hippiscus discoideus* (Serv.), Indiana. The so-called 'Coral' locust.

"ORANGE—YELLOW.—*Arphia xanthoptera* ♂ (Burm.), and *A. carinata* (Scudder). These two N. American species are orange in the male and yellow in the female. *Œdipoda flava* (Linn.), is a widely distributed, but chiefly African, species.

"GREEN.—There are plenty of green species, but comparatively few with green wings. Those species of *Phaneropterinæ*, whose wings are longer than the tegmina, have green tips, such as *Microcentrum laurifolium* (Linn.), N. America, *Phaneroptera falcata* (Sco.), Europe, and *Amblycorypha uhleri* (Brunner), N. America.

"BLUE.—*Œdipoda cærulescens* (Linn.), and *Sphingonotus azurescens* (Ramb.), are two well-known and striking species from France and Spain.

"INDIGO.—I have no pronounced examples of indigo, but the basal portion of the wings of *Phymateus morbillosus* (Linn.), seems to shade in that direction, and there is a flush of the same colour in an unnamed species from Demerara.

"VIOLET.—I have no violet examples, but as purple is not so very far removed, perhaps *Cyrtacanthacris septemfasciata* (Serv.) = *C. purpurifera* (Walker), a large and sometimes destructive locust of S. Africa, with the base of the wings purple, may pass as a poor substitute. The same apology, too, for the very variable *Arphia sulphurea* from the Upper Amazon, and *Pœcilocera pennicornis* from the Transvaal.

"The 'Ichabod' shown was originally the most beautiful *S. bicolor* I have seen, it is now doing duty for the ultra violet rays.

"There is another phase of the colouring of the Orthoptera which perhaps would have interested you more, that is changes which occur during life, or appear as seasonal forms, or present a protective resemblance to something, or when the normal colouring is protective, becomes attractive in a variety, and so on. But if those

I show fail to make a rainbow, they at least prove the Lepidoptera do not monopolize all the pretty colours."

Mr. A. W. Buckstone exhibited a collection of Hymenoptera, Orthoptera, and Coleoptera, taken by an officer shortly after the Crimean War, when on his way to Australia.

Mr. Talbot exhibited living examples of the human louse, *Pediculus humanus* (*vestimenti*), which was now ascertained to carry the bacillus of trench fever, and the dreaded mosquito, *Stegomyia calopus* (*fasciata*), the carrier of yellow fever. Of the latter species he showed the ova and demonstrated with the aid of the microscope the hatching of them under the influence of yeast. He also showed the larva of the common flea, *Pulex irritans*, and pupal and larval skins of the British mosquito, *Anopheles* sp., under the microscope.

Mr. Edwards exhibited a number of large exotic Coleoptera.

Mr. West, on behalf of the Society, exhibited—

1. Two drawers containing the type collection of Odonata (British).
2. One drawer containing a portion of the British collection of Hemiptera.
3. One drawer of British Hymenoptera.
4. One drawer of British Diptera.
5. One drawer containing the type collection of British *Carabidæ* (Col.).

Mr. Frohawk exhibited eggs of the following birds—

1. The blackbird (*Turdus merula*), varying from very pale cream to deeply spotted.
2. The thrush (*Turdus musicus*), varying from quite unspotted to those with large blotches of lilac and rufous brown. He remarked that he once met with a nest containing eight eggs.
3. The goatsucker (*Caprimulgus europæus*), a varied selection, one specimen having large dark blotches, of which one was the size of a farthing.
4. The lapwing (*Vanellus vulgaris*), 15 examples, all different, from extremely light ground colour with very small dots, darker ground with larger spots, markings concentrated at larger end, some with varied shades of chocolate coloured ground to deep olive ground with large blotches, and one in which the blotches covered more than half the surface.

MAY 23rd, 1918.

Mr. Main exhibited in one of his observation chambers the pupa of *Ocypus olens*. He pointed out that the pupa stood upright on its tail on the cast larval skin, and that strong spines on the body kept it from direct contact with the sides of the pupal chamber.

He also showed the larva of the Coleopteron *Timarcha tenebricosa* in its pupation chamber in one of his observation cages. He stated that the eggs were laid in the autumn and hatched in the spring, and that the larvæ were now ready for pupation. He pointed out that it rested on its back in the chamber.

Mr. Ashdown exhibited a copy of Albin's "Natural History of English Insects," published in 1720, one of the first English entomological works with coloured plates, in which life-histories of the insects were depicted.

Mr. Dennis exhibited stereoscopic slides of the imago of *Tortrix cristana*, the fruit of the London plane tree, and of *Smilacina* (*Maianthemum*) *bifolia*, a very local plant in this country, in appearance resembling the lily-of-the-valley, but nearly allied to the Solomon-seal.

Mr. R. Adkin and the President referred to the "Wicken Fen Fund," pointing out its object and what had been done hitherto to preserve this open space. He appealed for subscriptions to the fund in order that the good work might be carried on without interruption, and mentioned that subscriptions should be sent to the treasurer, Mr. G. W. Sheldon, "Youlgreave," South Croydon.

Mr. Main exhibited examples of the mosquito, *Anopheles bifurcatus*, and some other species, and Mr. Turner asked for assistance for the efforts of the S. Eastern Union of Scientific Societies in their investigation of the area of distribution of the various species of mosquito in Britain.

The remainder of the evening was devoted to the exhibition and discussion of the species *Mimas tiliæ*, introduced by Mr. Sperring.

Mr. Leeds' exhibit included a wild captured ab. *suffusa*, Epping Forest, May 17th, 1909, of which the following is the description: "Hindwings exceptionally marked with deep fuscous-black; forewings more distinctly marked than in normal imagines." He showed several ab. *maculata* in which the band was broken medially into costal and inner marginal parts.

Mr. Robert Adkin also exhibited long series of *Mimas tiliæ*, chiefly from Kent and Essex, but with a few specimens from other locali-

ties, including some "dusky" forms from Stony Stratford, Bucks. Among the more remarkable aberrations were a specimen of pinkish ground colour with the transverse band complete, broad, and of a deep red colour, it was taken at St. John's Wood, and two other very similar bred specimens, the one of Cambridgeshire and the other of Kentish origin, in which the bands were broken. Also a number of more normally coloured specimens, showing many modifications of the transverse band, it being in the one extreme reduced to an almost imperceptible dot on the centre of the wings, and in the other extreme broad and complete entirely across the wings. The series also included a gynandromorphous example.

Mr. Sperring then read—

Notes on Mimas tiliæ.—"This insect was first described by Linné in 1758 as *Sphinx tiliæ*, the type being described as reddish grey or red, strongly tinted with green, with complete transverse median band. This description, however, will not apply to more than two per cent., because very few specimens of *tiliæ* of the red-grey or red-brown form have the complete transverse band. In a later edition Linné re-describes it as 'subfasciatis,' *i.e.*, with the broken band, which is the insect known as ab. *maculata*, and so named by Wallengren, to which reference will be made later. The generic title of *Sphinx* was retained by Fabricius in 1775, but in 1805 Latreille placed *tiliæ* under the genus *Smerinthus*, together with *ocellata* and *populi*.

"In 1807 it was restored to *Sphinx tiliæ* by Fabricius, but in 1816 Dalman, in dividing up the Sphingid Group, placed *tiliæ* under *Dilina*, making *ocellata* the type. His original description, however, shows that *Dilina* is really a diagnosis of our family *Amorphidæ*. The genus *Mimas* was eliminated from the remaining *Amorphidæ* by Hübner, in 1822.

"The question of this nomenclature was very carefully worked out by Tutt in his "British Lepidoptera," vol. iii., where he summarises the whole of this vexed question of synonomy, fixing the type of *Sphinx ligustri*, as named by Linné in 1758, and *Mimas tiliæ* as fixed by Hübner in 1822.

"I have mentioned the above because it is frequently thought that the name *Mimas tiliæ* is extremely modern, the insect to-day being frequently known as *Sphinx tiliæ*; *Mimas*, however, dates back to 1822.

"Ova.—Egg-shaped and of the flat type. Laid on the flat side, covered with a rubber-like gum and pale green in colour, slightly below 2mm. in length and from 1·35mm. to 1·55mm. in width.

The markings on the surface can scarcely be observed owing to the gum secretion. I have never come across ova in the wild stage, they are said to be laid singly or in pairs, but in captivity practically the whole of the eggs are laid side by side, nearly always on the muslin of the cage. Over what period the female will lay in the wild state can scarcely be ascertained, but in captivity my experience is that it is a very short process. The insects separate within an hour or so of dusk on the day following pairing, and practically the whole of the eggs are laid in a matter of an hour or so.

"Larva.—When newly hatched the larvæ greatly resemble both those of *populi* and *ocellata*, but they can be readily separated at this early stage by the colour of the horn, which in *tiliæ* is a dark fuscous shade, in *populi* green, the same as the rest of the larva, and in *ocellata* a pinkish red. The larva feeds on a very wide range of food-plants, the most common being elm and lime, but including sallow, honeysuckle, birch, elder, oak, and ash.

"Pupa.—This is enclosed in a frail cell or cocoon composed of earth spun together with a few silk threads. The anal spike is large and thick, and this will readily separate it from any other of the Sphingid group, quite apart from the colour, which is deep red-brown; it is said that *Mimas tiliæ* does burrow to the depth of several inches, but I think that this must be very occasional.

"In searching for it in the wild one almost invariably finds it on the north side of the tree. In many cases it will be found practically on the surface of the ground, immediately below a layer of dead leaves, twigs, etc. Sods of earth thrown against the tree will, when removed, be found to disclose the pupa lying on the surface of the ground. Frequently the larva does not go down to the earth but spins up a frail covering of silk behind rotten bark. In other cases it will be discovered in holes where the tree has rotted at the ground level. These holes are generally filled up with decayed vegetable matter, and in such cases the pupa would be disclosed about one inch below the same.

"In the wild state the larva appears to feed more frequently on elm than on any other tree, at least that is one's experience when digging for the pupæ. The larva when preparing to pupate very rarely goes far from the tree trunk. Not only should trees in fields be searched, but those in public roads should also be examined, particularly where the tree has thrown up suckers from the roots, as these are generally well surrounded with masses of dead leaves, etc., which form a most suitable medium for pupation.

"Time of emergence.—This is most generally given by all standard authorities as being between 2 p.m. and 4 p.m., even when the insects are forced, but this latter is certainly incorrect. When the pupæ are brought into an ordinary living room they emerge at all hours of the day and night. Far more emerge between 6 p.m. and 11 p.m. than at any other time. Cages containing no living insects at 11 p.m. frequently had imagines in them when examined at 7 a.m. next morning. In the wild state they certainly do emerge most frequently in the afternoon, and when kept out of doors bred pupæ disclose imagines between 2 p.m. and 6 p.m.

"This insect is certainly one of the easiest to breed. The main difficulty appears to be to get the resulting insect full-sized. If, however, they are sleeved on birch, this difficulty will disappear; when fed on elm the specimens resulting are invariably much under-sized.

"Forcing.—To force the pupæ, a very good plan is to prepare a metal tray filled with well damped sand. Over this lay about two inches of moss which has previously been boiled. If the sand is damped every five or six days (when kept in a living room) very few insects will fail to emerge. Unlike *populi*, they do not require a very considerable amount of moisture to prevent the pupæ drying up or the resulting imagines appearing badly crippled. If treated in the manner described almost complete success can be relied upon.

"Assembling.—I find that the easiest method of assembling the males of this insect is to place the female in a box, both sides of which are made of muslin or similar material, held in position by elastic bands. It is necessary to have both of the muslin sides removable, so that according to whichever side the female selects on which to take up her position, the opposite side can be removed without disturbance. This is of course only when it is desired to obtain a pairing. In cases where it is only desired to assemble males for collecting of the same, and not for breeding purposes, then, in that case, as long as any transparent material is used to allow of a free passage of air through the cage, that is all that is necessary.

"If it be desired to obtain a pairing, care must be taken that the muslin is firmly held in position by the elastic bands, because, prior to the arrival of the males, the female is certain to indulge in flight in the cage, of a somewhat wild nature, and it is useless to use a cage for pairing purposes of which one side is left open until after the flight has ceased. Once, however, the female has settled down

from this flight, one side of the muslin can be removed without danger.

"VARIATION.—*Mimas tiliæ* is one of the most variable of insects, not only in regard to the ground colour of the wings, but also in respect of the development of the transverse band. Over 30 different colour variations have been described but appear to fall mainly into four distinct types, namely:—

"1. With the primary wings red and red-brown with green outer margins, giving us the type *tiliæ*.

"2. With the ground colour entirely green, or with a certain amount of pink suffusion on green, particularly against the median band, ab. *virescens*.

"3. Grey or fawn-grey ground colour, ab. *pallida*.

"4. With the ground colour entirely red and red-brown, without any of the green coloration, ab. *brunnea*.

"The two commonest are the red or red-brown, with the green outer margins, and ab. *virescens*. The rarest aberration is *brunnea*.

"The variations of the band are mostly easy to follow, with one or two exceptions. The commonest is when the median band resolves itself into a central spot, ab. *centripuncta*. This holds good for all four colour variations, so does ab. *costipuncta* (where only the costal part of the band exists), and ab. *marginepuncta*, where only the marginal part of the band remains, also ab. *obsoleta*, where the band is entirely obsolete. Where, however, the band is broken into two distinct parts, namely, costal and inner marginal portions on the pale grey or fawn-grey variety, namely, *pallida*, it is known as ab. *bipunctata*. This was the name given to the variety in question by Clark. The illustration and description, however, applies to the insect with the pale grey or fawn-grey ground, where the costal portion of the band does commence at the costa. Tutt, however, applied this name to all pale grey or fawn-grey varieties with the band broken in two portions, whether the upper portion started at the costa or otherwise. Where, however, the band is broken into two parts with the ground colour of red or red-brown, with green outer margins, we have an insect known as ab. *maculata*, likewise where the ground colour is green, this name having been applied by Wallengren; but there is still further complication in regard to the naming of the broken banded varieties, inasmuch as the type of ab. *brunnea* is an entirely red or red-brown insect with the broken band, the red or red-brown variety with the complete median band being known as *brunnea-transversa*. It is a great pity that Wallengren's original name of ab. *maculata* was not

applied to all colour variations with the band broken into costal and marginal parts, as it would have simplified matters very considerably. Apart from the four main colour variations and their subvariations of a broken median band, we also have another distinct variety, namely, ab. *suffusa*, in which the anterior wings are of the normal *virescens* aberration, namely, entirely green, with the usual cross band, but the hindwings black. Two such aberrations are shown in the exhibit which I am making. Apart from the varieties mentioned there is only one other of a very distinct character which, however, I have not yet seen. It is similar to ab. *obsoleta*, but has a claviform mark at the base of the forewings, *viz.*, ab. *pechmanni*.

