

City of London Entomological & Natural History Society.

PROSPECTUS FOR 1906.

THIS SOCIETY has for its object the diffusion of the science of Natural History, by means of papers, discussions, exhibitions, and the formation of collections for reference. Since its commencement in 1858, a valuable and useful Library has been formed, which comprises, amongst other works, sets of the "Zoologist" (1843—1897), "Entomologist" (Vols. 1—38), "Entomologist's Monthly Magazine" (Vols. 1—40), and the "Entomologist's Record and Journal of Variation" (Vols. 1—16). There is also a collection of British Lepidoptera, and collections of other orders are now in course of formation.

The meetings take place on the first and third Tuesdays in each month, EXCEPT JULY AND AUGUST, from 7.30 to 10 p.m., at the London Institution, Finsbury Circus, E.C., which is easily accessible from all parts. Exhibits are made at every meeting, and papers read on various Natural History Subjects, a special feature being the systematic discussion and exhibition of interesting groups of insects, etc.

The Entrance Fee is Two Shillings and Sixpence, and the Annual Subscription Seven Shillings and Sixpence, payable in advance, being fixed at as moderate a sum as is possible, consistent with the proper maintenance of the Society, and its work, in order that all may avail themselves of the benefits offered. The Society therefore looks with confidence for the support of all who are interested in the study of Natural History.

The year commences on the first Tuesday in December, but intending members may join at any time, the ballot being taken at the next ordinary meeting after that on which they are proposed.

Further information may be obtained from the corresponding Secretary.

170.

14 MAY. 1907

TRANSACTIONS

OF THE

CITY OF LONDON

Entomological & Natural History Society.

FOR THE YEAR 1906.



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CITY OF LONDON ENTOMOLOGICAL SOCIETY,
THE LONDON INSTITUTION, FINSBURY CIRCUS, E.C.

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CITY OF LONDON

Entomological & Natural History

SOCIETY,

Established 1858.

MEETINGS HELD AT

THE LONDON INSTITUTION

FINSBURY CIRCUS, E.C.

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W. J. KAYE AND A. SICH.

14 MAY. 1907

TRANSACTIONS

OF THE

City of London Entomological

AND

Natural History Society.

PART XV.

(1906.)



WITH LIST OF MEMBERS.

THE SOCIETY'S ROOMS, LONDON INSTITUTION,
FINSBURY CIRCUS, E.C.

JANUARY, 1907.

List of Members.

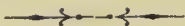
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REPORTS OF MEETINGS.



Dec. 19th, 1905.—*TRIPHÆNA SUBSEQUA* (=COMES).—Rev. C. R. N. Burrows exhibited three examples of banded form from Mucking.

CLEOCERIS VIMINALIS.—Mr. A. Harrison, a series bred from larvæ taken at Windermere in June, 1905, the specimens showing a considerable variation in colour, ranging from light to dark grey; a few captured imagines from Barmouth were all of the ordinary pale grey form.

POLYOMMATUS BELLARGUS.—FROST AND COLORATION.—Dr. G. G. C. Hodgson, three ♂s from Surrey Downs and Lewes, taken a few days after an early frost in September, 1905; these were more inclined to slate colour than those taken in the same districts previous to the frost.

CENONYMPHA PAMPHILUS ABERRATIONS.—Mr. C. P. Pickett, a series from Dover, August, 1905, including two ♂s with black marginal bands very pronounced, and two specimens with abnormally dark undersides.

SPILOTE GROSSULARIATA.—A living imago bred from larva found on October 21st.—Ibid.

JASPIDIA PERLA.—Mr. V. E. Shaw, a series from Torquay, July, 1905, including var. *flavescens* (Tutt).

RHEUMAPTERA HASTATA.—Mr. A. W. Mera, this species and its English allies, also two specimens of the Iceland form *Thulvaria*. Mr. L. B. Prout also exhibited this group and various European, American, and Oriental forms of the species and its allies.

PAPER.—Mr. L. B. Prout read a paper entitled "The Rheumaptera Hastata group," which is printed in extenso in this volume.

Jan. 2nd, 1906.—Pocket Box Exhibition.

MELANIC MALENYDRIS MULTISTRIGARIA.—Mr. J. A. Clark, several examples from Huddersfield.

ANGERONA PRUNARIA.—BANDED FORM.—Mr. G. R. Garland, a series bred from parents of this form in which only a small proportion followed the parents; also a brood from typical parents which included two banded specimens.

SPILOSOMA LUBRICIPEDA VAR. *RADIATA*.—A fine striated ♀, with black bands covering more than half the area of the hind wings, taken at Leyton, June, 1904.—Ibid.

HYLOPHILA PRASINANA ABERRATION.—Mr. T. H. L. Grosvenor, a specimen from Tilgate, June, 1904, with the area between the two silver lines almost entirely occupied by a white band.

MELANIC LEPIDOPTERA.—Mr. H. M. Edelsten, melanic specimens of *Phigalia pedaria* from Enfield, *Ectropis bistortata* from Swansea, *Cymatophora gemmaria* from Midlands, *C. repandata* from Huddersfield, and *Colotois pennaria* from Epping; in the latter the wings were sprinkled with black scales.

VARIATION IN *APECTA NEBULOSA*.—Mr. A. Harrison, a series bred from larvæ collected during spring of 1905, in Delamere Forest; the specimens varied from the ordinary light grey form, to the extreme

black form with white cilia (ab. *Thompsoni*), and included about 11 per cent. of more or less melanic forms.

COSMOTRICHE POTATORIA ABERRATIONS.—Mr. A. W. Mera, pale specimens from Cambridge Marshes.

NONAGRIA SPARGANII.—Mr. L. B. Prout, a short series showing considerable variation, bred August, 1905, from pupæ taken in East Kent.

AGLAIS URTICÆ ABERRATION.—Mr. V. E. Shaw, a specimen taken at Bexley, August 29th, 1905, with hindwings entirely suffused with black, and marginal bands on forewings much broader than in the type.

ASYMMETRICAL POLYOMMATUS ICARUS.—A ♂ with marginal row of ocelli absent on right wing, and represented by only two spots on left wing.—*Ibid.*

ACRONYCTA LEPORINA ABERRATION.—Mr. A. J. Willsdon, a unique (?) specimen from South Essex, having upper wings entirely black and the underwings somewhat darker than in normal specimens.

SUGGESTED CROSS-BREEDING OF DREPANA BINARIA AND *D. CULTRARIA*.—Mr. Willsdon also exhibited captured series of these species which so overlapped in appearance that the exhibitor suggested that they cross-bred in the wild state.

Jan. 16th, 1906.—DONATION.—Mr. J. A. Clark presented a copy of *The Naturalists' Directory* for inclusion in the Society's library.

ARCTIA VILLICA VAR. *KONEWKAI*.—Dr. T. A. Chapman, a ♀ taken in Sicily, April 1905, and other imagines bred in November and December from ova laid by the ♀.

SATURNIA PAVONIA-MINOR.—Mr. W. J. Kaye, two very large ♀s bred from Bexley larvæ.

ARCTIA CAIA ABERRATIONS.—Mr. A. W. Mera, imagines with yellow hindwings, from Ipswich.

ITHYSIA LAPPONARIA × ZONARIA HYBRIDS.—A living ♀, one of eleven ♀s bred to date from a pairing of *Ithysia lapponaria* and *N. Zonaria*.—*Ibid.*

EPUNDA LICHENEA.—LARVAL VARIATION.—Mr. V. E. Shaw, larvæ reared from a single batch of Torquay ova, varying from light green to dark green and brown.

PAPER.—Mr. C. P. Pickett read a paper entitled *Breeding British Tigers* relative to his experiences in collecting and rearing the various species included under the popular name of "Tiger moths." Mr. Pickett remarked on the increasing scarcity of *Aretia caia* in the London district, and the gradual disappearance of *A. villica* from the neighbourhood of Willesden; he also expressed surprise at the continued abundance of *Callimorpha dominula* at Deal, despite the annual raids made by collectors, professional and otherwise, and drew attention to the fact that this species scatters its eggs loosely.

Feb. 7th, 1906.—DONATION.—Rev. C. R. N. Burrows, numerous lepidoptera for the Society's cabinet.

NEW MEMBER.—Mr. Henry A. King, of "Oakleigh," Coolhurst Road, Crouch End, was elected.

SPECIAL EXHIBITION OF PRESERVED LARVÆ.—Mr. A. Bacot, larvæ of *Lasiocampa quercus* and its sub species: *Callunae*, *Meridionalis*, *Spartii*,

and *Sicula*; also of the following hybrids: *Spartii* × *Meridionalis*, *Spartii* × *Callunae*, *Callunae* × *Meridionalis*, and *Sicula* × (*Spartii* × *Meridionalis*).

Rev. C. R. N. Burrows, larvæ of about 200 species including *Aporia crataegi*, *Amathes dahlîi*, *Eremobia ochroleuca* and *Trigonophora flammea*.

Mr. J. A. Clark, larvæ of *Eurymus croceus*, *Lasiocampa quercifolia*, and *Triphaena comes* (= *subsequa*).

Messrs. Mera, Sequeira, and Shaw, also exhibited preserved larvæ.

ARUM LILY "SPORT."—Mr. Riches exhibited an arum lily with a somewhat abnormal blossom, and a leaf white on the upper surface, save for a narrow border of pale green, which colour also characterised the under side; the leaf, both in appearance and shape resembled a flower rather than a leaf.

DISCUSSION.—Mr. J. A. Clark opened a discussion on the preservation and mounting of larvæ, in which most of those present took part.

Feb. 21st, 1906.—DONATIONS.—The curators announced the receipt of various lepidoptera from Rev. C. R. N. Burrows and Mr. V. E. Shaw. Mr. A. W. Mera presented the 1905 volume of *The Entomologist's Record* to the Society.

NONAGRIA NEURICA.—Mr. H. M. Edelsten, in connection with his paper, exhibited four *N. neurica* (Hb.), including one taken by Herr Schmidt, two specimens of *N. arundineta* (Schmidt), and one *N. arundineta* (?) from Central Asia—all these specimens being sent to the exhibitor by Herr Püngeler, of Aachen; also specimens of *N. dissoluta*, (Tr.), (= *Hessii* Bdv.), and *N. dissoluta*, var. *arundineta* (Schmidt), from East Kent, etc., with ova, larva and pupa of *arundineta*. Rev. C. R. N. Burrows also exhibited specimens from Mucking, Cambridge, East Kent, and Norfolk, etc., including one ab. *Hessii*, taken at Rainham.