"Reverting to the colour variations in combination with the band variations, it is fairly easy to name the varieties of *tiliæ*. For instance, those with the green forewings, namely, *virescens* with a complete band would become *virescens-transversa*. With the band broken into two portions, *virescens-maculata*. With the costal spot only, *virescens-costipuncta*. Similarly, in the same way, the pale grey or fawn-grey ground colour, *i.e.*, *pallida*, with complete transverse band becomes *pallida-transversa*: with the costal spot only, *pallida-costipuncta*, and so forth. I regret that I am unable, even with such an extensive series as I have bred over a series of several years, to show all the varieties in question. It would not be difficult, however, to obtain a fairly comprehensive series of these with the exception perhaps of *obsoleta* and *pechmanni*, if one were to pair up a green male with a green female, and so on for the three other main colour varieties, because, as you are doubtless well aware, the median band is a very inconstant factor in any one brood."

In the discussion which followed Mr. R. Adkin, having expressed the indebtedness of the meeting to Mr. Sperring for the very full notes that he had brought before them, said that his own experience of the species was of somewhat ancient date and confined largely to the neighbourhood of Lewisham, when that place was to all intents and purposes a rural village. In those days lime trees were very frequent there, many of them of considerable age, while others were recently planted, in the commencement of the transformation of the place into the urban district which it had now become. The species was then of very common occurrence, and appeared to be confined entirely to the lime trees, for although there were also many elms and other trees in the neighbourhood, he had never, within his recollection, found it in connection with them. He had frequently taken the ovum, and in his experience it was usually deposited

singly on the upper surface of the leaves of the lime trees, and although one might often collect a dozen or more ova from one small tree, it was seldom that more than one was found on a leaf. As to the time of appearance, he thought that situation was a chief factor, but in one old garden, where he had taken many freshly emerged specimens, they were almost always found on the trunks of the trees or an adjoining fence, with the wings still limp, during the afternoon, but in this case it was not until about midday that the sun shone fully on the spot.

Mr. B. Adkin referred to the common occurrence of the larvæ on the limes in front of suburban houses, and described his method of getting those out of reach with a stone and string.

Mr. Sperring said that the larvæ would feed well on birch, and could be bred of full size.

Mr. West said that the pupæ were to be found at the foot of the oaks in Greenwich Park very commonly many years ago.

Mr. Edwards said that he had invariably found the larvæ on old lime trees, and it was only recently that he had met with them on elm.

Mr. Sperring said that the imagines bred from the pupæ dug under elm trees, in his experience, were very small. He had met with the pupæ in some number under elm.

Mr. Dennis recorded alder as one of the food-plants of the larvæ in Hyam's Park.

Mr. Main suggested that it would be interesting to breed the species for statistical purposes, *i.e.*, from a Mendelian point of view.

MAY 25th, 1918.

FIELD MEETING HELD AT CHINGFORD.

R. T. BOWMAN, *Conductor*.

Chingford was selected again this year for a Field Meeting, which was held on May 25th.

The morning was fine and the weather propitious for the occasion, and this helped to make the outing an enjoyable and successful one.

The morning party wandered through the glades of Epping Forest, in which larvæ of *Tortrix viridana* and *Cheimatobia brumata* were suspended from the oaks and hornbeams in thousands and had caused an almost complete defoliation of many of the trees.

The members who came on in the afternoon joined the morning

party at Grimstone's Oak, and a walk was taken in the direction of High Beech.

Several members beat for larvæ, and reported having obtained larvæ of *Hylophila bicolorana* and *Apocheima* (*Nyssia*) *hispidaria* from oak.

Imagines that were either netted or observed included the following:—

Pieris brassicæ, *Pieris napi*, *Gonepteryx rhamni*, *Hesperia* (*Syrichthus*) *malvæ*, *Rumicia phlæas*, *Nola confusalis*, *Lithosia sororcula*, *Drepana cultraria* (*unguicula*), *Triaena* (*Acronicta*) *psi*, *Xylocampa areola*, *Venilia macularia*, *Tephrosia crepuscularia*, also a fine melanic example of this species, *Panagra petraria*, *Acidalia remutaria*, and *Melanippe sociata*.

The Coleopterists reported having secured examples of *Silpha quadrimaculata* and *Calosoma inquisitor*.

The party returned to Chingford in time to partake of tea, which was provided at Martin's Café at 6.30 p.m.

JUNE 13th, 1918.

It was announced that Prof. F. A. Dixey, M.A., M.D., F.R.S., had been chosen and elected as one of the Honorary Members of the Society.

The evening was mainly devoted to an exhibition of living specimens of Natural History.

Mr. Ashdown exhibited living larvæ of *Anatis ocellata* and of other "Lady-beetles" feeding on Aphides and Lepidoptera larvæ, besides being cannibals. Also larvæ of *Galerucella viburni* which had been in myriads on both species of *Viburnum*, and some Longicorns taken at the Epping Field Meeting and kept alive on rotten wood and apple-rind.

Mr. Robert Adkin exhibited living larvæ of *Euproctis similis* (*auriflua*) and *E. chrysorrhœa*, together with their winter nests. He pointed out that *E. similis* was, in hybernation, a solitary species, each larva making a separate hybernaculum for itself, which it appeared was, in natural conditions, usually attached to the food-plant at the junction of two twigs, or some similarly protected position; the hybernaculum was made in two divisions, in the outer of which the larva cast its skin before retiring to the inner chamber to pass the winter. In spring, having once left the hybernaculum the larva did not appear to return to it. *E. chrysorrhœa*, on the con-

trary, was gregarious throughout the greater part of its larval life, large numbers, probably usually the whole of the brood making a common "nest" in which to pass the winter. This "nest" is a large webby arrangement, very difficult to examine, but it also has the appearance of having an outer envelope. In spring the larvæ may often be seen on suitable days sitting on the outside of the "nest" sunning themselves before recommencing to feed, and even, after scattering over the food-plant to devour its small, tender leaves, they return to the "nest" again and again, and cast their skins at least once in spring within the outer envelope, and do not appear to finally forsake the "nest" until (probably) in the last larval instar,

Mr. Adkin also exhibited living imagines of *Scoparia dubitalis*, and pointed out the peculiar *Depressaria*-like resting position of the very white specimens, in contrast to the attitude of specimens of the normal coloration.

Mr. Main made the following exhibits:—

1. Living examples of *Chrysomela graminis* (Col.) from York, found on *Tanacetum vulgare*, upon which they had been feeding and laying ova since he received them in early spring. The earlier larvæ produced had moulted three times and had now (June) pupated. They required fresh food frequently, and although imagines at first only oviposited at night, now the eggs were laid at any time during the twenty-four hours, and the larvæ also fed at all times. Some of the larvæ were shown feeding on garden mint, to which they readily took.

2. The ova of *Timarcha violacio-nigra* (*coriaria*) (Col.), on woodruff (*Asperula odorata*).

3. The earlier stages of *Timarcha tenebricosa* (Col.) in an observation cage, (*a*) a full-fed larva awaiting pupation, (*b*) a pupa in its pupation chamber, and pointed out the brilliant coloration, similar to that of the fluid exuded by the imago when irritated, and from which it has derived its vulgar name of "bloody-nose beetle."

4. Earlier stages of *Necrophorus mortuorum* (Col.), a species which was somewhat common in Epping Forest in and around the carcases of small dead animals; (*a*) the eggs, which were laid *in the earth* near the dead mouse, etc., and not as is generally stated in the carcase; (*b*) a larva of the same species in its pupal cell, full-fed, ready for pupation.

5. A larva of *Pseudoterpna pruinata*, on petty-whin (*Genista anglica*), to the foliage of which it showed, both in colour and form, such a close resemblance. On the plant was also a larva of the

Micro-lepidopteron, *Coleophora genistæ*, in its curiously constructed larval case.

6. A bunch of the ova of *Dasychira pudibunda* on a stem.

7. A puparium of the Bot-fly, *Gastrophila equi* (Dip.).

8. Living specimens of *Podisus luridus* (Hem.), with ova, from Northampton.

Mr. A. W. Dennis exhibited the larvæ of *Dicranura vinula* feeding on aspen, and several stereoscopic slides of lichens.

Mr. K. G. Blair made the following exhibits:—

1. On behalf of Mr. F. W. Campion the rare British beetle *Gnorimus nobilis*, taken at Ealing in the heart of a rose.

2. Early stages of *Anopheles maculipennis*, *A. bifurcatus*, and *Culex pipiens*, showing that in the case of the larva of the *Anopheles* the position in the water was parallel to the surface of the water, while in the case of the larva of the *Culex* the water position was at a considerable angle to the surface.

3. The two sexes of *Ptilinus pectinicornis* (Col.).

4. The larvæ and cocoons of *Lema melanopa* (Col.), more or less covered with débris for protection.

5. The two sexes of the wasp *Odynerus spinipes* (Hym.) and the contents of the cells, which are stored with paralysed larvæ of *Hypera* sp. The cells were constructed in a wall with a frail dependent outer tube, made of pellets of earth loosely attached to each other. There were numerous larvæ apportioned to each cell, each of which had one egg in it. Larvæ and pupæ of the wasp were also shown.

Mr. Bunnett exhibited a flower of *Anemone nemorosa* in which the sepals were leaf-like, photographs of the palmate newt, *Lophinus palmatus*, a bunch of the ova of the cristate newt, *Triton cristatus*, and a specimen of the common lizard, *Zootoca vivipara*, which had had its tail broken off and had reproduced it.

Mr. H. Moore, a living example of *Augiades sylvanus* from Westerham, and the seasonal forms of *Papilio marcellus*, Cr. (*ajax*, auct.), form *marcellus*, the spring form with broad white bands, and the form *telamonides*, the later spring form, which is a transition to the summer form *lecontei*, R. & J. (*marcellus*, auct.).

Mr. Hy. J. Turner exhibited a crippled example of a very dark melanic form of *Alsophila aescularia* from Mansfield, and *Pyrameis atalanta* from West Cornwall and South-West Ireland, in which the red band on the forewings was of a pale shade, to compare with a specimen from the centre of England, which had a very brilliant red band.

Mr. F. W. Frohawk exhibited :—

1. A specimen of the very rare *Trichius fasciatus* (Col.), from Carmarthen.

2. A male *Euranessa antiopa*, taken by Mr. E. J. W. Wood on April 3rd, 1918, at Fenghside, Banchory, N.B. It was the seventh Scottish record this year. The border was conspicuously white. Mr. Frohawk said that he now had twelve British specimens.

3. A series of eight examples of the female of *Pieris brassicæ*, in which there was more or less black scaling between the central spots on the primaries showing a gradual development to a complete band. The heaviest marked specimen had in addition a blotch of black scales in the centre of the secondaries, a very rare form.

Mr. Frohawk also reported that he had seen a dead frog which was completely covered by the larvæ of a species of *Silpha* (Col.).

Mr. Lachlan Gibb exhibited an example of the extremely rare yellow form of the Canadian race of *Pieris rapæ* from the collection of Mr. A. F. Winn of Quebec, who was generously presenting it to the British Museum Collection.

Mr. Neave exhibited a specimen of *Pieris brassicæ* bred from a larvæ found on Nasturtium, similar to Mr. Frohawk's specimens, with an almost complete band developed on the forewing.

Mr. Syms exhibited the living larvæ of *Ruralis betulæ*, and of *Strymon pruni*, with an imago of the latter which had just emerged.

Mr. Edwards exhibited a specimen of *Calosoma sycophanta* which he had taken during the Field Meeting in Epping Forest on June 8th.

JUNE 15th, 1918.

FIELD MEETING AT HORSLEY.

Mr. W. J. KAYE, F.E.S., *Conductor*.

A fine day attracted some fifteen or sixteen members to Horsley. A whole day's outing was arranged, and on arriving at Horsley station the path across the fields was taken leading out on the main road by the church, where the path to the sheep leas was sought. On the leas *Hamearis* (*Nemeobius*) *lucina* was over, but eggs were found on the undersides of the cowslip leaves. *Cupido minimus* was just appearing, but *Callophrys rubi*, *Nisoniades tages*, and *Hesperia* (*Syrichthus*) *malvæ*, were all worn. Pushing on towards Netley Heath *Brenthis euphrosyne* was seen, while *Rumicia phlæas* was abundant

in one small corner. The rhododendrons were well out on the heath but no "bee hawks" were seen, and were probably over, although they are usually very late in this high situation. The members at one o'clock halted for lunch, each one having provided himself with sustenance. After lunch the list of butterflies was swollen by adding *Pieris rapae*, *Euchloë cardamines*, *Pyrameis cardui*, *Pararge ægeria*, *Epinephele jurtina* (*ianira*), *Polyommatus icarus*, and *Augiades sylvanus*. Of the moths observed during the day Mr. H. M. Stewart has supplied me with the following list:—*Zygæna trifolii*, *Hipocrita* (*Euchelia*) *jacobææ*, *Rumia luteolata* (*cratægata*), *Panagra petraria*, *Ematurga atomaria*, *Bupalus piniaria*, *Lomaspilis marginata*, *Eupithecia pumilata*, *Xanthorhoë* (*Melanippe*) *montanata*, *X.* (*M.*) *sociata*, *Camptogramma bilineata*, *Anaitis plagiata*, *Triæna psi*, *Agrotis exclamationis*, *Euclidia glyphica*, *Hylophila prasinana*, etc. Late in the afternoon Mr. E. E. Green found several larvæ of *Ptilophora plumigera* resting on the undersides of the leaves of *Acer platanoides*, or Norway maple, a species introduced into the woods.

Botanically the chief finds were eight species of our indigenous orchids. They were the following:— *Orchis maculata*, L., *Gymnadenia conopsea*, Brown, *Habenaria montana*, D. & Sch. = *chlorantha*, Bab. The last was found after a good deal of searching growing in a rather thick bit of wood. The spikes were very fine and at their best. *Ophrys apifera* Huds., and *Ophrys muscifera*, Huds., the latter very local and growing in one small area only. One of the specimens had the tip yellow-brown with the normal blue area brownish-white, and with all the lobes much reflexed, giving the flower a much more slender and longer appearance. *Listera ovata*, Br., *Epipactis helleborine*, Crantz = *latifolia*, Allioni, and *Cephalanthera grandiflora*, S. F. Gray = *pallens*, Rich. Other plants observed were those usually met with on the chalk down; perhaps one might mention some very large clumps of *Atropa belladonna*, the deadly nightshade. One *Myxomycetes* might be noted, *Leocarpus fragilis*, which was found in the yellow *plasmodium* stage creeping over moss on Netley Heath (E. Step). The return route from the leas was made *via* the chalk lane, and a substantial tea was partaken of at the "Duke of Wellington," after which the members decided to walk on to Effingham Station. There was insufficient time for dusking, but a thoroughly enjoyable day had been spent.

JUNE 27th, 1918.

Mr. Main exhibited the seeds of Herb-robert (*Geranium robertianum*) attached by short stalks to leaves and other objects close to the ground. They looked uncommonly like ova of an insect for which they were at first taken. It was stated that the seeds of this plant were of two kinds, one with a silky appendage and the other without such.

Mr. Moore exhibited on behalf of Mr. Cooke specimens of *Tortrix viridana*, and said that in cleaning a jay for mounting, some three dozen pupæ of this moth, with clusters of ichneumon cocoons, several medium sized larvæ, mangled remains and portions of a large acorn, were removed from the crop and throat. The imagines exhibited had emerged since.

Mr. Priske exhibited the rare blue form of the beetle *Calosoma inquisitor*, taken in the New Forest. He also showed the large egg mass of the water-beetle *Hydrophilus piceus*, attached to the underside of a leaf of *Potamogeton*, and pointed out the "mast," a peculiar projection which would stand above the water. Also specimens of the Mollusca *Helix aspersa* and *H. nemoralis*, referring to the summer epiphragm by which the shell was closed during aestivation, and pointing out a more opaque spot in both cases, which was said to cover the respiratory organs.

Mr. Neave exhibited an extremely pale brown form of *Hesperia malvæ*, taken by him on Chipstead Downs, June 6th, 1918, and an example of *Polyommatus icarus* ab. *icarinus*, with considerable diminution in size of the usual spots.

Mr. Sperring exhibited several examples of *Agriades thetis* from Cuxton, in one of which the submarginal spots were unusually dark and well-developed, in another many of the spots were more or less sagittate, and in another the basal spots were practically absent on the hindwings.

Mr. Main called attention to the fact that the male imago of *Ptychopoda* (*Acidalia*) *aversata* rests on the four front legs with the hind pair extended; the female rests on six legs.

Mr. Hy. J. Turner exhibited on behalf of Dr. Chapman a larva of the Western American *Orgyia*, *O. retusta* from California.

Mr. B. W. Adkin exhibited on behalf of Mr. E. Bertram Kershaw a specimen of *Lycæna arion*, L., a male with the markings on both upperside and underside limited to the discoidal and marginal spots, the remainder of all four wings on both upper- and undersides being free from markings. The specimen was taken in North Cornwall

by himself, on July 14th, 1916. Also a specimen of *Clerome eumeus*, taken by Mr. Kershaw near Hongkong, December 15th, 1901, and figured in his "Butterflies of Hongkong and South China."

The rest of the evening was devoted to a discussion and exhibition of *Ematurga atomaria*.

Mr. Robert Adkin exhibited a series of *Ematurga atomaria* from a large number of British localities, including Orkney, the limit of its northerly range in these islands, Hebrides, Arran, various parts of the Scottish main land, Ireland, Wales, and many English localities. He called attention to a very yellow form occurring on the Kentish North Downs, notably at Wye and Folkestone, where it was the prevailing form; to an unicolorous dark brown male specimen, taken near Loughton by the late J. R. Wellman, and to a very similar form which had been bred in some numbers from Lancashire, in which both sexes were of the same dark brown colour.

Mr. B. W. Adkin exhibited series of *E. atomaria* from many parts of England and Scotland, including several specimens of the moorland form, blackish rather than brown, taken by himself at Stanhope, County Durham, in May, 1918, and showing considerable variation; males approaching female coloration from the South Downs; bright forms of males from Northamptonshire and the North Downs; various forms from the New Forest, Worcester and Dorset; two females with slight markings and the sub-marginal line absent; dark females bred from larvæ taken on the Shirley Hills; entirely brown males from Tilgate Forest, Huddersfield and Lancashire; a black female from Lancashire; and specimens from Arran, Hawick, Aviemore and the Hebrides.

Mr. W. J. Ashdown exhibited *E. atomaria* from many Surrey localities, and specimens from Switzerland of the yellow form so prevalent on the continent.

Mr. H. A. Leeds exhibited specimens of *E. atomaria* from the Midlands, including a specimen with bright yellow ground, and two female ab. *unicolorata* from Bury, Lancashire.

Mr. Barnett exhibited very pale examples of *E. atomaria* from Wicken and Chippenham Fens, and series from Shirley, Aldborough, Dartford, Wanborough, Box Hill, Farthing Down, Reigate, etc.

Mr. Turner exhibited short series from several British localities, and a series of specimens from France, Switzerland, Italy and Germany, pointing out the large amount of sexual divergence of colour in the British series, and in contrast the small amount of divergence in the continental series, in which latter the dominant colour was yellow in both sexes.

Mr. Turner then read a paper on the species under consideration, dealing with the original descriptions and figures of all the named forms, and making a summary of the lines of variation and aberration. (See page 1 *ante*.)

JULY 11th, 1918.

Mr. W. J. Ashdown exhibited species of Lepidoptera from Surrey, taken or bred by him this season, including *Cabera pusaria* ab. *rotundaria*, *Amphidasis betularia* with var. *doubledayaria* and intermediates. *Ptychopoda* (*Acidalia*) *aversata* with well banded forms. *Tricopteryx viretata*, *T. carpinata*, and *Acronicta leporina*.

Mr. W. West exhibited species of Coleoptera taken by him recently in the New Forest, including a fine series of *Elater sanguinolentus*, a species not usually met with in number, but in absolute abundance this season in the flowers of furze, and called attention to the extreme aberration in the extent of the dark marking bounding the suture down the back of the abdomen and to the seven yellow forms considered as extremely rare. They were met with on this occasion in a proportion of 1%. He also showed *Elater lythropterus* (*cinnabarinus*), *E. miniatus* (*pomona*), *Aphodius niger* taken in mud around ponds, *Cryptocephalus lineola*, also *Tomoxia biguttata*, parasitic on bees which bore into timber.

Mr. Dennis exhibited stereoscopic slides of the spotted orchis, *Orchis maculata*, and of the rush, *Juncus obtusiflorus*, which latter is much used in tying bundles of watercress.

Mr. Stanley Edwards exhibited a specimen of the beautiful *Euploea*, *E. depuiseti*, from the Tailaut Islands, Malay, probably the geographical race named by M. Oberthür as var. *lykeia*. He also showed the butterfly *Lycorea halias*, a member of the highly protected Danaine group, from Venezuela, and its mimic the moth *Pericopis angulosa*, an Arctiid.

Mr. Sich exhibited a specimen of an *Ephestia elutella* that he had just taken in the room.

Mr. Lachlan Gibb exhibited specimens of the rare Coleopteron *Gnorimus nobilis* females, found in roses at Hereford, and sent to him by Miss Hutchinson. Mr. Priske exhibited males of the same species from Chiswick.

It was reported that a large number of the larvæ of *Pœcilocampa populi* had been beaten out in N. Wales, and that of 28 found on

trunks no less than 24 had produced ichneumons, and also that five larvæ of *Polygonia c-album* had been found in Flintshire.

Mr. Sich read a paper entitled "A Beginner's Remarks on the Tortricina." (See page 11 *ante*.)

JULY 13th, 1918.

Visit to John Innes' Horticultual Institute, Merton.

By E. Step, F.L.S.

On Saturday, July 13th, a party of thirteen members paid a visit to the John Innes Horticultural Institute at Merton, on the invitation of Dr. W. Bateson, F.R.S., the Director. Unfortunately domestic affliction had called Dr. Bateson away from home, but the party was received by Mrs. Bateson, and conducted through the grounds and experimental houses by Mr. E. J. Collins, B.A., F.L.S., and several experts explained to us what was being done there for the practical improvement of plants of economic and horticultural importance. Messrs. Collins and Allard showed us the results of breeding disease-resisting potatoes; and Miss Sutton and other lady experts, how, by hybridisation and selection, great cropping improvements had been effected with sugar-peas (edible podded), flax, and garden plants. A new race of Flax (*Linum usitatissimum*) had been evolved here, which gave an increase of at least 20% of fibre, but objections were raised to it by manufacturers because the greater length of fibre necessitated an alteration of machines !. The methods of experimenting in insect-proof cages to ascertain which varieties of various fruits were susceptible to self-pollination and which resisted it, were also shown practically and in detail; and in other houses the propagation of plants with wonderful variegated foliage, and enquiries into the cause of such variegation. These are a few of the subjects explained to us with great courtesy and patience by the experienced workers.

Tea was hospitably provided for us in the Laboratory, and our President expressed the thanks of the Society to Mrs. Bateson and the staff for the cordiality with which we had been received and instructed. Before leaving, Mr. E. J. Collins, F.L.S. gave us an account of his cultural researches into sex-aggregation in the Mosses (*Bryophyta*).

JULY 20th, 1918.

VISIT TO THE ZOOLOGICAL SOCIETY'S GARDENS.

Conducted by F. W. FROHAWK, M.B.O.U., F.E.S.

The members to the number of twenty-two assembled in the Lion-House at 3 p.m. After viewing the great Carnivora, among which a fine melanic variety of the Jaguar was noted with much interest on account of its rarity, the party made its way to the Reptile-House, where considerable time was spent. Having obtained the services of the keeper the members were shown the curious worm-like creature the *Amphisbæna*, from Mexico; they also went to the back of the cages and examined the young alligator and crocodile; the immense power in their tails when handled was very noticeable, although they were only about twelve inches in length. The change of colour in the chameleons, when they were placed on one's black coat, was very marked, as they quickly assumed a darker hue. The Mappin terraces were then visited, also the Apes-House and Monkey-House, which latter is always an attraction to visitors. The members then made their way to the north side of the gardens and viewed the elephants, giraffes, zebras, and other large animals, then to the parrot-house, where the distracting noise is somewhat compensated by the brilliancy of their plumage. After tea, which was well served and as equally well enjoyed, the party went to the insect-house, where several interesting insects in their various stages were seen and admired; this terminated a pleasant and well spent afternoon.

JULY 25th, 1918.

Mr. Ashdown exhibited a fine series of aberrations of *Leptura maculata* (*armata*) (Col.), including a very small specimen, several very dark with a considerable increase in the area of black marking, and others with coalesced markings. He also showed *Clythra 4-punctata*, *Chrysomela orichalcea* (♂ and ♀), and *Ctesias* (*Tiresias*) *serra*. All were from Surrey.

Mr. Barnett exhibited a series of bred *Ephippiphora scutulana* (*pflugiana*) from Epping Forest, and its Hymenopterous parasite; a series of *Cydia* (*Carpocapsa*) *pomonella*, bred from the pupæ shown by Mr. West some time ago (see "Proceed.," 1917, p. 52); and several well marked blue females of *Polyommatus icarus*.

Mr. West exhibited the following species of Coleoptera taken in

June in the New Forest:—*Leptura scutellata*, *Silpha 4-punctata*, *Hypera rumicis*, *Luperus nigrofasciatus*, *Ceuthorrhynchus chrysanthemi*, and *Cleonus nebulosus*.

Mr. B. Adkin exhibited a photograph of the underside of the specimen of *Lycæna arion* exhibited at a previous meeting, showing that the obsolescent character of the marking on the upperside was also present on the under surface, where only the discoidal was developed.

Mr. A. W. Mera exhibited the living larvæ of *Amphidasis betularia*, and called attention to the protective coloration, which he stated appeared not to be influenced by heredity. Brood A was divided into two lots, some were fed on sallow and were green in colour, the rest were fed up on beech foliage, and were all dark brown. Brood B was also divided, those placed on sallow were green, as in brood A, the rest were fed on blackthorn (but did not take to it well) and were very dark, the darkest of all. This decision of colour occurred only in the very early stages of the larva.

Mr. Bunnett exhibited a bred specimen of *Dicranura vinula* in which the hindwings were very hyaline; a *Spilosoma menthastri*, unusually well spotted for the south; and a *Toxocampa pastinum*, taken at Coulsdon, Surrey.

Mr. H. Moore exhibited a box of butterflies from Florida, collected by Prof. W. Blatchley, at Dunedin and Lake Okeechobee, January to March this year, and remarked upon the distribution of the species, and the particular interest of several of them. How some, common in the West Indies and Tropical S. America, reach Florida as the northern limit of their distribution, such as *Heliconius charitonius*, Linn., *Thecla acis* (Drury.), and *Lycæna hanno*, Stoll., while others common in Florida are found as stragglers as far north as the States bordering the Great Lakes, such as *Papilio cresphontes*, Cram., *Neonympha phocion*, Fabr., and *Thecla halesus*, Cram. Others not extending beyond the Southern States, as *Anosia berenice*, Cram., *Dione vanilla*, Lin., and *Junonia cœnia*, Hübn.; while *Eumæus atala*, Poey., is only known from Florida and Cuba. Special attention was called to a fine specimen of *Limenitis* (*Basilarchia*) *floridensis*, Strecker, and compared with the common *L. disippus*, Godart., in conjunction with *Anosia archippus*, Lin., and *A. berenice*, Cram., as pointed out by Prof. Poulton when addressing the South London Society, and in his contribution to the Entomological Society. *Pyrameis atalanta*, Lin., widely distributed in N. America, represented perhaps an originally imported species.

Mr. Edwards called attention to an article in the "Ent. Mo.