HELIOPHILA BREVILINEA.—Mr. Edelsten, a supposed example of this species from Asia, with a British specimen for comparison. Mr. F. Capel Hanbury also exhibited this species, including a specimen closely approaching to var. *bilinea*.

CYCLOPHORA PENDULARIA VAR. SUBROSEATA.—Mr. W. J. Kaye, three examples of this var. from Staffordshire, also a bred series of the species from Reading, with a prominent pink central band.

EPIRRITA DILUTATA VARS.—Mr. A. Harrison, almost unicolorous specimens from Epping Forest, dark specimens with well defined bands from Delamere, and four examples of var. *Chrysti*, from Enniskillen.

NONAGRIA DISSOLUTA (NEURICA VAR. HESSII), FROM EAST KENT, WAS EXHIBITED BY MR. L. B. PROUT.

PAPER.—Mr. H. M. Edelsten read a paper on "The identity of the British *Nonagria neurica*," destined to be ultimately published in *The Entomologists' Record*. In this he pointed out that in 1805 Hübner gave four figures, numbers 381, 659 and 661, all of which were referred to as *Neurica*; in 1825, however, Treitschke expressed the opinion that numbers 659-61 did not represent the same species as number 381, and suggested that the former figures should be sub-named *Dissoluta*. Mr. Edelsten proceeded to quote the description of these insects subsequently given by the various authorities, demonstrating that the two forms (or species), had been frequently confounded, not only in the imaginal, but also in the larval stage. The conclusion arrived at, by

Mr. Edelsten, was that the black form at present known in Great Britain as var. *Hessii*, is actually *Nonagria dissoluta* (Tr.), (= *neurica* Hb., 659-61, non 381 and *Hessii*, Bdv.), and that the species regarded as the British *N. neurica*, is var. *arundineta* (Schmidt), of *N. dissoluta*.

March 6th, 1906.—HEMITHEA ÆSTIVARIA, ETC.—Mr. L. B. Prout exhibited specimens from Japan larger than the European form; also *Thalera fimbrialis* (Scopuli), from Central France and Spain, *Hemithea distinctaria* (Walker), and *H. disjuncta* (Walker), from India, and an apparent *Hemithea*—species unknown—from North Queensland.

Rev. C. R. N. Burrows exhibited *H. aestivaria* from Bentley, Suffolk.

HELIOPHOBUS HISPIDA FROM TORQUAY.—Mr. V. E. Shaw, a fine series taken at rest and on "sugar" in September, 1905.

PAPER.—Rev. C. R. N. Burrows read a paper on *Hemithea aestivaria*, the bulk of which was devoted to the larval characteristics; by diagrams and description he showed that the larva bears, in a modified form, the highly specialised appendages used by *P. smaragdaria* to attach its artificial covering, and also possesses spicules similar to those found on *Terpne papilionaria*. So far as the larva is concerned the species would therefore appear to form a connecting link between these two species.

March 20th, 1906.—TRIAENA PSI AND T. TRIDENS.—Dr. T. A. Chapman exhibited a series of supposed *T. tridens*, from the late Mrs. Bazett's collection, which he pronounced to consist entirely of *T. psi*, also the late Mr. Barrett's series of *T. psi* and *T. tridens*, which showed some confounding of the two species.

Messrs. Bell, Burrows, Mera, Prout, and Riches, also showed series of these species.

NONAGRIA DISSOLUTA AND N. DISSOLUTA VAR. ARUNDINETA.—Mr. H. M. Edelsten exhibited these forms ex. the late Mr. Barrett's collection, in which they appeared as *N. neurica*, Hb.

PAPER.—Dr. T. A. Chapman read a paper on "The Differentiation of *Triana tridens* and *T. psi*," which is included in this volume.

April 3rd, 1906.—DONATION.—Mr. W. J. Kaye presented to the Society's collection specimens of *Lithophane conformis* ex Erwick collection.

NEW MEMBER.—Mr. L. W. Newman, of Bexley, was elected.

MELANIC LEPIDOPTERA FROM RICHMOND PARK.—Mr. E. A. Cockayne exhibited dark forms of *Erannis leucophaearia* and *Apocheima hispidaria* taken in 1906.

UNUSUAL POSITION OF ANTHROCERA COCOON.—Dr. G. G. C. Hodgson, a cocoon of *Anthrocera jilipendulae* found on a hawthorn bush about two feet above the ground.

ANTICLEA BADIATA.—EXTENDED EMERGENCE.—Mr. W. J. Kaye, a series bred from ova laid by Surbiton ♀. The emergence extended from February 1st to March 22nd, although all the larvæ pupated within two or three days.

ITHYSIA LAPPONARIA × ZONARIA HYBRIDS.—Mr. A. W. Mera, ♂ and ♀ specimens, the former showing more resemblance to the ♂ parent (*N. zonaria*) than the latter. Several pairings of the hybrids were obtained, and the ♀s went through the action of oviposition, but no ova were laid.

AMATHES DITRAPEZIUM.—Mr. J. Riches, a series bred in 1904 from Hampstead Heath larvæ.

PAPER.—Mr. Alfred Sich read a paper on the Micro-lepidoptera of London, which is published at the end of this volume.

April 17th, 1906.—PARARGE EGERIA, 3rd BROOD.—Mr. C. P. Pickett, a series bred August 1904, and the descendants of this brood which passed the winter in the pupal stage, and emerged in March and April 1905.

LARVÆ FROM DEAL.—Mr. T. H. Hamling, larvæ of *Callimorpha dominula* from this district, where he had also found larvæ of *Leucoma chrysoorhea* plentiful.

BREPHOS PARTHENIAS AT THEYDON BOIS.—Mr. C. P. Pickett reported that this species had been abundant in the current spring.

May 1st, 1906.—PRESERVED LARVÆ.—Rev. C. R. N. Burrows, numerous larvæ, including *Ptychopoda degeneraria*, *Trochilium tipuliformis*, and *T. chrysidiformis*.

MESOPHLEPS SILACELLUS.—Mr. J. A. Clark, specimens taken at Falmer, in July, 1905, by Mr. Vine.

NOTOLOPHUS GONOSTIGMA.—Mr. W. J. Kaye, a series comprising first brood, bred July 1905, from Essex larvæ, and a partial second brood, reared from ova obtained from July emergence, bred in September and October, 1905.

MELANIC LEPIDOPTERA FROM YORKSHIRE.—Mr. V. E. Shaw, bred *Erannia marginaria* var. *fuscata*, and dark specimens of *Phigalia pedaria*.

EMERGENCE OF CYANIRIS ARGIOLUS.—Rev. C. R. N. Burrows reported that he had bred two crippled specimens in spring of 1906, from ova laid by the spring brood of the previous year.

May 15th, 1906.—HELIOPHILA FAVICOLOR.—Rev. C. R. N. Burrows, a preserved larva, and also that of *H. lithargyria*, for comparison.

EUPITHECIA HELVETICARIA VAR. ARCEUTHATA.—Mr. W. J. Kaye, a living imago from Surrey, which he considered to belong to this species. (See Exhibits September 18th, 1906.)

June 4th, 1906.—EUVANESSA ANTIOPA.—Dr. T. A. Chapman, larvæ in penultimate stadium from South France.

SYNOPSIS ABRUPTARIA.—Mr. E. Harris, a series bred from almost typical parents descended from dark and light cross; the specimens shown were considerably darker than the type.

PLUSIA MONETA, ABNORMAL COCOON.—Mr. C. P. Pickett, a cocoon about twice the usual length, and open at both ends.

EMATURGA ATOMARIA AB.—A specimen with two extra rudimentary wings.—Ibid.

EXPERIMENTS IN HYBRIDISM.—Mr. C. P. Pickett announced that he had obtained about forty ova from a pairing of *Smerinthus ocellatus* and *Amorpha populi*, and five ova from *S. ocellatus* and *Dilina tiliae*.

June 18th, 1906.—NEW MEMBER.—Mr. A. J. Willsdon was elected a member of the Society.

EFFECT OF PABULUM ON LARVÆ OF VANESSA CARDUI.—Mr. A. Bacot, a

larva in last stadium fed on burdock; the specimen seemed to bear out a suggestion, made by Dr. T. A. Chapman, that larvæ of this species found on burdock are more densely covered with hairs than those feeding on thistle.

TROCHILUM CULICIFORME AB.—Mr. A. W. Mera, a specimen from Essex with the body banded with white instead of red.

GRAPHIPHORA OPIMA.—RESPONSE TO ENVIRONMENT.—A series from Brentwood which was generally lighter in colour than those occurring on the same ground, a few years ago, immediately after the vegetation had been burnt down.—Ibid.

MIMAS TILLÆ ABS.—Mr. C. P. Pickett, a series including an almost unicolorous rust-red specimen.

AMORPHA POPULI.—a specimen with a lilac tinted bloom all over the wings.—Ibid.

DIPHTERA ALPIUM (ORION).—Mr. A. J. Willsdon, a specimen bred from New Forest, with brown blotches on forewings somewhat accentuated.

PACHETRA LEUCOPHEÆA AND *SCORIA DEALBATA* AT WYE.—Mr. V. E. Shaw reported the capture of both these species during the Whitsun holiday.

September 4th, 1906.—*LARVAL RESISTANCE TO ATMOSPHERIC PRESSURE*.—Mr. A. Bacot exhibited an imago of *Lasiocampa quercus* bred from a larva that had, during the last stadium, been submitted more than once for about an hour at a time to a pressure of 40 atmospheres without suffering injury.

LAMPIDES BOETICA AND *L. IDAS* FROM N. SPAIN.—Dr. T. A. Chapman, in showing these two species, called attention to the fact that the latter had hitherto only been recorded from Sierra Nevada.

PARASCOTIA FULIGINARIA.—Mr. J. A. Clark, a specimen taken in St. Katharine Dock in July, 1906.

SPILOTE SYLVATA ABS.—Mr. C. P. Pickett, a long and variable series from Bucks, including many leaden coloured specimens, the first captures of this form recorded in this county.

HERMAPHRODITE ANGERONA PRUNARIA.—A specimen with markings of ♂ and ♀ more or less confused, and tending to diagonal disposition instead of being confined to the pairs of wings on either side of the body as is more usually the case.—Ibid.

BRED NOTODONTA TREPIDA.—Mr. V. E. Shaw, a series from ova laid by New Forest ♀.