Mag." for July, entitled "Gynarchy in Coleoptera," by Mr. D. Sharp, F.R.S., and thought it would be useful if workers in all orders recorded facts in any way bearing on parthenogenesis.

Mr. Edwards then exhibited some very finely executed Diagrams of—

1. *Phylloxera vastatrix*, its life-history, and its ravages in the vine.
2. *Hylesinus piniperda*, *Bostrichus* sp., *Scolytus* sp., and *Clerus* sp., and their method of destruction in pine and other trees.
3. *Doryphora decemlineata* (The Colorado Beetle), its life-history and structure, on each of which he gave notes.

Communications were read from Mr. A. W. Dennis, who reported *Vanessa io* larvæ as extremely common in parts of Essex, but butterfly imagines were by no means common; from Mr. T. H. Wolley-Dod at Salonika; and from Dr. G. S. Robertson at Netley.

Mr. Sich read a paper on "*Lampronia quadripunctella* and its aberrations" (See "Ent. Record," vol. xxx., p. 146), of which he furnished the following summary:—

"In June a small dusky Tineid moth, *Lampronia quadripunctella*, may be seen flying over wild rose, especially where this plant grows thickly in a hedgerow. The forewings are dark greyish-brown, with from one to five more or less distinct pale spots. This variation in the spotting has prevented some authors from identifying the insect with the description given by Fabricius. ("Species Insect.," ii., p. 298, 52, 1781.) For convenience these spots may be numbered. Spot 1 is vertical and situated on the dorsum before the middle of the wing; more often present in the female. Spot 2, usually sub-quadrate, rises from the dorsum beyond the middle. This is the most conspicuous spot, and present in all specimens I have seen. Spot 3, often round, just above spot 2, and sometimes connected with it. Spot 4, small and triangular, situated on the costa near the apex of the wing. Spot 5, the smallest, lies between spot 3 and the costa; usually absent. Fabricius described the form in which spots 2 and 3 only were present, or at any rate these spots only were conspicuous, and this form is therefore the type of the species. Long after, in 1844, Duponchel finds the moth and describes it as *Incurvaria bipunctella*. ("Hist. Nat. Lep. Suppl.," iv.) His insect shows only spots 1 and 2. In 1852 Zeller captured the species at Glogau, but curiously his specimens, though having only two spots, were different from those already described. They had only spots 2 and 4 present. Not being able to identify his moths with the descriptions of Fabricius and Duponchel, which

he compared, he describes them as a new species under the name of *Lampronia morosa*. ("Linn. Ent.," vi.) He also mentions a form with one spot only, which he calls var. b. The costal spot, 4, being absent. Haworth, Stephens, and Stainton all employed the Fabrician name, but on the continent the insect is known as *morosa*. From the above we get five forms, all of which may be taken in England."

1. Spots 2 and 3 conspicuous * * * *quadripunctella*, Fab.
2. Spots 1 and 2 conspicuous * * * ab. *bipunctella*, Dup.
3. Spots 2 and 4 conspicuous * * * ab. *morosa*, Zell.
4. Spot 2 alone present * * * var. b., Zell. This may be called ab. *unipunctella*, n. ab.
5. Spots 1-5 all visible * * * ab. *quinquepunctella*, n. ab.

AUGUST 8th, 1918.

Mr. Ashdown exhibited a variable series of *Malacosoma neustria*, bred from larvæ taken in Surrey, and very dark examples of *Notodonta dromedarius*, probably referable to var. *perfusca*, from the New Forest.

Mr. Neave exhibited several specimens of *Hyles euphorbiæ* bred from pupæ sent over from the "Western Front" in France, where the larvæ had been found. He also showed a specimen of the wasp *Vespa norvegica*, taken in Rotherhithe.

Mr. Ashby exhibited a very long series of *Cetonia aurata*, the rose beetle, taken in the Isle of Portland, where it had occurred this year in hundreds in many kinds of flowers. He also showed a specimen of *Lasiocampa quercus*, taken in the same locality some years ago, in which the transverse band was unusually wide for a southern example.

Mr. W. West exhibited several specimens of the Neuropteron *Osmylus maculatus*, from the New Forest.

Mr. Blair remarked that he had recently observed *Hepialus sylvinus* flying over grass at dusk in some number. The females were perched on the stems of grass, holding their hindwings folded down in a position of rest, while the forewings were extended at right angles to the body, and vibrating rapidly, no doubt in the position of "call" to the males on flight around.

Mr. Turner remarked that the late J. E. Robson, of Hartlepool, described at some length the pairing habits of a species of *Hepialus*, but he only referred to the "vibration of the wings," so far as he remembered ("Ent. Record," 1892, vol. iii., p. 52, 77, and 100).

Mr. Bunnett exhibited living imagines, larvæ and pupæ of the Coleoptera species *Cassida equestris*, *Cionus blattariæ*, *Melasoma populi*, and *Chrysomela polita*, and also the egg cocoon of a spider, *Agelena labyrinthica*, spun in a glass tube. The cocoon was pure white and strongly angulated where the attachment threads were joined to it.

Mr. Bunnett observed that he had noticed an earwig using its "pincers" to clean the inside of the elytra.

Mr. Sich recorded the occurrence of the larva of *Notodonta dromedarius* at Chiswick.

Several members noted that the second brood of *Celastrina argiolus* was locally common this year.

Mr. Sich read a paper on "Species in the Genus *Cerostoma*." (See page 15 *ante*.)

AUGUST 22nd, 1918.

It was announced that Mr. C. P. Emmett, F.E.S., a member since 1914, had died of wounds.

Mr. Court, of Market Rasen, was elected a member.

Mr. Turner exhibited a copy of "Exotic Moths," Jardine's Library, 1840, and referred to the portrait it contained of the great French naturalist, Latreille, together with a sketch of his tomb, in Père-la-Chaise, and a facsimile of a specimen page of his MS.

Mr. Barnett exhibited two undersides of *Agriades coridon* from Royston, the one having the discal markings on all the wings obsolete, the other a very darkly marked form. He reported taking a number of examples of the form ab. *semisyngrapha*. He also exhibited a very pale form of *Anaitis plagiata* (2nd brood) from Colley Hill. On a visit subsequently made to Wicken Fen he heard that Montague's Harrier had again nested there this year.

Mr. Neave exhibited a living specimen of *Trichiura cratægi* bred from larvæ taken at Northampton. He also showed three bred specimens of *Arctia caja*, in two of which the discal black markings on the hindwings were either quite absent or nearly so, the third specimen was a fine yellow form.

Mr. Holden exhibited three bred example of *A. caja*, (1) a salmon-pink specimen, (2) in which the discal markings on the hindwings were practically obsolete, and (3) a rich yellow form. He also showed a specimen of *Mimas tiliæ* in which the transverse band was only represented by a medium-sized costal blotch.

Mr. Bunnett exhibited a very pale example of *Miltochrista miniata* from Crowborough, several species of Coleoptera, and a species of mite, *Trombidium*.

Mr. F. B. Carr exhibited series of *Abraxas sylvata* (*ulmata*) from Chalfont, with a minimum of markings rather faint, from Delamere with a maximum of markings much intensified, and from Wye with forms intermediate as to markings. Among the Chalfont specimens were several in which the hindwings were devoid of markings except at the anal angle.

SEPTEMBER 12th, 1918.

Mr. R. Adkin, Vice-President, in the chair.

Mr. Ashdown exhibited a short series of both sexes of the Homopteron, *Ledra aurita*, from Hants and Surrey, and pointed out several females in which the horns were more developed than those of the male. He also showed the larvæ at different stages of growth.

Mr. Blair exhibited specimens of the two very similar beetles, *Coccinella distincta* and *C. septempunctata*, from Weybridge, the former of which was always in association with the ant *Formica rufa*, and pointed out the distinction of the two species as follows:—

"*Coccinella 7-punctata*, L., and *C. distincta*, Fald. Though at first sight very closely resembling one another, with the arrangement of the black spots on the elytra almost identical, these two species present several more or less sharply defined points of difference that make their distinction comparatively easy. The more important of these may be expressed as follows:—

C. 7-punctata.	*C. distincta.*
Convexity sloping, feebly rounded; lateral margins of elytra completely visible from above, apical declivity sloping.	Convexity strongly rounded; lateral margins of elytra usually concealed from above by the overhanging convexity of disc, extreme apical declivity vertical.
Elytra with lateral borders thickened in anterior half, very fine behind.	Elytra with lateral borders very fine and even throughout.
Episternum and epimeron of metathorax black; *i.e.*, no con-	Epimeron and posterior end of episternum of metathorax

spicuous lateral white spot beneath at level of articulation of 3rd pair of legs.	white; *i.e.*, a conspicuous lateral white spot beneath at level of articulation of 3rd pair of legs.
White spot on side of thorax sub-quadrate, its posterior edge meeting the lateral line a little behind the middle.	White spot on thorax running backwards in a hook-like manner towards the posterior angles.
Anterior submarginal black spot of elytra usually not much smaller than the others.	Anterior submarginal spot of elytra usually very small in comparison with the other two.

"While the ants accepted the presence of *C. distincta* quite readily, *C. septempunctata* always had a "rough time" when placed on a nest of this species."

He also exhibited specimens of the beetle *Cassida rittata*.

Mr. Bowman exhibited series of four broods of *Dysstroma* (*Cidaria*) *truncata* :—

1. A wild female taken at Horsley in June, 1917, from which three successive broods were obtained by inbreeding. The female was an average typical form.

2. Representatives of a second brood from ova of (1) in August. These included a number of the yellow clouded form ab. *centumnotata* and a dark example suggestive of steel-blue coloration.

3. Representatives of a third brood bred out at the end of October and beginning of November, all more or less typical in colouring and marking.

4. Representatives of a fourth brood bred from the middle to the end of December; also more or less typical. All the specimens of the third and fourth broods were quite as large as the original parent captured.

Mr. A. Sich exhibited the following species of Micro-lepidoptera:—

Cacoecia podana ab. *sanberiana*, Sorh. This nearly black form was bred from a pupa found on ivy at Bath.

Pandemis ribeana. A specimen in which the markings were only outlined.

Pandemis heparana. One specimen from Hayling Island. One dark specimen bred from rose at Hammersmith.

Euarmonia weberiana. A large dark specimen bred from *Pyrus aucuparia* at Bath.

Acalla (*Teras*) *contaminana*. The aberrations *ciliana*, *rhombana*, and the newly identified *omicron* form, all from Bath.

Mr. Barnett exhibited a series of *Aricia medon* (*astrarche*), taken at Chipstead in July last. The underside of the forewings in one example was striated.

Mr. B. W. Adkin exhibited a series of *Nisoniades tages*, including a remarkable, light khaki-coloured form and some finely marked female examples.

Mr. Sperring exhibited a series of eight specimens of *Abraxas grossulariata* bred from wild collected larvæ, July, 1918, Aberdeen, all being gradations of the dark suffused local race. He also exhibited two specimens from South-East London, bred from wild collected larvæ, and previously exhibited, inserted for comparison purposes between the Scotch and southern wild race to illustrate that the specimens from the south in some cases are even darker than the northern ; and also one specimen of the aberration *fulrapicata*, with a dark banded specimen, both from wild collected South-East London larvæ.

Mr. Sperring exhibited ten specimens of *Arctia caia*, bred from wild collected larvæ in South-East London in July, 1918 :—1, A suffused female with orange hindwings; 2, ditto male; 3, female in which the white predominates over the dark markings ; 4, banded male, otherwise normal; 5, female with asymmetrical markings ; 6, female with banded forewings; 7, 8, 9, and 10, three males and one female with orange hindwings.

Mr. F. B. Carr exhibited a series of *Agriades coridon* taken at Royston this year, including specimens of ab. *roystonensis*, ab. *semisyngrapha*, specimens approaching closely to ab. *syngrapha*, and several very nicely marked underside aberrations.

Mr. Dennis exhibited some heads of the common rush, *Juncus communis*, on which the very young larvæ of *Coleophora cæspititiella* were feeding, in their comparatively large, newly made, and conspicuously white cases.

Messr. H. Moore and Hy. J. Turner exhibited a large number of species of Japanese Rhopalocera.

Mr. Hy. J. Turner read a few "Notes on the Butterflies of Japan." (See page 22.)

Messrs. B. Adkin and A. W. Buckstone called attention to the second flowering of the broom this year in July and August.

Mr. Frohawk called attention to the scarcity of butterflies in Essex this autumn, and also said that many varieties had been reported from the New Forest this season, especially remarkable aberrations and gynandromorphs of *Dryas paphia* and *Limenitis sibilla*.

Mr. A. W. Buckstone reported that *Pararge megera* (2nd brood) had been a common butterfly in the neighbourhood of Guildford and Dorking. *Epinephele tithonus* was also very plentiful.

Messrs. Adkin and Sperring had also met with *P. megera* in number.

SEPTEMBER 26th, 1918.

Dr. T. A. Chapman, F.R.S., F.Z.S., in the chair.

The decease of a member, Mr. W. F. de Vismes Kane was announced.

Mr. Main exhibited, on behalf of Mr. Carr, leaves of Alder from Blackheath containing the circular mines of the sawfly, *Phyllotoma vagans*.

Mr. Main exhibited living specimens of the large water-beetle *Dytiscus circumcinctus*, and pointed out that, unlike the rest of the species in the genus, it was not sexually dimorphic.

Mr. Moore exhibited specimens of *Sphinx ligustri* 2nd brood, and read the following note:—

"Autumn emergence of S. ligustri.—Tutt, in his 'British Lepidoptera,' says one authentic record of the emergence of *S. ligustri* the same season as the parent was known to him. The experience of my neighbour, Mr. Cook, this year may therefore be of interest. The parents emerged on May 10th, 1918, the larvæ were full fed July 23rd-28th, the imagines emerged August 21st, 23rd, 31st, and September 2nd. A number of larvæ were given to a friend, who had two emerge in August. These six emergences were from a brood reared under natural conditions in previously empty cages."

Mr. Bunnett exhibited galls of the gall flies *Rhodites* (*Cynips*) *eglanteriæ*, a very fine colony, under leaves of the rose, and *Rhodites* (*Cynips*) *rosæ* on the stems of the rose.

Mr. W. West exhibited examples of the "fire-beetle," *Melanophila acuminata*, from Crowthorne, taken by Mr. W. E. Sharp. The species was found about six years ago by Mr. Champion at Woking. It frequents areas recently devastated by fire, sitting on the charred stumps of fir trees, often when the fire is actually going on. (See "Ent. Mo. Mag.," 1918, p. 244.)

Mr. B. W. Adkin exhibited specimens of *Pararge megera*, selected from many hundreds which he had looked over on the S.W. slopes of Dartmoor during August, 1918. The specimens exhibited showed

the more extreme forms which were observed by him, and were of three types:—

1. With large ocelli on forewing.
2. With small ocelli on forewing.
3. With the space between central lines on forewing more or less suffused with brown, so as to form a bar. (ab. *mediolugens*.)

The last form would appear to resemble what Barrett describes as a local form taken on the slopes of Dartmoor, by Major J. N. Still. Mr. Adkin stated that he found this form to be uncommon, and that he concurred in the view that *Pararge megera* cannot be regarded as a variable species.

Mr. Wheeler said that banded forms of *P. megera* were not peculiar to Dartmoor. He had met with the aberration on the Hog's Back, near Guildford.

The remainder of the evening was devoted to the exhibition of lantern slides.

Mr. H. Main, slides showing the resting positions of the sexes of Mosquitoes and Gnats found in this country, and also of *Chironomus plumosus*. He also showed slides of the yellow-fever mosquito, *Stegomyia fasciata*, and contrasted the appearance, structure and habits of *Culex* and *Anopheles*, both of which he had met with in Epping Forest.

Mr. Bunnett, slides of a large number of species of fungi.

Mr. Dennis, slides of numerous species of grass, mostly showing their fructification.

OCTOBER 5th, 1918.

FUNGUS FORAY, WIMBLEDON COMMON.

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

Having regard for the war-time suspension of travelling facilities, it was thought desirable to try a field of operations nearer to London than that usually selected. The leader had satisfied himself in September that there was still an abundance of Fungi at Wimbledon, though, of course, not nearly so many species as occur in the pine woods of Oxshott and Esher. But for a week previous to the meeting the weather had been unpropitious, continuous rain, with low temperature and night frosts. The day itself was very wet until the meeting hour, when it cleared wonderfully, and gave an enjoyable afternoon to the five members who turned up.

Perhaps the small attendance was not wholly due to the weather, but partly to an erroneous notion that Wimbledon Common has shared the fate of Clapham and Wandsworth Commons, and been so suburbanised as to be no longer worthy of a visit from naturalists. In past years I have heard many remarks to this effect in our meeting rooms, and I should like to take this opportunity of saying that the notion is entirely false. In the 70's and 80's I had a very intimate acquaintance with the Common, but until my recent removal to the district had not set foot on it for thirty years. After what I had heard about the County Council's drainage and gravelling of paths [the County Council, by the way, has never had the slightest authority over it!] I was agreeably surprised to find that the wooded glens and bottoms, which are invisible to the motorist or 'bus passenger, were just as I had left them thirty years before. There are fairly dense woods of birch, oak, crab and buckthorn, intersected by convenient rides, where the trunks bear evidence of sugaring; ponds, bogs, and trickling moorland runnels that flow into the Beverley; and the gravel of the paths is the natural plateau gravel that covers much of the London Clay here.

Our course lay along Robin Hood Road to Brickfield Cottage, descending through the woods to Beverley Plain, then along Stag Ride to Queensmere, where we ascended again to the plateau a little south of the Windmill, and took tea in Wimbledon village.

Among the species of Fungi noted were the following:—*Lactarius piperatus*, *L. turpis*, *L. subdulcis*, *Scleroderma vulgare*, *Boletus scaber*, *Russula emetica*, *Amanita rubescens*, *A. muscarius*, *Hygrophorus psittacinus*, *Armillaria mellea*, *Hypholoma fasciculare*, *Paxillus involutus*, *P. atrotomentosus*, *Amanitopsis vaginatus*, etc.

Messrs. Ashdown and Carr found beating for larvæ and Coleoptera remunerative.

OCTOBER 10th, 1918.

The evening was spent in hearing a lecture on "Sponges," by Prof. Dendy, F.R.S., who exhibited nearly a dozen large sheets of diagrams and a series of lantern slides.

After a few introductory remarks on the history of our knowledge of sponges, and reference to the popular notion of a sponge obtained from contact with the bath sponge, the lecturer gave a description of the general characteristics of a sponge, which consisted of a skeleton and tissue with a canal system for the entrance

and exit of currents of water. The reproduction took place sexually with ova and sperm, resulting in free-swimming young, which young, after settling upon a base grow into a more or less large colony by budding. The evolution of the skeleton was next described, the substance of which was called "spongin." From the hypothetical origin there were two main lines of descent, in one of which the spicules which coated the outer surface were composed of carbonate of lime, while in the other they were non-calcareous and termed "jelly sponges." Of this latter class there were three divergent sub-classes, (*a*) the horny sponges, of which the familiar "bath-sponge" was a member; (*b*) the sponges with three- or six-rayed spicules of siliceous matter; and (*c*) those with four-rayed siliceous spicules.

The slides exhibited illustrated these various sections of the group, and also the theory of the formation and development of the spicules, supported by mechanical and mathematical expressions of the formation of their "nodes."

OCTOBER 24th, 1918.

Mr. Edwards exhibited the Fungus *Bulgaria* (*Peziza*) *polymorpha* (*inquinans*), found on dead trunks of trees, especially beech. The fungus bursts through the bark under the form of small rusty brown, scurfy knobs, which gradually expand at the apex until a plain black shining disc is formed. The substance is soft and tough, cutting almost like india-rubber.

Mr. R. Bowman exhibited an example of *Cymatophora ocularis* with ground colour nearly jet black, taken at Chingford in June last.

Mr. W. J. Ashdown exhibited a short series of *Geotrupes pyrenæus* (Col.), from Surrey, including a fine bronze tinted specimen.

Mr. Wheeler exhibited the various phases of variation shown in the species *Epinephele tithonus*, and read a paper "The Variation in *Epinephele tithonus*, L." (See p. 29 *ante*.)

The Rev. A. T. Stiff exhibited a large number of examples of the species, especially illustrating the local races in the S. West of England, near Tavistock. He was of opinion that the cause of variation in that area was partly due to a combination of heat and moisture. Although the species was abundant near Leigh, in Essex, this season there was not a single variation worthy of note, while near the former place one in six was an aberration more or less notice-

able. There was very much greater variation in ground in the female than in the male. In one year the anal spot on the upperside of the hindwing was unusually large in numbers of examples. He had found that specimens with an apical spot above the bipupillated spot were extremely rare.

Mr. A. W. Buckstone exhibited—

1. A series of *E. tithonus* from Oxshott, showing slight variation in colour of wings and size and number of spots on the same. The underside of the lower wings varied in colour from greenish-grey through various shades of grey-brown to rich dark brown. He showed three asymmetrical specimens.

2. A series from Broxbourne, not quite such a rich colour as specimens from Oxshott. They might be described as grey-brown as compared with red-brown of the Oxshott series.

3. A "bleached" specimen from Royston.

He stated that in his experience only a small percentage of males taken at Oxshott have a spot on the upperside of the underwings, the female usually having one, and in many cases two.

Mr. H. J. Turner exhibited specimens of *Epinephele tithonus*.

1. From Guethary, W. Pyrenees, darker in general coloration with increased black markings.

2. From Grésy-sur-Aix, Dauphiné Alps, of general dull coloration.

3. From Cuenca and Albarracin, in Spain, with the apical spots without pupils on the upperside.

4. From Albarracin, Clelles, and Grésy, with only one pupil in the apical spots.

5. From Box Hill, Liphook, and Horsham, with additional marginal spots on the forewings, upperside.

Mr. A. H. Leeds exhibited a number of specimens of *E. tithonus* showing the various lines of aberration met with by himself.

A. Spotting of forewings of the male upperside.
   1. Two small black spots closely approximating, one with minute pupil.
   2. Ditto, with slightly larger spots, lower one nearer margin, both white pupilled.
   3. With extra spots (1 extra : 2 extra ; R side 1 spot and 1 dot, L side 1 minute dot).

B. Spotting of hindwings of the male. Upperside.
   1. Number (none : one : two : three : four :).
   2. Aberrant (3 on forewing, 4 on hindwing, all white centered).

C. Spotting of forewings of the male. Underside.
   1. Number (1 extra : 2 extra ; 2 extra and one above normal apical spot).

D. Spotting of hindwings of the male. Underside.
   1. Large spots and some lanceolate.

E. Spotting of forewings of the females. Upperside.
   1. Extra (1 small : two coalesced and 1 extra : 1 extra and streak above apical spot : 2 extra).

F. Aberrations.
   1. Left forewing two-thirds straw colour.
   2. Hindwings with large fulvous patch : ditto small.
   3. All margins of a bleached appearance. Male.
   4. Male with apical spot doubled like a figure 8.

Mr. Frohawk exhibited a short series of striking aberrations, including a row of xanthic forms, a beautiful cream coloured specimen, bred examples of the "bleached" form, showing that this aberrational charactor was not produced by damp, specimens showing variation in the amount of fulvous area, and specimens varying much in size.

Mr. Newman said that examples with additional spots were rare at Bexley, where the species was abundant.

Mr. Wheeler remarked that *E. tithonus* was not comparable to *E. jurtina* in its range of variation.

NOVEMBER 14th, 1918.

Mr. Clifford Craufurd of E. Molesey, was elected a member.

Miss G. Lister, F.L.S., President of the Essex Field Club, gave a lecture with specimens, coloured drawings, and microscopic and lantern slides, on "The Mycetozoa," of which the following is an abstract kindly furnished by the lecturer.

THE MYCETOZOA.

"The Mycetozoa are a group of organisms lying near the border line which separates plants from animals. They are now usually considered to belong to the Protozoa in the animal kingdom.

"They live amongst decaying leaves or in moist dead wood, and are to be found apparently all over the world, wherever decaying vegetable matter may afford them means of subsistence.

"Their life-history may be briefly narrated. The minute spores

are found in great numbers without spore-cases, or 'sporangia.' When a spore, wafted far, perhaps by the wind, falls on to a suitable moist surface, such as dead wood or dead leaves, the spore-wall cracks and the contents creep out into the water as a speck of naked protoplasm, termed a 'swarm-cell' or 'myxamœba.' It contains a nucleus and a contracting vacuole; soon a lash-like flagellum is extended, by the aid of which it swims off as an active 'zoospore.' The food of the zoospores consists chiefly of bacteria. To catch these, delicate sticky processes, 'pseudopodia' are protruded from the posterior end of the zoospore, to which the bacteria adhere, and by which they are conveyed into special digestive vacuoles, formed for their reception within the cell. Here they are gradually digested, while indigestible matter is thrown out.

"The zoospores divide repeatedly by bipartition, each daughter zoospore resembling its parent. After a certain number of divisions, the flagella are withdrawn, and the cells creep about as 'myxamodæ,' which again may divide several times.

"Thus, as Dr. Jahn first discovered, as these myxamœbæ unite in pairs, and their nuclei fuse into one, they must be regarded as *gametes*, and the body formed by the union of a pair, as a *zygote*. By the recent admirable investigations of Skupienski, further light is thrown on the nature of these gametes. He finds that a gamete does not fuse indiscriminately with *any* other gamete, but exercises a distinct power of selection. He has proved that they are of two kinds, and it is only when a pair includes one of each kind that fusion takes place. Thus although to our eyes the gametes are exactly alike, there exists among them a distinctive suggestion of a primitive sexual differentiation.

"A zygote formed by this process of fusion may be distinguished from a gamete by its larger size, the larger nucleus, and by a regular rhythmic circulation of its more fluid granular contents. It also develops the faculty of devouring the myxamœbæ. It increases in size by feeding, and also by uniting with other zygotes, or young *plasmodia* as they are called. As they grow they spread out in search of food in a network of veins through which a torrent of circulation may be seen to flow. The current usually continues for about a minute and a half in one direction, then stops, and flows for the same time in the opposite direction; this 'tide,' as it may be termed, is strongest towards the part where most active feeding is taking place. By means of this circulation all parts of the plasmodium are kept in close communication.

"In dry weather, when the moisture needful for the active life of

the plasmodium begins to fail, the network of veins contracts, and the plasmodium passes into the resting or *sclerotium* stage; the circulation gradually ceases, and the whole mass breaks up into a number of cells or cysts, each surrounded by a wall. In its dry resting state it can experience considerable extremes of heat and cold without losing vitality. When again moistened, it may be after weeks, months, or even several years, the cyst walls dissolve or split open, and their contents reunite to form once more an active plasmodium.

"When the food supply is exhausted, a new phase sets in, and *sporangia* are formed. The plasmodium concentrates at a number of centres to form little masses which may become stalked, or else remain sessile; around each mass walls are formed, while the contents break up into numerous spores. Each spore contains a single nucleus, which is a daughter nucleus, formed by the division of the nuclei of the plasmodium just before spore formation.

"In most species of Mycetozoa, before the spores are formed, a system of threads or tubules, called the *capillitium*, is developed within the sporangium, whose function is eventually to control or to assist in the dispersion of the spores. The many beautiful devices by which this is effected, and the varied structure of the capillitium, afford some of the principal characters by which Mycetozoa are classified.

"Nearly three hundred species have been recognised, of which one hundred and seventy-three have been recorded as British."

A series of coloured lantern slides were thrown on the screen illustrating some of the more striking types of sporangia, and the means by which the spores are dispersed.

A number of specimens of Mycetozoa were also shown, several species being grouped together in one tray with natural surroundings, to suggest what species may be found growing together in our woodlands and gardens. The creeping plasmodium of *Badhamia utricularis* was exhibited under the microscope, and displayed satisfactorily the rhythmic streaming of its circulation.

A short discussion took place.

NOVEMBER 28th, 1918.

ANNUAL EXHIBITION.

Mr. E. W. Nimmey, F.E.S., of Watford, and Mr. D. C. Johnstone, of Rayleigh, were elected members of the Society.