September 18th, 1906.—*DAPHNIS NERII LARVA*.—Mr. A. Bacot, a larva in first stadium, the caudal horn being about half as long as the body.

PACHYS BETULARIA.—Rev. C. R. N. Burrows, a ♀ intermediate between type and var. *doubledayaria*.

XANTHORHŒ AMNICULATA AB.—A specimen from Mucking, having the white ground colour suffused with brown.—IBID.

ARGYNNIS AGLAIA AB.—Dr. G. G. C. Hodgson, a specimen taken at Brighton resembling *A. adippe*, owing to the marginal band being lightly marked, especially as regards the intra-marginal black lines.

ENNOMOS AUTUMNARIA AB.—Mr. L. W. Newman, a ♀ bred from wild parents, having the wings heavily suffused with dark scales.

LAPHYGMA EXIGUA FROM ISLE OF WIGHT.—A series taken in 1906.—Ibid.

MELANIC EMATURGA ATOMARIA.—A series from Bury, Lancs., with hardly any trace of the typical light markings.—Ibid.

BREPHOS NOTHA—PROLONGED PUPATION.—Mr. Newman also exhibited a long series of this species that had remained in the pupal stage for three years.

EUPITHECIA SATYRATA.—Mr. L. B. Prout, specimens beaten from Juniper near Dorking, which were at first believed to be *E. helveticaria* var. *arcenthata*, but which he considered to be *E. satyrata*.

EFFECT OF FOOD-PLANT ON CYMATOPHORA REPANDATA.—Mr. L. W. Newman reported that larvæ fed on birch had produced a second brood, while others on hawthorn had only grown to the length of about an eighth of an inch.

DREPANA FALCATA EMERGENCE.—Mr. Newman also stated that although this species usually appears in April, when in captivity this year the emergence had been about equally divided between April and June.

CYANIRIS ARGIOLUS—THIRD BROOD.—Rev. C. R. N. Burrows reported the rearing of specimens which resembled the spring form.

Oct. 2nd, 1906.—POLYOMMATUS ICARUS ABS.—Mr. T. H. L. Grosvenor a long series including blue spotted ♀s and ♂s, a ♂ without marginal band, and a specimen from Witherslack, with black dots on cilia as in *P. adonis*.

EUCHLORIS SMARAGDARIA AB.—Mr. A. Harrison, a series including a specimen lacking the usual white line on forewings.

CUCULLIA ASTERIS FROM ESSEX MARSHES.—Mr. A. W. Mera, a series bred from larvæ found on Sea-aster.

PAPILIO MACHAON AB.—Mr. L. W. Newman, a specimen with red colouration in all the lunules on the hindwings.

MAMESTRA GLAUCA.—a series from Cannock Chase, Rannock, and Bury, those from the latter showing a melanic tendency.—Ibid.

MELANIC LEPIDOPTERA FROM NORTH CORNWALL.—Mr. L. B. Prout, on behalf of Mr. G. B. Oliver, melanic examples of *Leptomeris marginipunctata* and *Ptychopoda subsericeata*, 1906; also a dark *Coenonympha pamphilus*, 1903.

PHRYXUS LIVORNICA.—Mr. V. E. Shaw, an imago taken at Torquay, June 2nd, 1906.

TAPINOSTOLA BONDII.—A series taken at Folkestone, July 10th, 1906.—Ibid.

Oct. 16th, 1906.—PTEROPHORUS BRACHYDACTYLUS.—Dr. T. A. Chapman, a series bred in 1906, from ova laid by imagines bred from larvæ taken in Switzerland, May 1905.

CHORTOBIUS DAVUS.—Mr. T. H. L. Grosvenor, the type from Aberdeen and var. *rothliebii*, from Witherslack and Penrith.

AGROCHOLA LUNOSA.—Mr. G. H. Heath, a series from Sandown, September 1906, varying from deep brown to sandy specimens.

EUCHILOË CARDAMINES AB.—Dr. G. G. C. Hodgson, a ♂ with tips of forewings streaked alternately with yellow and orange.

LAPHYGMA EXIGUA.—Mr. L. W. Newman, a series showing considerable variation in ground colour of forewings, from Isle of White, 1906.

Mr. P. H. Tautz, a single specimen taken at Pinner.

Mr. V. E. Shaw, fullfed and recently hatched larvæ of this species.

POLIA XANTHOMISTA FROM BUDE.—Mr. L. B. Prout, specimens resembling the Isle of Man form.

HELIOTHIS PELTIGERA AB. OVO.—Mr. A. Sich, a specimen bred from Dorset, the imago emerging 42 days after the larva hatched out.

TRIPHLENA JANTHINA.—Mr. A. J. Willsdon, a melanic specimen bred from New Forest ovum.

LAPHYGMA EXIGUA.—BRIEF LARVAL STAGE.—Mr. L. B. Prout stated that larvæ kept in a warm room had pupated within twenty days of emergence from the egg.

Nov. 6th, 1906.—*PLEBEIUS ARGUS* (*ÆGON*).—Dr. G. G. C. Hodgson, a long series from Ashdown Forest and Witherslack, including an almost grey ♂, and several aberrant undersides.

DRYOBOTA PROTEA AB.—Mr. G. H. Heath, a specimen taken at Sandown, September 1906, closely resembling the third figure given in Newman's *British Moths*

CHRYSOPHANUS PHLEAS ABS.—Mr. L. W. Newman, a long series taken at Bexley during September and October, 1906, including a golden coloured specimen, several intermediate between this form and the type, a ♀ without the usual marginal band on the hindwings, and striated, brick-red, and almost white undersides.

ASTHENA BLOMERI.—Mr. V. E. Shaw, a fine series from Chalfont Road, June 30th, 1906.

The evening was devoted as usual to the exhibition and exchange of members' duplicates.

November 20th, 1906.—NEW MEMBERS.—Messrs. L. A. E. Sabine and Harold B. Whitehouse were elected members of the Society.

SYNOPSIS ABRUPTARIA.—The special feature of the evening was an exhibition and discussion with regard to this species.

Mr. S. J. Bell exhibited two broods bred from pupæ received from Mr. E. Harris. Brood A, ex-light ♀ and dark ♂ parents and light ♀ and dark ♂ grand-parents, yielded 80 per cent. dark and 20 per cent. light specimens; brood B, from dark parents, ex-light ♂ and dark ♀, yielded 96 per cent. dark and 4 per cent. light forms. Brood A consisted of 48 per cent. ♂ and 52 per cent. ♀, while brood B yielded 34 per cent. ♂ and 66 per cent. ♀.

Mr. Pickett exhibited long series, including first, second, and third brood of the type, and dark forms ex Clapton parents, including a slate-coloured specimen.

Messrs. J. A. Clark, J. Riches, and V. E. Shaw, also exhibited series; amongst those shown by Mr. Clark was a gynandromorphous specimen.

APOROPHYLA LUTULENTA.—Rev. C. R. N. Burrows, nine examples of the grey form, being the only specimens found in about 200 taken at Mucking during 1906.

AGROTIS ASHWORTHII.—Mr. J. A. Clark, a single specimen from N. Wales, August, 1906.

GLEA LIGULA.—Mr. G. H. Heath, a series from Sandown, Isle of Wight, October, 1906, including specimens with pale submarginal line very pronounced.

ANTHROCERA MINOS.—Mr. L. W. Newman, specimens from Wales and Oban. Also an *Anthrocera*, taken at Oban, in June 1903, in company

with *A. minos*, having six spots on forewing, but with the fluffy body characteristic of *A. minos*.

APOROPHYLA AUSTRALIS ABS.—Mr. L. B. Prout, very strongly marked ♂s and a ♀ of the rare ab. *ingenua*, from Sandown, Isle of Wight, September, 1906.

LEPTOMERAS IMMORATA.—Six specimens, a partial second brood, from Lewes ova.—Ibid.

DISCUSSION.—During the discussion on *S. abruptaria*, it was elicited that the dark form had been found in the Clapton district for many years, and was apparently gaining ground there.

Dec. 4th, 1906.—LOMASPILIS MARGINATA ABS.—Mr. W. Bloomfield, two specimens with black marginal blotch intersected by a slender white line.

FOOTMEN.—BRED AB. OVA.—Mr. H. M. Edelsten, short series of *Lithosia muscerda*, *L. caniola*, *L. complanula* and *L. griseola* var. *stramineola*, all bred ab. ova.

LAPHYGMA EXIGUA.—Mr. G. H. Heath, a variable series taken at Sandown, Isle of Wight, September, 1906.

NOTOLOPHUS GONOSTIGMA.—Mr. J. Riches, imagines reared from ova laid by ♀s bred in 1905, the larvæ having been hibernated in captivity.

APAMEA BASILINEA AB.—Mr. V. E. Shaw, a long series from Wye Downs, June 1906, including a very pale specimen in which the orbicular stigma was entirely absent, and the reniform only partially outlined.

GELECHIA PINGUINELLA AND BORKHAUSERIA PSEUDOSPRETTELLA.—Mr. A. Sich exhibited these species to show their close resemblance to one another, and called attention to the following means of identification, *G. pinguinella* has the more pointed hindwings with margin indented below the costa; also nervures six and seven spring from a common stalk while in *B. pseudospretella* these nervures are parallel, and the hindwings are not indented.

ANTIQUA EUVANESSA ANTIOPA.—Dr. J. S. Sequeira exhibited reputed British specimens dating from 1803 to 1872.

PANOLIS GRISO-VARIEGATA.—Mr. A. J. Willsdon, a specimen of the green form, taken at Oxshott.

ABNORMAL EMERGENCES.—Mr. Willsdon also exhibited *Anticlea badiata* and *Cyclophora pendularia* bred in the open air on October 31st and November 1st respectively.

HOLLY IN BLOOM IN DECEMBER.—A sprig of holly in bloom, picked in a London park, was also shown by the same member.

ELECTION OF EXECUTIVE FOR 1907.—The result of the election of officers for the ensuing year was as follows:—

PRESIDENT.—Mr. A. W. Mera.

VICE-PRESIDENTS.—Dr. T. A. Chapman, and Messrs. J. A. Clark, F. J. Hanbury, and L. B. Prout.

TREASURER.—Mr. C. P. Pickett.

LIBRARIANS.—MESSRS. G. H. Heath and V. E. Shaw.

CURATORS.—Mr. T. H. L. Grosvenor and Dr. G. G. C. Hodgson.

SECRETARIES.—MESSRS. S. J. Bell and E. Harris.

NON-OFFICIAL MEMBERS OF COUNCIL.—Rev. C. R. N. Burrows, and Messrs. A. Bacot, H. M. Edelsten, J. Riches, and P. H. Tautz.

SECRETARIES' REPORT FOR THE YEAR 1906.

The Society's rules decree that the production of an annual report shall be one of the burdens under which the secretaries languish; moreover, there is also laid down in those rules—perhaps not unwisely—the precise form that the said report shall take. It is not surprising, therefore, that the secretaries' annual literary effort smacks of repetition, and since the Society plods along year after year practically without change in any respect, we offer no apology for a necessarily monotonous performance.

In our report for 1905 we ventured to gently chide members on the subject of attendance, and the reproof has had precisely the effect—or lack of effect—that the result of previous efforts to stir members into at least a semblance of greater activity led us to expect. Last year the average attendance was, to be precise, 16·85, while this year it has been 16·55; the attendance of visitors has also declined from 1·1 to ·85. Having in our previous report expended considerable energy in an endeavour to bring home to members that their presence, as well as their subscription, is essential to the well-being of the society—obviously without result—we will this time leave the following fact to speak for itself, *viz.*, that the total attendance of those members within easy reach of Finsbury Circus gives an average of six per capita out of a possible 20.

The membership of the society remains practically in *statu quo*, four members having retired, while five new members have been elected; for some occult reason it is apparently impossible for the society to secure more than 70 to 75 members.

As regards field meetings, we have this year tried the experiment of increasing the number, and instead of only two being held, three were conducted, *viz.*: to Horsley in May, Effingham in June, and Chalfont Road in July, by Messrs. Kaye, Shaw, and Prout respectively; these were, we think, sufficiently successful to encourage a continuance of the increased number of meetings. It could be wished that a greater variety of localities could be found, but there are so many limiting factors that this is apparently impossible.

In the matter of donations there is not very much to record. Some interest seems to have been aroused by our curator's persistent attempts to obtain members' assistance in the improvement of the collection of lepidoptera. The Society is indebted for numerous specimens to the Rev. C. R. N. Burrows and Messrs. J. A. Clark, W. J. Kaye, A. W. Mera, and V. E. Shaw. It must not be forgotten also, just because it is annual event, that the President has once more added a volume of the *Entomologist's Record* to the library.

The Society's programme for the winter months has, we think, been as interesting as usual, but that is mainly due, as we pointed out last year, to the efforts of a select few of our members who year after year throw themselves into the breach—or perhaps it would be more correct to say that they are led there, and at times almost dragged there by your humble servants the secretaries. One's imagination fails to picture the position of the Society in the event of these gentlemen coming to the conclusion that they had earned a rest, and therefore declining to give further assistance. It is more than time that other members began to get into training to assist and succeed our present stalwarts. For this reason, as also for the excellence of his

initial essay, the Society is to be congratulated on the entry of Mr. H. M. Edelsten into the lists.

The details of the winter programme for the past year are as follows :—

1905, Dec. 19.	“The <i>Rheumaptera hastata</i> Group.”	Mr. L. B. Prout, F.E.S.
1906, Jan. 2.	“Pocket Box Exhibition.”	
„ „ 16.	“Breeding British <i>Tigers</i> .”	Mr. C. P. Pickett, F.E.S.
„ Feb. 6.	Exhibition of Preserved Larvæ.	
„ „ 20.	“The identity of the British <i>N. neurica</i> ”	Mr. H. M. Edelsten.
„ Mar. 6.	“ <i>Hemithea aestivaria (strigata)</i> ” ...	Rev. C. R. N. Burrows.
„ „ 20.	Discussion and Exhibition—Differentiation of <i>Triaena tridens</i> and <i>T. psi</i> in imaginal stage. Opener,	Dr. T. A. Chapman.
„ Apr. 3.	“A contribution to the study of the Micro-lepidopterous fauna of the London District.”	Mr. A. Sich, F.E.S.
„ Nov. 6.	Exhibition of Member’s duplicates with a view to exchange.	
„ „ 20.	Exhibition and Discussion— <i>Synopsisia abruptaria</i> .	
„ Dec. 4.	Annual Meeting.	

S. J. BELL }
E. HARRIS } *Hon. Secs.*

PRESIDENTIAL ADDRESS.

By A. W. MERA.

GENTLEMEN,—

You have just heard the Secretaries’ report which has set forth in detail the position of our Society, and you have also had a statement of the financial condition as well, both of which it is hardly necessary for me to enlarge upon. Nevertheless, I may say that I hope that what you have heard has given general satisfaction. Societies of this kind are always given to ebb and flow to some extent, and while we keep up our reputation as a thorough field working society, we are to a large extent fulfilling our part. The exhibits at our ordinary meetings have been well maintained, and I am inclined to think that they have increased of late. This has always been one of our strong points, and it is very gratifying to see no falling off in that direction. As will be seen by our programme for the Winter Session, we may look forward to some very interesting papers to be given by members both willing and able to lend interest to their subjects, and we confidently look forward to the increased activity and advancement of our Society.

Possibly the most striking feature of the season of 1906, and the one that will be best remembered, has been the extraordinary abundance of *Exigua*. This hitherto rare insect has been long looked upon as one of our greatest prizes, and until this year it was very poorly represented in most of our cabinets. I think it is safe to say that never before in the history of British Entomology has the species appeared in such abundance. The records come chiefly from the South Coast, and more particularly from the Isle of Wight and South Western Counties. It has, however, made considerable inroads inland, as it has been taken somewhat freely by our friend Mr. Burrows at Mucking, and a single specimen was taken at Pinner by Mr. Tautz. There are also records from Kingston-on-Thames, and from Navestock near Romford. Newman gives a description of the larva which was successfully reared from the egg in the year 1859, and from that time until this season, as far as I know, no one had been successful in rearing the insect. *Licornica* also has been unusually numerous this season, and as this is the second year of its appearance, it seems as if it may have come to stay. *Sphinx pinastri* is again recorded from the neighbourhood of Woodbridge, where it has been taken on and off for the last 30 years. This species undoubtedly has a hold in the County of Suffolk, whether originally planted there or not, and it cannot be compared to most of our other rarities, whose uncertain appearances would point to their migratory habits, and with a favourable season or two, they are able to establish themselves for a time.

My own experience of field work during the season has been very restricted owing to unavoidable causes, but during the early part of the summer, on the few times that I went collecting, I was usually rewarded with a goodly number of captures. The most interesting additions I have made to my cabinet are specimens of hybrid *lapponaria* ♀ and *zonaria* ♂. Last year I mentioned that I had been so far successful in getting the hybrids into pupæ, and this spring I was rewarded with the imagines. These commenced to appear considerably earlier than either *lapponaria* or *zonaria* occur, even when bred in confinement. The first three appeared on January 9th, followed by four on the 14th, continuing at short intervals to the end of the month. Then there was a rest until February 11th, followed by others on the 14th, 20th, 25th, and 27th. Up to this date I had bred nothing but females, 24 in all, and I began to despair of ever seeing a male; but on March 2nd two males appeared, followed by others, until March 17th. These last were all males, twelve in all, so that not a single male put in an appearance until all the females had emerged. I believe this is a characteristic with *lapponaria*, as I have invariably bred the females first and the males after, although I must confess that my acquaintance with the species is not of very old standing. As most of us know, it usually happens that the males of a species put in an appearance first, and the females afterwards. I have noticed this to be most pronounced in breeding *hispidaria*, which is not such a great way removed from *lapponaria*. The hybrids have more the appearance of *zonaria* than of *lapponaria*, being very much like a dark form of *zonaria*, but the females are very intermediate between the two, as they lose the red stripe down the body which *lapponaria* has, and the rings of *zonaria* are very much less conspicuous, although not entirely absent, and the body generally, is nearly as dark as *lapponaria*.

I sent one or two of the females to Mr. Cockayne, who had male *zonaria* out at the same time, and he was successful in getting a pairing between them. The result, however, was a failure, as no eggs were laid. Mr. Cockayne also sent me male *zonaria*, but I did not succeed in even getting them to pair, although I succeeded in pairing the ♂ and ♀ hybrids. These also paired without any satisfactory result. The hybrid females commenced calling almost immediately they emerged, and after having paired they went through a performance of egg-laying, placing their ovipositors between the the lid of a box and the box, and remaining in that position for days at a time, but never laying a single egg. I think it may safely be assumed that the females were without eggs, for although when they were alive they were plump and appeared full of eggs, after they were set, the bodies dried up to about a quarter of their original size.

Some few years ago there was an effort made on the part of a number of influential Entomologists to endeavour to check the over-collecting of certain species of Lepidoptera, with a view to prevent their possible extermination, and it was suggested that these species should be protected by common consent. Personally, I had very weak faith in the beneficial results of any concerted action in the matter, for my belief has always been that species disappear from certain places from natural or perhaps unnatural causes, rather than from any effort on the part of the collector to stock his duplicate boxes. To my mind the great cause of the disappearance of insect life near our large towns is from the contaminated atmosphere caused by smoke. We have only to take a ramble in country lanes and fields, a few miles from London, to notice how many of our commonest butterflies are conspicuous by their absence. *Tithonus* is one of the first to go. This species, as we all know, is one of the most common in the South of England, but it has quite gone for several miles round London, and being so common an insect no one could attribute its disappearance in certain places to over-collecting. Other striking examples of the absence of common species round London are those of *megeera*, *egeria*, and *hyperanthus*, all of which have more or less disappeared, besides a large number of others not so common, whose absence might lend colour to the theory of extermination by over-collecting; but seeing that our common ones have gone with others which are held in greater request, it appears to be only reasonable to assume that a vitiated atmosphere has more to do with their absence than that they have been over-collected. On the other hand, it is remarkable how some of our local species maintain their numbers under very hard collecting. We may instance *bondii*, which still holds out in its old locality near Folkestone, where it has been collected probably for the last 40 or 50 years, while other things that have been scarcely touched have gone unaccountably.

The failure to introduce butterflies into our parks, I imagine, was no surprise to most of us, and if I am right in assuming that so many of our common species have gone through the influence of smoke, it would have been indeed surprising if the hopes of seeing our parks beautified by the graceful flight of *sibylla* and *paphia* had been realised by introducing them there, with their necessary pabulum of honeysuckle and violet.