Mr. W. G. Sheldon exhibited a series of about 400 specimens of *Sarrothripus revayana*, Scop. (*undulanus*, Hb.), including the named forms ab. *ramosana*, Hb., *stonanus*, Curt., *dilutana*, Hb., *fusculana*, Schmid., *ilicana*, Fab., *afzelianus*, Wd., *lathamianus*, Steph., *undulana*, Hb., *bifasciana*, Don., and a number of forms as yet unidentified or unnamed. He asked for help to get other forms such as *russiana*, Dup., and *glaucana*, S. Lampa.

Mr. W. J. Lucas exhibited an album containing a series of photographs of well-known entomologists *in situ*, *i.e.*, collecting in the field.

Mr. R. South exhibited the following:—

Brenthis selene. Three aberrations from Brighton, 1918 (on behalf of Mr. Penn).

(*a*) Melanic. Normal fulvous colour only showing on costa at base of forewings, and on the dorsum of hindwings. There is also a fulvous dot at end of the cell on the forewings, and a subterminal row of fulvous dots on all the wings. The fringes are pale fulvous marked with black on the forewings, and faintly so on the hindwings.

(*b*) Pale straw coloured.

(*c*) Pale buff coloured, and

(*d*) A ragged specimen from the New Forest, also shown, appeared to have been of a form similar to (*a*).

Epinephele jurtina.

(*a*) Male with pale hindwings, Hants coast, April 30th, 1918.

(*b*) Female with lower portion of the fulvous blotch white, New Forest, July, 1915.

Tricopteryx (*Lobophora*) *polycommata* (on behalf of Mr. W. Meadon). Two curious brown suffused aberrations, bred with typical specimens by Mr. Meadon, of Brighton.

Boarmia repandata. Holmsley, New Forest, June 15th, 1918, measuring only 15mm. in expanse.

Also the following eight species of Coleoptera found in June, 1918, in the New Forest and on Hants coast. *Pyrochroa coccinea*, L., *Lytta vesicatoria*, L., *Cleonus nebulosus*, L., *Asemum striatum*, L., *Anthaxia nitidula*, L., *Ischnomera sanguinicollis*, Fab., *Rhagium bifasciatum*, Fab., aberr., and *Leptura scutellata*, Fab.

Mr. Hy. J. Turner exhibited—

1. *Euchloë cardamines*. A short series of the southern race, *turritis*, in which the discoidal spot is on the margin of the orange apical area. The specimens were from the island of Cyprus, and included the extremely small form ab. *minor*, ♂ 26·5mm. and ♂ 27mm.

2. *Parnassius apollo.* Specimens of the race *pumilus*, characterised by small size, reduced markings, small and finely black marginal ocelli, etc., from the Calabrian Mts. in S. Italy, where it is very local and rare.

3. *Colias edusa.* Male and female of the clear yellow (not orange) form, known as ab. *helicina*: two ab. *helice*, one a much squarer insect with a light discoidal on the hindwing, the other with larger and more elongate wings, having a rich orange discoidal on the hindwing and much orange suffusion of the same wing. All were from Cyprus.

4. *Satyrus briseis.* Male, female and underside of the race *fergana*, larger, darker, with more emphasised markings, especially on the under surface, than the type: ab. *pirata*, in which the lighter markings on the upperside were a deep orange-brown instead of white; the specimens were from Cyprus; also an extremely small male from Neu Spondinig, Tyrol, measuring 40mm. (type = 52 mm.).

5. *Satyrus prieuri.* A very similar species to *S. briseis*, but with a quite distinctive underside; ab. *uhagonis*, a form very similar to the ab. *pirata* of *S. briseis*; from Spain.

6. *Agriades coridon.* A short series of the single brooded "chalk-hill blue," from near Florence, taken from July 29th to August 24th, including a nice ab. *albo-lunulata* with white chevrons above the orange eye-spots on the margin of the hindwings.

7. *Agriades aragonensis.* A short series of the two broods of the double-brooded "chalk-hill blue," from near Florence; 1st brood June 1st to July 1st, 2nd brood August 24th to September 9th, etc.

8. *Plebeius argon.* Specimens of the ♂s and ♀s of the race *masseyi* from Witherslack, compared with typical examples from Swinley Woods.

9. *Cœnonympha tiphon.* A long series of the race *philoxenus* (*rothliebii*), the dark suffused form with ample eye-spots on the under surface, from Witherslack.

10. *Notodonta ziczac.* A second brood specimen. The larva taken wild this year and sleeved with a batch of *Cerura vinula* in Dr. Chapman's garden at Redhill. It emerged on July 31st, 1918.

11. *Hypena proboscidalis.* An unusually dark form, from Reigate, July, 1918.

12. *Hesperia malvæ.* A light marked form with much light clouding between the usual white spots.

13. *Salebria semirubella* (*carnella*). A series taken at Box Hill,

August 22nd, where it was in abundance on that date. The ab. *sanguinella* with the light costa was by no means common.

14. *Agriades coridon*. Two ab. *semisyngrapha* and ab. *roystonensis* ♀, R. wings smaller in size, both from Royston. Ab. *per-aurantia* with red sub-marginal markings on the forewings, a by no means common occurrence, and ab. *irregularis-obsoleta*, with much obsolescence of markings on the underside of the hindwings, both from Reigate.

15. *Danaida plexippus*, *D. chrysippus*, and *Anosia archippus*. The specimens were exhibited to call attention to the nomenclature of the first and last. The following note was communicated:—

"In 'Systema Naturæ' (1758) Linnæus described an insect as follows, 'Wings entire, fulvous; with dilated black veins and a black margin with white dots. Forewings with a white fascia as in the next species, *chrysippus*, which it resembles.' To this insect he gave the name *plexippus*. Unfortunately he got mixed in his localities and gave N. America as the habitat, to which he subsequently added China.

"The white marked species is the Asiatic species, the one with absence of white is the American species.

"Authorities are about equally divided during the subsequent 150 years as to the application of these two names, *plexippus* and *archippus*, all sorts of fantastic ideas being brought in to support each side.

"The whole matter is very ably discussed by the late Dr. Buckle in the first pages of the fifth volume of the 'Ent. Record,' in January, 1894, with the names applied as I have applied them.

"I may say that from a letter I have, written by the late Mr. Jenner Weir, who attended our Society for so many years, the above determination was quite in accord with his view."

Mr. W. J. Lucas exhibited five species of *Nemopteridæ* (Nat. Ord. *Neuroptera*) from S.E. Mediterranean district. *Nemoptera sinuata*, Oliv., *N. bipennis*, Ill., *N. coa*, Linn., *Lertha barbara*, Keng., and *Halter pallida*, Oliv.

Mr. J. H. Carpenter exhibited a long series of aberrations of the undersides of *Agriades coridon*, including the following named forms:—Males; ab. *obsoleta*, ab. *cinnus*, ab. *obsoletissima*, ab. *antico-juncta*, ab. *irregularis-obsoleta*, ab. *calida*. Females: ab. *cinnus*, ab. *cinnus-obsoleta*, ab. *antico-discreta*, ab. *biarcuata-obsoleta*, ab. *confluens*, ab. *calida-obsoleta*.

Mr. L. W. Newman exhibited—

1. A long series of *Melitaea aurinia* bred from wild Co. Tyrone

larvæ, showing considerable variation, some forms being extremely pale for the Irish race.

2. Two curious *Aglais urticæ* having a sheen with a very greasy appearance, and a wild caught *Argynnis cydippe* (*adippe*) with exactly the same sheen.

3. A short series of *Triphæna janthina* aberrations, including several bleached forms.

Mr. Newman also exhibited on behalf of Mr. Percy Richards—

1. Long and very varied series of *Agriades coridon* from Royston, including many extreme forms.

2. Long and varied series of *Canonympha pamphilus* and of *Rumicia phlæas*, all caught wild in the Bexley district this season.

3. A series of aberrations of *Epinephele jurtina* (*janira*) from North Kent.

4. A remarkable gynandromorph of *Dryas paphia* ab. *valezina* from the New Forest, three wings being pure *valezina* and the right forewing a good mixture of *valezina* and ♂ *paphia*, the ♂ marking running the whole length of the costa.

5. *Aglais urticæ*, a fine yellow variety bred from a Bexley larvæ.

Mr. Robert Adkin exhibited a variety of *Argynnis paphia* in which the marginal black wedge-shaped marks are much enlarged, the round black spots, usually forming the submarginal rows, united into elongated patches and the other black markings intensified. The specimen is somewhat asymmetrical, the left side being more strongly marked than the right. On the underside the black markings of the forewings are confused, and the greenish area of the tips increased in size. On the hindwings there is a large silvery patch at the base, the central green portion entire, and the marginal lilac shade unusually wide. The specimen was taken at Abbot's Wood, Sussex, in July, 1917. Also a series of *Peronea variegana*, all reared from larvæ found feeding on a crab-apple bush on the parade at Eastbourne, on June 9th, 1918, and which included the following forms, *viz.*, *P. variegana*, Schiff., var. *asperana*, Fb., var. *borana*, Haw., and var. *cirrana*, Curt.

Mr. L. W. Newman exhibited on behalf of Mr. G. B. Oliver—

1. *Aglais urticæ*. Gradation in ground colour, ab. *salmonicolor* to ab. *alba*; two var. *ichnusa*, one with light ground to forewing; light blotched, and other aberrations.

2. *Epinephele jurtina* (*janira*). ♂ grey mottled.

3. *Ruralis betulæ*. ♀ underside without the outer white lines on all wings.

4. *Argynnis aglaia*. ♂, bleached.

5. *Agriades coridon*. Three males of the rare infuscated or metallic form showing the three main tints, grey, blue, and green, and a striking underside of the same form; ♂ ab. *obsoleta* without the usual lunules; ♂, broadly striated form; ab. *suavis* (cum *punctata*).

6. *Hamearis lucina*. ♂ with cream ground colour.

7. *Aricia medon* (*astrarche*). Yellow spotted form, var. *artaxerxes*, entirely without red on upperside.

8. *Celastrina argiolus*. True gynandromorph (Sutton Park, 1912).

On behalf of Mr. Sabine, Mr. L. W. Newman exhibited a large number of *Noctuæ* collected by him in Ireland during the season 1918, including *Plusia festucæ*, *P. bractea*, *Acronicta leporina*, very dark forms of *Noctua dahlii*, *Cirrhædia xerampelina*, some examples being of a unicolorous brownish colour with the two transverse yellow lines bordering the central band bright and very distinct, *Polia chi*, large forms of *Noctua c-nigrum*, *Aplecta prasina* (*herbida*), *Plusia interrogationis* with a few rosy forms, *Pharetra euphorbiæ* var. *myrica* of large size and very clearly marked, one example was unusually dark, *Mamestra* (*Hadena*) *glauca*, rather large and very varied, *Apamea secalis* (*oculea*) (*didyma*), a specimen of *Calamia lutosa* thickly powdered with black scales, dark aberrations of *Xylophasia monoglypha*, *Noctua castanea* race *neglecta*, *Apamea gemina* var. *remissa*, a dark purplish aberration of *Hydræcia micacea*, *Cleoceris viminalis*, etc.

Mr. C. H. Williams exhibited the following aberrations of *Agriades coridon*:—ab. *albicans*, Royston; a very fine dark brown ♂, Prince's Risborough; ab. *marginata*, Isle of Wight; ab. *fowleri*, Swanage: ab. *syngrapha*, Alton and Prince's Risborough; ab. *semi-syngrapha*, Royston; ab. *obsoleta*, Dover and Royston; and a striated form, Royston.

Mr. B. W. Adkin exhibited cabinet drawers of—

1. *Argynnis paphia*, mostly captured in the New Forest, 1918, including (*a*) a gynandromorphous specimen, one side male the other female, of pale coloration; (*b*) a dark suffused specimen devoid of ordinary marking; (*c*) a small bred specimen with hind-wings brown on the underside; (*d*) two male specimens with large white patches; a row of selected var. *valezina*, and other aberrations.

(2) *Eugonia polychloros*, mostly bred from larvæ obtained in the New Forest, 1918, showing considerable variation in colour and markings, and including two yellow males, one male with small markings and others exceptionally heavily marked.

Mr. Stanley Edwards exhibited a large number of species of *Euplœa* from India and the Malay.

Mr. H. A. Leeds exhibited the following series of aberrations, all captured during 1918.

Pararge egeria var. *egerides*. White central dots absent from all black spots of right forewing and both hindwings, very minute on left forewing. ♀ upperside. Chiltern Hills, August 24th, 1918.

Epinephele jurtina (*janira*). Central area of forewings largely suffused with pale ochreous, extending nearly from the base and entering irregularly the outer marginal border; the ocellated spot of each forewing has a misty appearance. ♀ upperside. Kent, July 6th, 1918.

Epinephele tithonus. Forewings with two large additional ocellated spots. ♀ upperside. Chiltern Hills, August 10th, 1918.

Aphantopus hyperantus. Forewings, three small pale spots instead of ocelli on right side, and two similar spots and one small (central) ringed black spot on left side. ♂ underside. Chiltern Hills, August 1st, 1918.

Cœnonympha pamphilus. Apical spot on each forewing large, but black rings entirely absent. ♂ underside. Herts, May 27th, 1918.

Agriades thetis. Orange lunular markings of all wings absent. ♀ upperside. Kent, September 7th, 1918.

Polyommatus icarus :—

1. Complete row of six orange lunules on forewings and an orange streak below, discoidal spots extending outwardly. ♀ upperside. Monks Wood, Hunts, June 8th, 1918. (English form usually lacks at least the two orange lunules nearest to the costa of forewings, and Oberthür named it racially var. *tutti*.)

2. Blue to marginal line, no orange lunules; also on hindwings a large paler blue wedge = ab. *fusca-thetis-cæruleo-cuneata*. ♀ upperside, Monks Wood, Hunts, June 9th, 1918.

3. Bright blue ground, with white costa as in male = ab. *apicata-thetis-albicosta*. ♀ upperside. Monks Wood, Hunts, June 1st, 1918.

4. Blue ground of ab. *thersites-thetis* form, plus seven interneural black streaks on each forewing, the last four joining the black border. ♀ upperside. Monks Wood, Hunts, June 9th, 1819.

5. ab. *postico-obsoleta*. ♂ underside. Monks Wood, Hunts, June 1st, 1918.

6. ab. *obsoleta*. ♂ underside. Monks Wood, Hunts, June 2nd, 1918.