In a few instances it would appear that some species thrive under

smoky conditions. Our familiar friend *grossulariata* can stand absolutely anything, in fact, it would seem the more confined and smoky the garden the larger the number of *grossulariata* there are to be found. Although this insect thrives so well under dirty conditions, there appears to be no pronounced effort on the part of the insect to assimilate in colour to its environment in the perfect state, but in the larval state it undoubtedly does. I have frequently seen the larvæ from my own garden almost entirely black, and in great contrast to larvæ beaten from blackthorn, where the atmosphere is pure and the bushes free from soot. Another insect which has made itself entirely at home in the neighbourhood of houses is *rhomboidaria*. In this case the species, generally speaking, is much darker than country-bred ones, undoubtedly having been able to adapt itself to circumstances. *Abruptaria* is also making a brave effort to do the same, but I think it is generally conceded that melanic forms of *abruptaria* are more delicate to breed than those of the type. This, I believe, would apply to a good many other species, and it would seem that the more delicate species die out in smoky districts, and those of more robust constitutions do their best to adapt themselves to environment.

It is still a very debatable question as to the actual cause of melanism, but we are mostly agreed that when a species first shows signs of melanism, these examples most frequently occur in or around our towns. A year or two ago I took one or two *clingularia* in my garden with an unmistakable tendency to darken, and my friend, Mr. J. P. Minter, has in his cabinet a specimen of *Zeuzera aesculi*, taken in the north of London, with all the wings of a smoky colour, which may be looked upon as a case of protective resemblance, as undoubtedly it would be less conspicuous on a tree trunk, which is discoloured by London smoke, than an ordinary typical specimen would be in a similar position.

As my collecting extends over some considerable number of years, I thought, perhaps, I might be allowed to give some account of one or two of the bygone collecting localities, where some of the early British Entomologists used to frequent, with such good results. The principal spot in my mind is Hammersmith Marshes, and as I have frequently been asked where they used to exist, I hope I may be pardoned for introducing the subject. I imagine most of us have read, more particularly in Newman's book, the rich list of insects which used to occur in these marshes, and although their best days had gone even before I was able to do any serious collecting, I saw enough of them to be able to tell what a grand spot it must have been in its palmy days.

The extent of these marshes, as I knew them, extended on the East from the Railway where now stands Addison Road Station (then only a goods line with no passenger traffic) to Shepherds Bush Road on the west, and Blyth Lane on the south. This space consisted principally of osier beds intersected with dykes or ditches of various width, and in most cases full of reeds and bullrushes. There was one large pond thickly surrounded with bullrushes, and the insect and pond life was most luxuriant. We have only to look through Newman's *British Moths* to see the number of wainscots that were to be had in that Entomological Paradise, including such species as *obsoleta*, *ulvae*, and *gemini-puncta*. The Lepidopterist was not alone in his happiness, as the ponds were alive with every sort of aquatic insects, and the dragonflies were

in plenty. In most of the dykes the water was clean and clear, and I imagine it could not have been absolutely stagnant. I never saw any fish taken from any of the ponds with the exception of the two species of sticklebacks, the common three spined and the much rarer ten spined. This latter species only occurred in one pond and I believe it is not a very common species.

The osiers also were very full of various larvæ, and I think I am safe in saying that I have never since found larvæ of *Smerinthus ocellatus* and *Dicranura rinula* in such numbers as I used to find them in these marshes. The unusual feature about the larvæ of *ocellatus* found there was, that probably 90 per cent. of them were ichneumoned. I have found these larvæ from Cornwall to Suffolk, but in no other place have I found the number of ichneumoned larvæ to predominate. With a little experience it was quite easy to tell which of the larvæ were stung and which were not, as with those stung the horn at the tail was invariably shorter, and it would lose nearly all the blue colour, whereas the healthy ones had a perfect tail, and it was of a rich blue. It would almost appear as if the larva had gnawed a piece off its own tail for some unaccountable reason, as there was frequently an indication of a healed wound.

Bird life was also well represented. A friend of mine, some years my senior, had shot on these marshes, wild duck, snipe, and the lesser Grebe, the last mentioned bird clearly showing that the place must have been marsh land pre-historically, as these birds have no power of flight, and they were probably there from the dark ages. All this grand hunting ground disappeared as by magic. I think it must have been about the year 1862 when the main drainage was extended or much enlarged, down the Bayswater and Kensington Roads, and when this was done the water all disappeared, the bullrushes for a season were left high and dry, roads were soon made, houses sprung up, and what was once Hammersmith Marshes now glories in the name of West Kensington Park.

Another collecting ground of my young days, which perhaps is not entirely devoid of insect life at the present day, was Wormwood Scrubbs and Old Oak Common. These places are practically one and the same, as they are only separated from one another by the line of the Great Western Railway. Some of the most interesting species taken in that spot by myself, or by my schoolday colleagues, were *Melitæa artemis* (a single specimen), *Vanessa polychloros*, *Lycaena agestis*, and about the year 1865, *Hesperia sylvanus* was particularly numerous. *Bombus rubi* was very abundant both in the larval and perfect state. *Arbuti* was also plentiful, as well as *Tanagra choerophyllata*. *Statice* was another local species which was found in some numbers, and also *Arctia villica*. This latter species, I believe, still holds out to the present day, as the railway banks afford undisturbed feeding ground, but I understand that it is no longer in great abundance.

With reference to the capture of *artemis*, I was greatly surprised at the time to meet the species so near London, but I have since seen that Frederick Bond used to take it at Kingsbury, in Middlesex, which is no very great distance from Old Oak Common, and probably the specimen I saw was one of the very last of an old colony.

Before concluding, it now only remains for me to thank most heartily the officers of the Society for their willing co-operation in the

several duties they have fulfilled. And finally I wish to sincerely thank the members for the confidence they have reposed in me in once more electing me as their President, and to express my full appreciation of the goodwill and indulgence which they have so frequently shown towards me. And I am sure it is the wish of us all that continued success and prosperity may attend our Society.

TREASURER'S ACCOUNT, DECEMBER, 1905, TO DECEMBER, 1906.
GENERAL FUND.

Dr.	£ s. d.	Cr.	
To Balance from 1905 ..	9 12 3½	By Rent July 31st, 1905, to July 31st, 1906 ..	12 12 0
„ 49 Subscriptions, 7/6 ..	18 7 6	„ Insurance ..	0 9 6
„ 2 „ „ 5/- ..	0 10 0	„ Attendance ..	0 10 0
„ 1 Half „ „ 5/- ..	0 5 0	„ Printing and Stationery.	2 2 0
„ 6 Entrance fees, 2/6 ..	0 15 0	„ Postage ..	2 11 2
„ 2 Arrears from 1905, 7/6 ..	0 15 0	„ Subscription to Entomo- logist ..	0 6 0
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REPORTS ON FIELD MEETINGS.

CLANDON AND HORSLEY, May 26th, 1906.—Leader, Mr. W. J. KAYE.

The scheme was to train to Clandon Station and walk up through the village, and on to the downs, where the principle collecting was expected to have been done. The weather, however, was very unpropitious, and although better than what the morning promised (being so bad as to drive part of the early contingent homewards), little real collecting could be indulged in. At the foot of the downs some considerable time was spent in searching for *Strenia clathrata*, where it is usually plentiful. An odd one or two specimens were the total reward of not a little hard search. After this the party slowly wended its way over the downs, passing Newland's corner, along the ridge, and down to the Silent Pool, where an excellent tea was provided under the welcome shelter of the cottage roof. Tea having been disposed of the route taken was back on to the crest of the downs, and along eastwards to Netley Heath. This piece of country on a fine day is most beautiful, and entomologically and botanically a happy hunting ground, but under dull skies, and showers at intervals, it was robbed of half its beauty and nearly all its insect, if not its plant, treasure. Netley Heath itself had not had time to recover from the extensive fire that raged on the previous Easter Monday. This deplorable conflagration had demolished a large part of the very fine rhododendron bushes, and the bilberry, where usually *adrenaria* is not uncommon, was largely demolished. Having crossed the heath, the lane that leads down to the southern end of the Sheep Leas was followed until a footpath was struck which led right into the delightful bush-covered downs. Here several members hung back in the hope of retrieving a bad day's sport, but little was to be found, and several members were nearly left on the station platform. A list is appended below of the lepidoptera noted, together with one or two of the more conspicuous plants. In spite of the meteorological conditions, the members enjoyed the ramble, particularly as country new to many members was explored, the possibilities of which looked full of promise.

LEPIDOPTERA OBSERVED.—*Pieris napi*, the only butterfly seen; *Bapta temerata*, *B. bimaculata*, *Eupithecia seabiosata*, *Lampropteryx suffumata*, *Xanthorrhoe fluctuata*, *Lomaspilis marginata*, *Eupithecia abbreviata*, *Lozogramma petrarica*, *Xanthorrhoe montanata*, *Zonosoma linearia*, *Ectropis punctularia*, *Strenia clathrata*, *Ectropis erepuscularia* (*biundularia* auct.), *Acidalia remutata*, *Asthena candidata*, *Nola cristulalis*, *Nemophora swammerdamella*, *Adela viridella*, *Crambus chrysonuehellus*, *Plusia moneta* larvæ, *Eupithecia sobrinata* larvæ, *Hydriomena elutata* larvæ.

PLANTS.—*Orchis militaris*, *Orchis morio*, *Belladonna*.

EFFINGHAM, June 23rd, 1906.—Leader Mr. V. E. SHAW.

About a dozen members and friends put in an appearance on this occasion.

On arriving at Effingham the party took the Ripley Road, working the wood *en route*, and made for the Wisley Pond, where a few *Hydrelia unca* were turned up; in the pine wood a number of species addicted to this pabulum were taken.

After tea, at Martyr's Green, members gradually worked their way back again to the starting point at Effingham Station. It was generally agreed that the ground traversed offered excellent opportunities for collecting, and it was regretted that the time available to take advantage of the same was of necessity so restricted.

Between 40 and 50 species of lepidoptera were observed including the following:—*Erymnis sylvanus*, *Hydrelia unca*, *Nemeophila sannia* (*russula*), *Cymatophora consortaria*, *Macaria liturata*, *Hydriomena autumnalis*, *Eupithecia lariciata*, *Euphyia picata*, *Mesoleuca albicillata*, *Erastria amata*, *Epirrhone rivata*, *Perconia strigillaria*, *Plerocymia mucronata* (*palumbaria*).

CHALFONT ROAD, July 7th, 1906.—Leader, Mr. L. B. PROUT.

Fine weather and considerable abundance of lepidoptera combined to make this excursion a decided success. Thirteen members and visitors attended, commencing work in the woods near Chalfont Road Station, and thence working back to Chorley Wood—after tea at the "White Lion"—by a lane which provided excellent beating, especially for the Geometrides. Seventy-eight species of lepidoptera were recorded, the more interesting being—*Sesia stellatarum*, *Stenropus fagi* (two males), *Bombycia fluctuosa* (one at light), *Eurois prasina* (*herbida*), *Spilote* (*Abra.ras*) *sylvata* (as abundant as last year, and including leaden-coloured and other aberrations), *Hydrelia blomeri* (still fairly common, but past its prime, having been out early this year), *H. luteata*, *Euphyia picata*, *E. amniculata* (*unangulata*), *Ochyria quadri-fasciata*, *Mesoleuca albicillata*, *Melanthia procellata*, *Amoeba rubidata*, *Coenocalpe tersata*, *Ligdia adustata*, *Leptomeris imitaria*, and *Dichelina grotiana* (one only); while of the Tortricides the pretty little *Grapholitha aurana* was flying in remarkable abundance, in the sunshine, over the top of a high hedge.

PAPERS READ BEFORE THE SOCIETY.

THE RHEUMAPTERA HASTATA GROUP.

(Read December 19th, 1905, by LOUIS B. PROUT, F.E.S.)

The subject of my paper this evening was suggested principally by material in my own collection, and the drawer of black and white Geometrides which I have passed round for exhibition may serve in part as a basis for my remarks. The fact that I am rather well provided with the principal forms of *hastata* and its closest allies, and have also types of some Eastern species bearing more or less affinity thereto, and the further fact that my kind friend Dr. Chapman, in presenting me with some specimens of *luctuata* Schiff. (*lugubrata* Stgr.), spoke of it as a close ally of *hastata*, these were among the principal causes of my overhauling this section of my collection and preparing the following notes.

I believe all the species contained in my drawer have some considerable natural affinity, but it will be manifest to you at a glance that they do not form one genus, and that they could hardly all be described as forming the "*hastata* group." The first group, the comparatively narrow-winged black species with narrow or broad white central bands, comprises the genera *Baptria* (*tibiale* Esp., with vars.), *Trichodezia* (*haberhaueri* Led. and *exsecuta* Feld.) and *Neodezia* Warr., recently erected (*Nor. Zool.*, xi., p. 541) for the American representatives of the last-named (*alborittata* Guen., etc.) which have not well developed the hair-tuft to which *Trichodezia* owed its name. There are some interesting structural questions in connection with the group, but I am not going to discuss them on this occasion. *N. alborittata* (incongruously placed by Hulst in *Euchoeca*) is, as I am informed by Mr. R. F. Pearsall, of Brooklyn, a day-flier, like so many black or black-and-white species, and I suspect the same is true of *Baptria* and *Trichodezia*. In fact most, if not all, of the black-and-whites which I am exhibiting will come under the same category, and this will account in part for their similarity in coloration. For instance, the next species to which I would direct your attention, *semenovi* Alph., is superficially very like *lugens* Oberth., but as it differs not only in its pectinated antennæ, but also in neuration, and probably some other characters, it is referable, in the present state of our knowledge, to the genus *Xanthorhoë*, or at any rate not to *Rheumaptera*.

Tristata and its group, again, placed near *hastata* ever since the time of Linnæus, are in like case. Not only the imaginal structure, but here also the weighty support obtained from larval characters*, suffice to place this group with *alternata* Mull. (*sociata* Borkh.), etc., in

* Aurivillius *Nord. Fjar.*, p. 236) apparently ignores these latter, for he mentions the close relationship of "*Cidaria*" *hastata* and *tristata* as an argument against using the formation of the discocellulars for generic subdivisions of that unwieldy "genus."

the genus *Epirrhoë*. So, too, *luctuata* Schiff. must go to *Euphyia*, of which more anon.

The "*hastata* group," in the narrowest sense, embraces only a single species and its varieties, races and Darwinian forms or species, if we may include among the last-named the Japanese *hecate* Butl., which seems a little less close to *hastata* than the others of the group, and *proserpina* Alph. (*Rom. Mém.*, ix., p. 183, pl. x., fig. 5), of which I know next to nothing—only that figure and description point to a near relative of *hecate*. But there are a few other species (Japanese or Chinese) so near to *hastata* in structure that Mr. Warren (*in litt.*) advocates placing them in the same genus, and I am strongly inclined to believe they are veritable "mimics" of the distasteful *Abraxinae*.

Before passing on, I should like to enlarge a little on this last point. It seems pretty clear that our European *hastata* has made absolutely no attempt in the direction of mimicking, say, *Spilote grossulariata* (or even *Lomaspilis marginata*, if we may assume that comparatively retiring little species to be of the "warning" type, which I much question); but that it (*hastata*) has evolved its spotted pattern and sharp contrasts to suit its day-flying habits. But when we trace the modifications of its eastern relatives, step by step, we cannot fail to be struck with the increasingly Abraxine appearance of many of them. In *lugens* Oberth., which I have already mentioned, the body has become yellow, while the wings are still near *semenovi* and other tolerably normal "carpets." But in *placida* Butl. and its allies (or varieties) *evanescens* Butl., and *propinqua* Butl., the yellow is appearing on the wings also, and the same is the case with the similar and not distantly-related *whitelyi* Butl., for which Warren (*Nov. Zool.*, x., p. 264) has erected the genus *Calenulpe*: while in some further undoubted Larentiids, such as *latifasciaria* Leech (the type of *Xenospora* Warr., *Nov. Zool.*, x., p. 265), *interruptaria* Leech (? genus), etc., the abraxine appearance seems to me still stronger; and it culminates in such species as *Callabraxas trigoniplaga* Hmps., *Christophiella agnes* Butl. (= *festinaria* Stgr.) and "*Gandaritis*" *maculata* Swinh. It may be added that *Xanthorhoe* (?) *abraxaria* Butl. has also an Abraxine-looking body. It appears that *Spilote sylvata* (*ulmata*) is an extremely abundant Asiatic species, with varieties or subspecies innumerable, and it would not be surprising if it and some of the other abundant Eastern *Abraxinae* (*Perenia*, etc.), attracted some true Batesian mimics, although in my ignorance of field work in these lands, my suggestion must be taken as purely speculative.

Mr. Warren would constitute our genus as follows:—*hustata* Linn., *subhastata* Nolck. (var. or subsp.), *thulearia* H.-S. (sp. Darw.), *hecate* Butl., *proserpina* Alph., *lugens* Oberth., *kezonmetaria* Oberth. (?), *placida* Butl., *evanescens* Butl., *propinqua* Butl., and perhaps a few with which I am not acquainted; he also adds a strange South American species (from Ptreopolis) which he has named *nondescripta* (*Nov. Zool.*, viii., p. 465), and which does not seem to fit anywhere else; but one would here suspect accidental convergence, as the group is otherwise exclusively holarctic and oriental, and I am not sure whether it even extends very far south in China.

The genus forms a section, but in any case not the typical section of Meyrick's somewhat mixed genus *Plemyria* (accepted by Hulst, *Trans. Amer. Ent. Soc.*, xxvii., p. 279). The type of *Plemyria*, and so

far as I know the sole species (unless we add the North American *georgii* Hulst) is *bicolorata* Hufn., a species which I have always insisted (from oval and larval characters, etc.), has more relationship with *Cidaria* or *Thera*, etc., than with the species oftenest associated with it; and I am glad to learn that Mr. Warren supports me in regarding it as *sui generis*. The residue fall into two distinct groups, that of *hastata* and that of *tristata*, *virata*, *galiata*, etc., and Mr. Warren has called my attention to the fact that even on Meyrick's own pet character of neuration he could have avoided the error of lumping these, for the majority have the discocellular of the hindwing oblique and simple with the radial from about the centre, while the *hastata* section has it bi-angulate, the radial from the lower angulation. The neuration of *hastata* is figured by Packard (*Monogr.*, pl. i., fig. 10, the forewing only), and by Grote (*Ill. Woch. Ent.*, ii., p. 594, pl. i.). Until more is known of the Asiatic representatives in their early stages, I am well content to accept Warren's composition of the genus, excepting *kezonmetaria* Oberth.; from the specimens in our National Collection, as well as from Oberthür's figures, I think this comes nearer to (*Xanthorhoë*) *semenori* than to the present genus, and Mr. Warren now writes me:—"It is a long time since I had anything to do with *kezonmetaria*; it should very likely be referred, like *semenori*, to *Xanthorhoë*, but I have a sort of idea that there may be two species united under the name" (*in litt.*, November 27th, 1905).

As regards the synonymy of the genus, which Mr. Warren calls *Eulype* (Hb., *Verz.*, p. 328), I follow the American authors (excepting Hulst, *olim*) in using the older *Rheumaptera* (Hb., *Tent.*, p. 2). In any case, the two genera are co-typical, both having undoubtedly the type *hastata*, and if the "Tentamen" should finally have to be rejected, there will be no difficulty in deciding that the right name is *Eulype*. The other (the *tristata*) section of Meyrick's *Plemyria* is, as I have mentioned, the *Epirrhoë* of Hübner (type *alternata* Müll. = *sociata* Bork., fixed by Warr., *Proc. Zool. Soc.*, 1893, p. 375, under the synonym of *birivriata* Bork.); although whether the male antennal differences are sufficient to warrant its separation from the closely-allied *Xanthorhoë* is another question, which need not now be considered.

"*Abraxas*" *whitelyi* Butl., which comes so near the genus *Rheumaptera*, but which, absurdly enough, has still been left in *Abraxas* by Staudinger and Rebel, differs somewhat in its longer and narrower wings, its up-curved and blunt palpi, smooth and flat forehead, antennæ with angular joint, etc., but agrees with *Rheumaptera* in neuration and general facies, and with some members of it in the yellow *Abraxine* body.