7. ab. *antico-striata*. ♂ underside. Monks Wood, Hunts, June 9th, 1918.

8. ab. *obsoleta*. ♀ underside. Bucks, September 4th, 1918.

Agriades coridon :—

1. All fringes white = ab. *albo-fimbriata*. ♂ upperside. Chiltern Hills, August 1st, 1918.

2. ab. *marginata*, of a steely-blue ground colour. ♂ upperside. Chiltern Hills, August 18th, 1918.

3. Cinnamon-khaki borders and a suffusion of this colour across all wings. (Apparently the male form of the cinnamon-khaki female also shown, both captured in same locality, and may have emerged from same brood.) ♂ upperside. Chiltern Hills, August 10th, 1918.

4. ab. *punctata*. ♂ upperside. Chiltern Hills, August 7th, 1918.

5. Leaden coloured = ab. *plumbescens*. ♂ upperside. Chiltern Hills, August 1st, 1918.

6. ab. *obsolescens-anticojuncta-semicinnus*. ♂ underside. Chiltern Hills, August 19th, 1918.

7. ab. *fuscescens*. ♂ underside. Chiltern Hills, August 11th, 1918.

8. ab. *antico-extensaglomerata*. ♂ underside. Chiltern Hills, August 14th, 1918.

9. Only discoidal, and four large black spots within margin of each forewing. ♂ underside. Chiltern Hills. August 17th, 1918.

10. Cinnamon-khaki ground colour. ♀ upperside. Chiltern Hills, August 19th, 1918.

11. Pale drab ground colour with golden sheen. ♀ upperside. August 4th, 1918.

12. Black ground with white circles to all borders, no other colour present. ♀ upperside. Chiltern Hills, August 4th, 1918.

13. ab. *tithonus* (*syngrapha*), of pale blue ground. ♀ upperside. Chiltern Hills, August 17th, 1918.

14. ab. *pertithonus*, of greenish hue. ♀ upperside. Chiltern Hills, August 13th, 1918.

15. ab. *aurotithonus*, of brilliant blue, discoidal spots of forewings large. ♀ upperside. Chiltern Hills, August 4th, 1918.

16. ab. *castanea-parripuncta* + white wedges within borders of all wings. ♀ underside. Chiltern Hills, August 14th, 1918.

17. ab. *crassipuncta-parisiensis*. ♀ underside. Chiltern Hills, August 1st, 1918.

18. ab. *corydonis* (*obsoleta*)+large white wedges within borders of hindwings. ♀ underside. Chiltern Hills, August 19th, 1918.

19. ab. *confluens* (*parisiensis-costajuncta-basijuncta*) combined. ♀ underside. Chiltern Hills, August 1st, 1918.

Aricia medon (*astrarche*). ab. *subtusradiata*. ♂ underside. Chiltern Hills, August 13th, 1918.

Strymon[1] *pruni*. Fulvous patches large and five in number on each fore- and hindwing, extreme form of ab. *excessa*. ♀ upperside. Monks Wood, Hunts, June 21st, 1918.

Bithys (*Thecla*) *quercûs* :—

1. Dark blue instead of purple patches. ♀ upperside. Monks Wood, Hunts, July 12th, 1918.

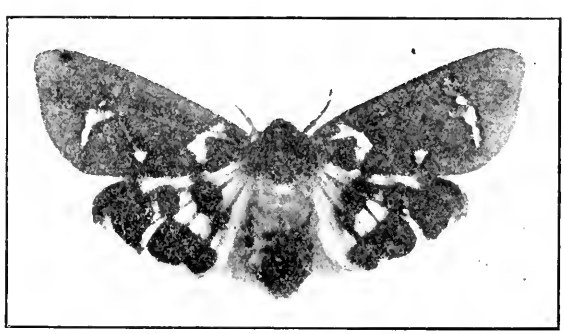
2. Ground colour dark smoky-grey. ♂ underside. Monks Wood, Hunts, July 8th, 1918.

Mr. R. Bowman exhibited—

1. A second brood example of *Numeria pulveraria*, bred from a female taken at Horsley in May, and which emerged in August of this year. The ground colour is brown, is heavily specked with dark brown, and the bars on the upper wings being brown and not chocolate as is usually the case, are much less conspicuous.

2. A very dark example of *Rumicia phlæas*, captured at Oxshott in August of this year ; it is so heavily suffused with black that only a very small part of the central area of the upper wings shows the golden colour, and the marginal bands on the lower wings are very narrow, giving it the appearance almost of a black butterfly ; also a blackish suffused example from Horsley captured in August, 1918, and a very pale yellow example captured at Chingford. The blackish suffused forms of *R. phlæas* are the form known as var. *eleus*.

On behalf of Mr. A. K. Ing, Mr. Bowman exhibited specimens of



Arctia caia, *ab*
Bred July, 1918, Kingston-on-Thames, A. K. Ing.

Arctia caia bred in July, 1918. Nine were reared from eleven larvæ found in the garden and fed on dandelion and dock under perfectly normal conditions. Six specimens were typical and one varied thus:—"Forewings almost entirely brown, the small remnants of markings are peppered with brown. Hindwings orange-yellow with the metallic black spots very strongly developed and running into one another. The melanism has also spread to the body, where the black markings are much heavier than usual" (see fig.).

Mr. F. W. Frohawk exhibited—

1. Series of eight specimens of *Brenthis euphrosyne* showing great variation, chiefly a coalescence of the basal marking. All captured in May and early June, 1918, in the same locality, Essex.

2. Series of thirteen *Euchloë cardamines*, exhibiting much variation in the depth of colour and size of the apical markings and size of discoidal spots in both sexes, including an albino male example, and a female with additional black spots on the undersurface of primaries.

3. A variety of *Chrysophanus dispar* ♂ in perfect condition, having all the wings symmetrically blotched with white, bred by Doubleday in 1842. Also a perfect unemerged pupa of the same species showing all the markings.

4. Two specimens of *Issoria lathonia* in perfect condition, captured by J. Hog, at Colchester, a century ago (1818).

5. A very beautiful and unusual variation of the Starling, shot by himself on September 4th, 1918. Grey, cream, white, and buff, delicately marked on wings and tail with cross-bars.

6. A beautiful pied variation of the Pied-wagtail; whole of head and neck white tinged with lemon-yellow, rest of plumage mottled with white. Shot in Bushy Park, October, 1918.

The Rev. George Wheeler exhibited very dark specimens of *Pararge megera*, L., taken on the Hog's Back, at Guildford, on May 31st and July 31st, 1918, the only ♀ of the 1st brood taken being of the ab. *mediolugens*, Fuchs, with the whole central band of the forewings filled in with blackish scales; the ♀ of the 2nd brood tended towards the same form. Also a few specimens of *Rumicia phlæas*, L., taken in Wolford Wood on August 8th, including ab. *suffusa*, Tutt, and ab. *cæruleopunctata*, Stgr.; with it there was a ♀ specimen of the brassey ab. *intermedia*, Tutt, taken at Guildford on May 31st.

Mr. J. Riches exhibited a series of aberrations of *Abraxas grossulariata*, bred from wild larvæ taken in North London, 1918.

Dr. E. J. Salisbury exhibited the branched carpels of *Clematis vitalba* and subsequently contributed the following note :—

"The exhibit shows twelve specimens of branched (or fused?) carpels from twelve separate finitiary heads of *Clematis vitalba*. As is well known, the normal achene of this species bears a long feathery style, which at maturity attains a length of about 25mm. The specimens in question bear two styles, in place of one, these being quite separate or joined for a short distance at the base only. The body of the achenes shows clear indication of double origin, since eight out of the twelve specimens present a longitudinal, more or less median, furrow, indicating the plane of partial separation, or incomplete fusion, between the component parts. Evidently, then, these instances are to be interpreted as either due to fission, or fusion, of the original carpel rudiments, most probably, in view of the distinct styles, they represent a fission followed by partial fusion resulting from the contiguity of the two halves. It will be manifest that where the process, whether of fission or fusion, is complete there will be no outward indication of the abnormal mode of origin, so that the frequency of such can only be inferred from that of the, probably very much less common, cases where the process is incomplete. Approximately 2% of over 1000 finiting heads (ca. 1 in 1300 carpels) showed bifurcated carpels, so that it is not unlikely that complete fission is a common phenomenon. Similar branched carpels have been observed by the exhibitor in *Helleborus niger* and *Anemone apennina*, and, as I have shown elsewhere, is a common phenomenon in the perianth and androecium of the *Ranunculaceæ* (cf. Annals of Botany, Jan., 1919). The feature here considered had an important significance in view of the great variability in the number of carpels produced by each flower of the Old Man's Beard (*C. vitalba*), which may be as few as nine or over fifty. In each inflorescence the range is, however, much more restricted, and the meristic variation may be in large part an outcome of the process here adumbrated."

Mr. A. A. W. Buckstone exhibited (1) a bred series of *Hygrochroa syringaria*. "Male parent normal, female parent with forewings very much deformed. These specimens are representative of a number, none of which had normal wings.

"Emergence took place in the month of September as a partial second brood; the less precocious members of the brood died as larvæ in the following spring."

(2) A series of "bleached" and teratological specimens showing many forms of malformation and crippling.

"So-called 'bleached specimens' and those with wings which are devoid of certain scales, making them semitransparent, owe their condition, it is considered by many, to weakness caused by malnutrition while in the larva state.

"In connection with this I should like to state that I have found bleached specimens of *Thera firmata* plentifully at Oxshott, and that in most instances one or more wings have been deformed.

"Experience gained in breeding leads me to think that much of this crippling may be due to weakness in the first pair of legs, amounting in many inbred specimens to total impairment of one or both of these limbs. The insects are thus handicapped in their efforts to climb to a suitable situation for expanding their wings, and frequently fall while endeavouring to do so.

"I am unaware if bleaching is frequent with *T. firmata* in other districts than Oxshott.

"Malnutrition in some species makes itself manifest in a considerable darkening of the wings, as in the two specimens of *Hipocrita jacobææ* shown. Both these specimens are far below the normal as regards size and show a considerable dearth of scales."

Mr. H. Moore exhibited a long series of specimens of *Anosia archippus*, from localities ranging from Canada through the States, Central America to the Argentine Republic.

The Rev. J. E. Tarbat, on behalf of Mr. Burras, of Portsmouth—

1. Three aberrations of the female of *Dryas paphia*. One, taken at Leigh Park, near Havant, in which the usual black markings are enlarged and coalesced into big blotches, giving it a very handsome appearance. Two, taken in the New Forest, in which the black markings had to a great extent coalesced, so as to give a black suffused appearance to all the wings.

2. An aberration of *Melitæa cinxia*, from the Isle of Wight, with marking throughout suffused.

3. A very pale form of *Argynnis cydippe* (*adippe*).

4. Six specimens of *Calymnia trapezina* showing extremes of aberration and colour.

5. A short series of *Lithosia deplana*, including very dark forms.

6. A yellow specimen of *Phragmatobia fuliginosa*, taken at Fareham by himself.

The Rev. A. T. Stiff exhibited—

1. Pale buff and pink variety of *Amorpha populi*, bred from pink-washed ♂ and pale ♀, Leigh-on-Sea.

2. Large ♀ *Saturnia pavonia* (=*carpini*), with pink marginal band on hindwings. Bred Hockley, Essex.

3. *Arctia villica* ♀ with confluent spots on forewings, and hindwings almost devoid of black markings. Bred from a Benfleet larva.

4. Five *A. caja*, ♂ with salmon-pink hindwings; ♂ with yellow hindwings; ♂ with very little cream colour on forewings and pinky-yellow hindwings with confluent spots; and two very dark females.

5. *Euchloë cardamines* ♂ with long and narrow forewings and hindwings underside more strongly marked with green than usual. Leigh-on-Sea.

6. *Hamearis lucina* with white spots on hindwings. Hockley.

7. *Cœnonympha pamphilus* with extra ocelli on underside of forewings. Folkestone.

Mr. Ashdown exhibited a long series of aberrations of *Adalia bipunctata*, the most variable of the British species of "Lady Beetles," and enquired if there was any species of Lepidoptera with the same extended range of dissimilar markings.

Dr. T. A. Chapman exhibited a series of *Orgyia retusta*, a Californian species, nearest probably to (of European species) *O. gonostigma*. They vary a good deal in tint and depth of markings. The ♀s also vary from very dark (blackish) to nearly white, the difference being especially marked in the tufts of the wool with which they mix and cover their eggs. These are laid in masses near, but not necessarily on the cocoons. Specimens of *O. antiqua*, *O. splendida*, and *O. aurolimbata*, exhibited also to show the range of variation in the European species of the genus.

Mr. Gordon Fryer exhibited a melanic specimen of *Scodiona fagaria* (*belgiaria*), a striated specimen of *Polyommatus icarus* and a teratological example of *Ematurga atomaria*.

Captain B. S. Curwen exhibited a small series of Fossorial Hymenoptera, including three specimens of the rare *Methoca ichneumonides*.

Mr. W. West called attention to the exhibit of Canadian Lepidoptera from the Society's cabinet.

Mr. Leonard Tatchell exhibited—

1. A specimen of *Argynnis paphia* ♂ with continuous darkened line bordering all wings, taken at Bordon, Hants, 1915; and three ♀s *A. paphia* with very heavy markings, from the New Forest, 1918.

2. *Euvanessa polychloros* showing very light underside, bred from a larva taken in the New Forest.

3. A series of *Aglais urticæ* var. *polaris*, bred from larvæ taken at

Wanstead in an almost full-fed condition, and feeding on dying and partially withered nettle, this possibly may account for their darkened shade, and also to their being somewhat undersized.

4. A long series of *Agriopis aprilina*, bred from Yorkshire pupæ, showing the light typical forms, var. *virgata*, and melanic forms. These specimens began to emerge in early September and continued emerging until the end of October, 1918.

5. A series of *Parasemia plantaginis* var. *hospita*, Schiff., bred from Delamere larvæ, 1918.

6. A peculiar bicolor form of a ♂ of *Angerona prunaria*, taken at Wimbledon, 1914.

7. A series of the forms of the exotic Pierid *Hebemoia glaucippe*, showing male and female of each. *H. glaucippe*, Linn., India; race *australis*, Butl., S. India; race *sumatranus*, Hag., Sumatra; race *celebensis*, Wall., Celebes; race *javanensis*, Java.