The interesting species *luctuata* Schiff. = *transversata* Thnb. (*nec* Hfn.) = *obductata* Moeschl. = *lugubrata* Stgr., next claims our attention. I have already mentioned that it impressed one of our British entomologists, Dr. Chapman, as an apparently close ally of *hastata*, and it has nearly always been placed beside *hastata* in our lists, while Packard, the first to resuscitate *Rheumaptera* as a genus, finds it a place therein. In addition to their general similarity, which is perhaps induced by similarity of habits, as Staudinger (*Stett. Ent. Zeit.*, xxii., p. 397) found them indistinguishable in flight, both these species produce parallel black varieties in Labrador, and elsewhere in North America (*hastata* var. *gothicata* Gn., and *luctuata* var. *obductata* Moeschl.). Probably the

first thing to excite a suspicion that the two may not really come as close together as they appear, is the considerable difference in form and habit between the larvæ. That of *luctuata* is figured by Freyer (*Neu. Beitr.*, vii., pl. 690) and Milliére (*Nat. Sicil.*, iv., p. 8, pl. 1, figs. 4, 5) and there is a not very important account by Schille of his rearing it from the eggs (*Soc. Ent.*, vii., pp. 12-13, 18-19); it is evidently not at all of the characteristic stout form of *R. hastata*, and it feeds quite exposed on *Epilobium*, while *hastata* feeds spun on leaves, in a manner made familiar to our Epping Forest collectors by the similar habit of *Philereme retulata*. Having only very inadequate book-knowledge, I cannot say much about the larva of *luctuata*, but, from the figures, I see nothing against uniting it with its other most probable allies, *picata* Hb., *amniculata* Hb. (*unangulata* Haw.), etc.—the genus *Euphyia* Hb. Meyrick has also arrived at a separation between *hastata* and *luctuata*, on account of the simple areole of the former and the double areole of the latter, and he has all the three *Euphyia* species which I have enumerated standing as congeneric in *Hydriomena* (vide *Trans. Ent. Soc. Lond.*, 1892, pp. 72-73); but this latter fact loses its significance when we observe what a medley his *Hydriomena* is—comprising *ocellata*, *albicillata*, the genera (or a great part of them) *Emmelesia*, *Thera*, *Cidaria*, *Ypsipetes*, *Anticlea*, *Triphosa*, *Larentia*, *Campptogramma*, etc., etc., of our British lists—and it is rather amusing to read that “as here restricted” (!) “it is not, in fact, so large as to be unmanageable.”

On account of the absence of an adequate diagnosis of *luctuata* in the *Vienna Catalogue*, Staudinger refused to recognise the name, and imposed that of *lugubrata* (*Cat.*, 2nd ed., p. 189, 1871); at the same time calling *another species*, which was at first misidentified by Hübner, “*luctuata* Hb.”, notwithstanding that Hübner himself discovered his mistake and renamed his new species *hastulata*. But in any case Staudinger’s new name was not required, or at most only as a varietal one, for Moeschler had in the meantime (*Wien. Ent. Monats.*, iv., p. 374, 1860), named the Labrador form *obductata*, and that would have priority over *lugubrata*, as would also Walker’s *concordata* from Nova Scotia (*List*, xxv., p. 1295, 1862). Meyrick resuscitates Thunberg’s *transversata* (1788), which is older still; but this was a homonym, as the *transversata* of Hufnagel (1767) was the species which we call *Philereme* (*Scotosia*) *rhamnata*. The whole complication is avoided by the obvious and natural course of accepting Schiffermüller’s *luctuata*, which is at any rate more than a mere “nomen nudum,” and was elucidated by Hübner and Treitschke. This course has been followed in Dyar’s “*List of North American Lepidoptera*,” p. 279.

This species varies considerably in the amount of white, particularly on the hindwings, where in the type it is quite broad. I have already remarked on the close parallelism between the extreme dark form (var. *obductata* Moeschl. = *concordata* Walk.) and the darkest examples of *Rheumaptera hastata* (var. *gothica* Gn.); you will notice that, except in the direction of the outer margin of the central area of the forewings, there is very little whereby to distinguish them superficially. An intermediate variety has been described by Petersen (*Lep. Estl.*, p. 331, 1902) as var. *borealis*, with the diagnosis:—“*alis posticis nigris, fascia media alba angusta, marginem costalem versus haud dilatata.*” Herr Petersen kindly sent his type (from the Ural)

for my inspection; its hindwings, on both surfaces, have the band as narrow as on the upper side of forewings, where it is normal. Schøyen, in a survey of Arctic Norwegian lepidoptera (*Arch. Math. og. Vid.*, v., p. 198) mentions an example which is evidently referable here, and the Siberian form which I have recently received from Staudinger approaches it. Very similar again is var. *kodiakata* Pack. (*Proc. Bost. Soc.*, xvi., p. 23, pl. i., fig. 7, 1874), from Kodiak I., Alaska, which—unlike so many of the American forms—has the white bands on the upper side of all the wings, although (to judge from the figure) they are not very sharply defined nor very broad, so that the form stands between var. *borsalis* and the type, to which latter Dyar (*Proc. U. S. Mus.*, xxvii., p. 895) doubtfully suggests sinking it. In the same place, Dyar correctly suggests sinking var. *concordata* to var. *obductata*: Gumpfenberg (*Nova Acta*, iv., p. 279) has them separate, and by implication makes the former have no white band on the hindwings, even on the underside, but the type specimen shows that this is wrong. Ab. *wendlandti* Fuchs (*Jahrb. Nass. Ver. Nat.* iii., p. 60, 1900) seems to come near *borealis* Peters., but is uncertain, Fuchs being so unreliable in his determinations; it is described from a single broad-winged example from St. Goarshausen. In direct antithesis to these dark forms, there is a var. *albidior* Alph. recorded from Kamtchatka (*Rom. Mém.*, ix., p. 78, 1897) with more of the *white* than the type form.

But probably the “*hastata* group” in its most restricted sense possesses the most interest for an audience of British Entomologists. This comprises five forms which have, at one time or another, been considered to rank as species; *hastata* Linn., *gothicata* Gn., *subhastata* Nolck., *thulearia* H.-S., and *hecate* Butl. The last two are, by common consent, still treated as worthy of that claim, although Packard (*Monogr.*, p. 165) is inclined to doubt it in the case of *thulearia*, whilst Dyar’s *List of North American Lepidoptera*, p. 278, sinks *hecate* as a synonym to *hastata* var. *gothicata*. Opinion is still somewhat divided on the exact strength of the claims of *subhastata*, but the weight of opinion (and, as it seems to me, of evidence) is against them; while *gothicata* is now universally sunk to *hastata*, notwithstanding a rather noteworthy peculiarity to which I shall refer presently.

RHEUMAPTERA HECATE Butl. (*Ann. Mag. Nat. Hist.* (5), i., p. 448, 1878) from Japan is, so far as is yet known, a pretty constant species, although Leech (*Ann. Mag. Nat. Hist.* (6), xix., p. 570) mentions that his two from Hakodate are smaller than any of Pryer’s extensive series from Oiwake, and have the central white band wider on the secondaries and towards the costa of primaries. The typical form is figured by Butler in *Ill. Typ. Lep. Het.*, iii., p. 55, pl. iv., fig. 12 (1879). It bears considerable resemblance to the blackest form of *R. hastata* var. *gothicata* and to var. *chinensis*, but is quite distinguishable in its even more angulated central fascia of forewings, which is white *unspotted* with black, and much broader in its costal than in its marginal half.

RHEUMAPTERA THULEARIA H.-S. (*Syst. Bearb.*, iii., p. 156, fig. 387, 1848), only known from Iceland*, is a very interesting creature. It

* Fuchs had a form from Krasnoarsk, Siberia, which he took to be this, but he tells us (*Jahrb. Nass. Ver. Nat.*, liii., p. 62) that the determination was certainly incorrect.

is certainly well worth separating as a species, a manifest convenience for the working out of its variation, since no single specimen is like any single specimen of *hastata*: yet there can be no question about its very close resemblance to its more widely distributed relative, of which it is simply the Iceland representative. Its larva feeds on the dwarf birch of that country, also, nearly as commonly, on *Vaccinium* and occasionally on willow (Staudinger, *Stett. Ent. Zeit.*, xviii., p. 261)—*i.e.*, the same plants as its relative *R. hastata* var. *subhastata* (see *infra*)—and has apparently never been differentiated more definitely than by small colour-distinctions from that of *hastata* (*vide* Stgr., *loc. cit.*: Mill., *Icon.*, iii., p. 266, pl. 131, fig. 4-6). The chief characteristics of *R. thulearia* are its browner tone and peculiar greasy appearance, so different, even in the best-marked forms, from the charming purity of the white and black of *hastata*, and the regular continuity of the subterminal, with consequent suppression of the sagittate markings in the marginal area, which, in some form or other, seem to be always indicated in *hastata*. Usually the subterminal line is quite orthodox in *thulearia*, but very occasionally a thickening between veins 3 and 4, or even an increase of the white uniting this to the white band suggests the line of evolution of the missing mark. I have a long and variable series of *thulearia* obtained from the Rev. H. H. Slater, unfortunately not mostly in the best of condition, owing chiefly to the difficulty which he had in accommodating insects during a rough ornithological campaign. I think the only named variety or aberration is var. *islandica* Gump. (*Nova Acta*, liv., p. 304, 1890) “*Strigis transversalibus et ciliis niveis, ceterum unicolori-infumata.*” But to this is immediately added an “ab.” unnamed, but with a brief diagnosis which I will quote. I propose for this extreme form the name ab. *infumata* mihi, n. ab. “*Alis infumatis, strigis, obsoletis.*”

In order to get at Gumpenbergs meaning it must be understood that the type form of *thulearia* is “*nigricans, linea undulata et strigis duplicibus, albidis, infumatis, harum posteriore sinuata, non cum undulata cuhærens*” (Herrich-Schäffer), so that the deviation in *islandica* seems to reside chiefly in the purer white bands, while *infumata* represents just the opposite extreme. Obviously “var.,” in the case of *islandica*, should read “ab.,” and Gumpenbergs must have got into some muddle (as usual!) in choosing such a name; for the type form itself belongs to Iceland alone, as he duly recognises. To be sure, there appears to be some local variation, for Staudinger (*Stett. Ent. Zeit.*, xviii., p. 259) says that northern examples are on the average much larger and whiter than southern; but it is rather absurd to single out either of them for a varietal name derived from that of the land which gives birth to them both. Nevertheless, of course the name will have to stand. Millière (*Icon.*, iii., pl. 131, fig. 6) has figured this rather extreme form, ab. *islandica*, which approaches *hastata* as nearly as seems possible with this species. Ab. *infumata* is also alluded to by both Millière (*tom. cit.*) and in Staudinger’s interesting paper already twice cited (and which devotes four pages to *thulearia*), being given in the latter as “var. *alis concoloribus nigricantibus* ♂ ♀”; it has never been figured, but you will find it represented in my series. A still more striking aberration than either of these, and apparently a much rarer one, is:—

Ab. *clara* mihi, n. ab. The whole outer area of all the wings

whitish, except a very narrow stripe of the ground colour which forms the outer boundary of the customary whitish band. I have only one of this pretty form, but there is another, though rather less extreme, in the British Museum collection. As is usual with this type of variation (compare *Entom.* xxxvii., pp. 155-6), the dark colour in the central area is well consolidated, as if to enhance the contrast.