Mr. A. W. Buckstone, on behalf of Mr. Pugsley, exhibited imagines of *Plutella cruciferarum*, bred from wild seakale on the S.E. coast.

Mr. A. Butterfield exhibited a series of the Madagascar Pierid *Teracolus eranthe*, including the three forms of the female with a typical male, and a rare aberration of the male in which the apical blotch was clear lemon-yellow instead of being deep orange.

Mr. Cuzner exhibited, under the microscope, a series of slides illustrating the life-history of the Hydrozoa.

Mr. W. J. Kaye exhibited a very fine graduated series of *Helicomius melpomene*, from St. Jean, in French Guinea. The series was arranged in six rows. The first two containing specimens with a black hindwing graduating from typical *melpomene*, with a solid red discal patch of the forewing, to *melanippe*, a form with the yellow group of spots replacing the red, only traces of red appearing distally. The forms shown connecting *melpomene* to *melanippe* were *melpomenides*, *lucinda*, *lucia*, *collis*, and *melpina*. Two more rows contained specimens with the red basal streak to the hindwing only. The variation covered the same ground as the first series, except that the series progressed even further by showing the gradual extinction of the yellow discal spots such as is found in the form *funebris*. Intermediates between *diana* and *funebris* included *maris*, *dianides*, *deinia*, *negroida*, *faustina*, *cybele*, *eulalia*.

The last two rows contained again the same variation, but with the addition of a flame-streaked hindwing. *Melpomene* is thus represented by *tyche*, and *melanippe* with the black hindwing, is represented by the common and well known *thelxiope*. Again, in

this set, the development was carried to a suppression of the yellow discal spots when the form became *stygianus*. The forms connecting *tyche* and *stygianus* were *punctarius*, *hippolyte*, *majestica*, *augusta*, *thelxiope*, *thelxiopeia*, and *aglaopeia*.

DECEMBER 12th, 1918.

Mr. Ashdown exhibited and presented to the Society's Cabinet some Neuroptera received from the late Mr. C. A. Briggs. They included *Perla maxima*, ♂ and ♀, *P. cephalotes*, ♂ and ♀, *Chloroperla grammatica*, *Isopteryx tripunctata*, *I. torrentium*, *Nemoura variegata*, *N. meyeri*, *Isogenus nubecula*. They were from Devon, Rannoch, etc.

Mr. Ashdown exhibited ten species of the genus *Cryptocephalus*, taken in Surrey during 1918, and including *C. bipunctatus* (var. *lineola*), *C. moraei*, *C. parvulus*, etc.

Mr. Robert Adkin exhibited series of Tortrices bred from larvæ which he had found feeding on the ivy growing on the parades at Eastbourne in May last, the species being *T. forsterana*, *T. pronubana*, and *T. podana*. He said no special search had been made for the larvæ, he had simply picked off any rolled or spun together leaves that happened to catch his eye as he passed along. His object in making the exhibit was to demonstrate how easily one might obtain several species of this somewhat neglected group by keeping their eyes open on their daily perambulations.

Mr. Bowman exhibited an example of *Tephrosia bistortata*, taken on May 4th, in which the marginal area of the forewings was dark suffused.

Mr. Barnett exhibited a long series of the very variable race of *Bryophila perla*, which occurs in and around Warrington.

Mr. B. W. Adkin exhibited a number of specimens of *Argynnis selene*, taken by himself, showing considerable variation in size, marking, coloration, and shape of wing, including (*a*) males with narrow pointed wings, broad rounded wings, and a specimen with asymmetrical wings; (*b*) a dark suffused female with asymmetrical markings, with others for comparison; (*c*) a small race from Tilgate Forest, 1902, compared with a normally sized race from Windsor Forest, 1918, to which the above selected specimens (*a*) and (*b*) belonged.

Mr. West exhibited a series of the very rare Coleopteron *Amarochara bonnairei* from Box Hill, where it had been swept by him in

some number in the near neighbourhood of a bee's nest. It was taken about 1863, at Mickleham, by the late Dr. Power.

Mr. Dennis exhibited stereoscopic slides of *Heleocharis palustris*, and of the fruiting of the meadow sweet, *Spiræa ulmaria*.

Mr. Turner exhibited a long series of the Lycænid *Chilades trochylus*, from Cyprus, stating that it was the smallest species of Rhopalocera. He also exhibited a series of *Hydræcia crinanensis* from Ireland, and pointed out the forms known as ab. *rufescens-flava*, ab. *rufescens-alba*, ab. *grisescens-flava*, and ab. *grisescens-alba*.

It was noted that *Cheimatobia brumata* had not been so plentiful in some places as usual, while *Hibernia defoliaria* had been quite as common as usual. Mr. Ashdown reported a specimen seen on September 23rd, in Surrey.

Mr. A. A. W. Buckstone exhibited several series of *Agriades coridon*, and contributed the following note :—

"At a meeting of the Society held on October 11th of last year, reports were received concerning two dwarf races of *Agriades coridon*. One was reported by Mr. Newman as occurring in the Chilterns, the other as having been observed by me at Shere, in Surrey.

"Mr. Newman stated that by the end of August the small race had given place to a form of which the specimens were of normal size.

"This year I was fortunate in being able to visit Shere during both July and August. I found, as last year, the dwarf race in abundance at the top of the Downs, and a larger race, which by the way is considerably smaller than normal specimens, on the lower part of the Downs. This was on July 15th.

"On August 5th only a dozen specimens of the dwarf race were seen, all being very worn, but those of the larger form were fairly numerous at the foot of the Downs, although in very poor condition. As on the Chiltern Hills, these small specimens appeared to be giving place to larger ones; for found plentifully over the entire slope was a form the specimens of which were quite equal in size to any I have seen.

"On August 15th the species was nearly over, the males being few in number and very worn, while the females, although still plentiful, were mostly in poor condition. No particularly small specimens were observed.

"Average expanse of wings, measured from tip to tip of forewings :—Taken July, 1917, dwarfs, ♂ s, $1\frac{1}{16}$ in., ♀ s, 1 in., larger form, ♂ s, $1\frac{1}{4}$ in., ♀, $1\frac{1}{8}$ in. Taken July, 1918, dwarfs, same as

1917, both sexes, larger forms, ♂ s, $1\frac{3}{8}$ in., ♀ s, $1\frac{1}{4}$ in. Taken August 5th, 1918, ♂ s, $1\frac{1}{2}$ in., ♀ , $1\frac{7}{16}$ in."

JANUARY 9th, 1919.

Mr. G. H. Cornish, of Plumstead Common, was elected a member.

Mr. Ashdown exhibited numerous species of Lepidoptera taken by him in Surrey during the past year, including *Hylophila bicolorana*, *Pygæra curtula*, *Himera pennaria*, and a fine aberration of *Pieris napi* in which the veins were strongly marked, the apical blotch of the forewings was absent, with the spots reduced in size and uniform in shape.

Mr. Buckstone exhibited two series of *Agriades thetis* (*bellargus*) second brood, and communicated the following note :—

"One of the series consists of specimens taken near Brighton in September last, and the other of representatives of a large number of specimens taken in the Dorking district of Surrey during the last sixteen years.

"The Brighton specimens are smaller than those from Dorking, while the females are of a darker colour, and the undersides of the males greyer.

"The blue form of the female, so plentiful most seasons at Dorking, was not found at Brighton, although two of the specimens exhibited do certainly show a considerable number of blue scales, but in no way approaching the extreme forms one finds in the Surrey locality, some of which are shown."

Mr. H. Main exhibited an *Anopheles* species from Eastbourne, where it had occurred in considerable abundance during the autumn.

Mr. F. W. Frohawk exhibited (1) *Plebeius agon*, very pale examples, very dark with the forewings underside immaculate, and a slightly striated specimen. (2) *Aricia medon* (*astrarche*) with pale yellow marginal markings. (3) *Polyommatus icarus*, a female with pale yellow marginal markings.

Mr. Edwards exhibited some Nematoid worms from a cat, named for him by Mr. Hirst, of the Nat. Hist. Museum, *Belascaris cati*, Schrank, or *Ascaris mystax*, Zeder. According to Neumann, 1914, the ♂ measures from 3-6 centimetres, and the ♀ measures from 4-10 centimetres. The worms do not affect the health of the cat. He also exhibited a fungus, *Peziza ventriculosa*, one of the *Ascomy-*

cetes: it was named by Miss A. Lorrain Smith. According to the late Mr. Massee it is common on manure heaps.

Mr. Hugh Main exhibited a series of photographs (enlargements) of the Dipteron *Gastrophilus equi*, of *Eristalis tenax*, of *Nepa cinerea*, of *Palomena prasina* and of a species of caddis-fly, with various details of their life histories.

Mr. R. T. Bowman read the Report of the Field Meeting at Chingford, on May 25th (see p. 69).

Reports of the Fungus Foray, held on Wimbledon Common on October 5th (see p. 88), and of the visit to the John Innes Horticultural Institution on July 13th, were communicated by Mr. E. Step (see p. 78).

Mr. Frohawk commented on the almost continuous wet season from about last June to the present time. In County Cork there had been 45 consecutive wet days and 11½ in. of rain had fallen in that period. He suggested that both Lepidoptera and Northern birds had been scarce from this cause.

Mr. Bowman remarked on the scarcity of *Cheimatobia brumata* at Epping, and Mr. Adkin noted that much land seemed to be now quite waterlogged.

JANUARY 23rd, 1919.

The PRESIDENT in the Chair.

ANNUAL MEETING.

The first portion of the Session was devoted to the business of the Society.

The Balance Sheet was read by Mr. Tonge, one of the Auditors, and was adopted. (See pages xiv., xv.)

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

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

President.—S. Edwards, F.L.S., etc.

Vice Presidents.—K. G. Blair, B.Sc., F.E.S., and H. J. Turner, F.E.S.

Treasurer.—A. E. Tonge, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West (Greenwich).

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

Hon. Secretary.—Stanley Edwards, F.L.S., etc. (Corresponding).

Council.—B. W. Adkin, F.E.S., R. Adkin, F.E.S., W. J. Ash-

down, R. T. Bowman, E. J. Bunnett, M.A., A. W. Dennis, F. W. Frohawk, F.E.S., M.B.O.U., Lachlan Gibb, F.E.S., and T. W. Hall, F.E.S.

The President the read the Annual Address. (See page 36.)

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

Ordinary Meeting.

Mr. Bunnett exhibited photographs of the details of the life-history of *Dasycera sulphurella*, of which the larvæ live in damp rotting wood, including imagines, larvæ, and pupa, together with living imagines recently bred. He also showed photographs of the immature stages of the sawfly, *Phyllotoma aceris*, in the leaf of the sycamore tree, including the larval tracks, the pupal case, and the pupa.

Mr. Tonge exhibited a specimen of *Phigalia pedaria* (*pilosaria*) taken at Reigate on November 24th. This date was supposed to be the earliest date hitherto recorded for this species.

Mr. Bowman exhibited aberrations of *Cœnonympha pamphilus*, including (1) a very pale form from Tring; (2) a specimen with very dark and wide margins; (3) several with very dark suffused undersides of hindwings; (4) with well developed ocellated spots on undersides. These latter were all from Horsley. Mr. Tatchell said that specimens with heavily marked margins were to be taken at Purbeck.

Mr. Cornish reported breeding *Dasychira pudibunda* in January, and Mr. Tatchell *Stauropus fagi* in December.

Mr. Hy. J. Turner exhibited a short series of *Polyommatus* (?) *dolus*, the typical form from near Florence, Italy, the form ab. *vittata* with a faint whitish median streak on the hindwings beneath and greater suffusion of silky gloss on upper surface, from the Cevennes, Central France, and a specimen of the race *menalcas*, from Asia Minor, in which the streak is well defined. The specimens of this species in the Society's (Freeman) collection were pointed out as being from the Cevennes, and showing the streak as being very faint and the upper surface almost wholly suffused with the silky gloss. He also showed a very small male of *Polyommatus icarus* (22mm.) from the Isle of Elba, with specimens of *Pieris mannii*, including the summer form of female *rossii* from he same place.

INDEX.

THE ABSTRACT OF PROCEEDINGS

For 1886, 1887, 1888-9 (1 Vol.),
1890-91 (1 Vol.), 1892-3 (1 Vol.),
1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901,
1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909,
1910, 1911, 1912, 1913, 1914, 1915, 1916 and
1917

Are still in print, and may be had on application to the Librarian.

1886, price 1/6; 1887, price 2/6; 1888-9 and 1890-91, price 3/6 each; 1892-3, price 3/-; 1894, price 2/6; 1895, price 2/-; 1896, price 2/6; 1897, Part 1, price 2/-; Part 2, price 2/-; 1898, Part 1, price 1/-; Part 2, price 2/-; 1899, price 2/6; 1900, price 2/6; 1901, price 2/-; 1902, price 2/6; 1903, price 2/-; 1904, price 2/-; 1905, price 2/6; 1906, price 2/6; 1907, price 2/6; 1908, price 2/6; 1909, price 5/-; 1910, price 4/6; 1911, price 4/6; 1912, price 3/-; 1913, price 4/-; 1914, price 4/-; 1915, price 5/-.; 1916, price 3/6; and 1917, price 3/6.

N.B.—MEMBERS are allowed a discount of one third off the above prices.

CONTENTS.

MEETINGS OF THE SOCIETY

HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.

1919-1920.

1919:—May 8th, 22nd; June 12th, 26th; July 10th, 24th; August 14th, 28th; September 11th, 25th; October 9th, 23rd; November 13th, 27th; December 11th.

1920:—January 8th, 22nd (Annual, at 7 p.m.); February 12th, 26th; March 11th, 25th; April 8th, 22nd; May 13th, 27th; June 10th, 24th.

LIBRARY OPEN AT 6.30 p.m., CHAIR TAKEN AT 7 p.m.

Members exhibiting specimens at the Meetings of the Society are requested to be good enough to hand to the Secretary, at the Meeting, a note in writing of the generic and specific names of all specimens exhibited, together with the names of the localities in which such specimens were obtained, and any remarks thereon which the exhibitors have to make. In the absence of such a note in writing the Secretary cannot be responsible for any errors in connection with his report of such exhibits, or for the omission of any reference thereto in the Proceedings.