Herrich-Schäffer's *figure* (not *description*) might almost represent yet another aberration, as it shows a partial suppression of the dark markings in the central area (excepting its boundaries) and in the marginal (between veins 3 and 7), but as he only possessed a worn example, which was presumably the one figured, I think it wiser not to over-emphasize these peculiarities. At the same time, the British Museum collection contains one ♂ bearing some analogy to it in respect of the large central spot surrounded with pale colour, and my own series includes some (apart from ab. *clara*) in which there does not seem to be much of the dark colour in the marginal area of the forewings.

RHEUMAPTERA GOTHICATA Gn. (*Spéc. Gén.*, x., p. 388, 1858) was erected as a separate species intermediate between *icterata* Gn. (pl. ix., fig. 9, said to be from Australia, but probably by error, compare Meyrick, *Proc. Linn. Soc. N. S. W.*, (2) v., p. 879) and *hastata*, making its blackest form his type, its whitest, most *hastata*-like his var. B, and an intermediate form (the white band continued on hindwing) var. A. It was first sunk to *hastata* by Moeschler in 1860, in his valuable "Beiträge zur Lepidopteren-Fauna von Labrador" (*Wien. Ent. Monats.*, iv., p. 374); he gives good figures (pl. x., fig. 4-5) of the two females which he had received, the first of which (no doubt fig. 5) had been determined by Zeller as *gothicata* Gn., while the second (a less extreme form) removed all his doubts as to its specific identity "with *hastata*," its underside, in particular, showing "not the slightest difference therefrom." In *Stett. Ent. Zeit.*, xxxi., p. 370, he is equally emphatic in claiming it as a var. of *hastata* "and not even an essential one." The American forms are excessively variable, and some whiter forms are now known (Anticosti, St. Martin's Falls, Oregon, Colorado, British Columbia, etc., and especially Vancouver I.) which are hardly distinguishable from certain forms of European *hastata* and var. *subhastata*; but the point which has struck me in all the true dark *gothicata* which I have seen (and in a few paler Americans) is the less irregular outer margin of the central fascia, and especially the fact that it reaches the inner margin with an *outward* curve, often, indeed, its entire lower half is directed somewhat obliquely towards tornus. Moeschler (*Stett. Ent. Zeit.*, xlv., p. 122) also notices slight differences between his S. Labrador ♀ *hastata* and the European. There may possibly be two distinct species mixed up in America, but I am not prepared with any convincing evidence of this. On the whole it is simplest to use the name *gothicata* Guen. as merely varietal, for the blackened American forms, and to treat the New World examples with the white preponderating (Pack., *Monogr.*, pl. ix., fig. 11) as, for the present, synonymous with the type.

RHEUMAPTERA SUBHASTATA Nolek. (*Verh. zool.-bot. Ges. Wien*, xx., p. 68, 1870) = § *hastata* Hb. fig. 356, *nec* Hb. *Beitr.*, was first made known by Hübner's figure in the "Sammlung," just cited; but as the same author had earlier used that name for another species (the

tristata-like species which he had first misidentified as *luctuata* Schiff.), it rightly belongs to that, *i.e.*, it becomes a homonym here (indicated by § or * according to the Merton Rules), and Noleken was quite right in imposing a new name—*subhastata*. Hübner evidently viewed it as a valid species, but Treitschke (*Schmett. Eur.*, vi., 2, p. 209) unhesitatingly sinks it as “an aberration” of *hastata* “with more black and less white,” and says it “occurs intermixed with the ordinary type, yet rarely.” Herrich-Schäffer (*Syst. Bearb.*, iii., p. 156) followed Treitschke, and so did Lederer (*Verh. z.-b. Ges. Wien*, iii., p. 184), but Staudinger, in 1857 (*Stett. Ent. Zeit.*, xviii., p. 259) wrote: “*Hastulata** is still held by some to be a var. of *hastata*, which in my opinion is decidedly incorrect”; while Guenée, about the same time (*Spec. Gen. Lep.*, x., p. 389), was still more dogmatic, stating that it is “perfectly distinct” and “cannot be confounded” with *hastata*, and that those who have sunk it have done so without having seen it in nature. But Guenée only judges after a few rather extreme examples of the Lapland form, which would now be reckoned as ab. *moestata*, and Staudinger, dealing with larger material, soon wavered in, and finally forsook his earlier view, vide *Stett. Ent. Zeit.*, xxii., p. 397, where, amongst other things, he mentions that Wocke took, in Finmark, a ♂ *subhastata* in cop. with a practically typical ♀ *hastata*. However, the view that there were two species continued to find supporters, *e.g.*, Rössler (*Jahrb. Nass. Ver. Nat.*, xxxiii.-xxxiv., p. 154), August Hoffmann (*Stett. Ent. Zeit.*, xlix., p. 175) and, to some extent, Sparre Schneider (*Troms. Mus. Aarsh.*, xv., p. 83), and Strand (*Nyt. Mag. Naturrid.*, xxxix., p. 63), while Gumpfenberg (*Nora. Acta.*, liv., pp. 278, 292, 293) has introduced it three times, first as var. (*subhastata*) of *hastata*, next as n.sp. (*sagittifera*) and finally again as species (*hastulata*)! The Norwegian and Scottish forms certainly seem to me to grade through from *hastata* to *subhastata*, as for example a short series which I bred from larvæ collected in a single locality, Strathcarron, Rossshire; the ones with the most white must clearly be called *hastata*, notwithstanding that their size is a little below that normal for the south of England, while the blackest ones approach the dark *moestata* form of var. *subhastata*. As I propose to treat the whole range of forms as a single species, I shall reserve the study of the variation, and shall devote the rest of my paper to *hastata*.

RHEUMAPTERA HASTATA Linn. (*Syst. Nat.*, ed. 10, p. 527, 1758), is one of the very many species which—in spite of the many unfortunate discoveries which we students of literature make, and which bring continual execrations upon our devoted heads—can never change its specific name while the world lasts; even if the faddists, who demand that inappropriate or unmeaning names should be subject to alteration, should ever get their way (which heaven forbid!) I believe our pretty little friend is reasonably safe, for “*hastata*” is suggestive enough of a characteristic marking, and the alternative name of *betularia* (although given it by the ignorant Gladbach, *Namen-und Preis-Verz.*, 1778) is comfortably appropriated elsewhere. *Phalaena Geometra hastata* was described by Linné, in the first year of binomial nomenclature, under the following diagnosis:

* That is, of course, *subhastata* Nolek., which had not yet been rechristened.

“*P. Geometra seticornis*, alis omnibus nigris albo maculatis fasciis duobus albis immaculatis hastato dentatis.”

Clerck in the following year figured (*Icon. Ins. Rar.*, pl. i., fig. 9) the same form which Linné had described, and Linné himself in his later works somewhat amplified his descriptions. His type specimen still exists in his collection, now in the possession of the Linnæan Society, and is of a form nearest some of my Yorkshire ones, or one from Wismar, in that the central fascia is divided by a longitudinal white line, and its outer half interrupted again with white near the inner margin.

The larva of *R. hastata* was well known to some of the old masters, and is described and figured by Degeer (*Mémoires*, ii., pp. 455-7, pl. viii., fig. 19) and Kleemann (*Beyträge*, pp. 369-72, pl. xlv., fig. 1-4), and figured by Hübner (*Geschichte, Geom. Aequiv. I. b.*, fig. 1a, b). They all give it on birch only, in the spun-together leaves of which it so generally lives in Central Europe, etc. Kleemann (*loc. cit.*, fig. 7, 8) figures the large typical form of the imago (fig. 7, indeed, quite abnormally large, measuring about 2 inches), Degeer (*loc. cit.*, fig. 20) a smaller form with the black a little more consolidated and with strong black dots in the white band, *i.e.*, a more intermediate form, but certainly not the genuine var. *subhastata*. As to the larva, it is very variable in colour (compare Ratzeburg, *Waldrederb.*, ii., p. 408, pl. iii., fig. 10), and on this account one would hesitate to give much importance to mere colour in differentiating those of *subhastata* or even of *thulearia*. As regards foodplants, Sandberg (*Ent. Tid.*, v., p. 143) says that the larva of var. *subhastata* is practically polyphagous, but it has long been known that its favourite pabulum is *Vaccinium*, pre-eminently *V. uliginosum* (Stgr., *Stett. Ent. Zeit.*, xxii., p. 398; Hoffm., *ibid.*, xlix., p. 175; Schneid., *Troms. Mus. Aarsh.*, xv., p. 85; etc.) but also sometimes *V. myrtilus* (Zell., *Stett. Ent. Zeit.*, xxxviii., p. 468, as “*hastaria*,” but Schneider, *Ent. Tid.*, vii., p. 251, would see in this *subhastata*: Krieghoff, *Mitt. Geog. Ges. Thür.*, iii., p. 167; etc.); and it is equally well known that it does not despise birch where this is obtainable in its haunts, nor do the various *Salices* come amiss to it (see Sandb., *loc. cit.*, Schneid., *Troms. Mus. Aarsh.*, xv., p. 85). Rössler (*Jahrb. Nass. Ver. Nat.*, xxxiii.-xxxiv., p. 154) says “also on whortleberry” for the type from *hastata*, perhaps on the strength of Zeller’s record for Ober-Albula just cited above; at any rate Hoffmann (*loc. cit. suprâ*) explicitly states that he has never found a *Vaccinium* larva produce any but the *subhastata* forms. Newman (*Brit. Moths*, p. 157) gives *Myrica gale*, in addition to birch, as a foodplant of *hastata*, and I have been given to understand that this record referred to our Scotch forms of var. *subhastata*, but I have not been able to trace the reference further, though it appears to be confirmed by McArthur’s experience in the Outer Hebrides (South, *Entom.*, xxv., p. 88). Richter, in one of the old local lists (for Dessau, *Stett. Ent. Zeit.*, x., p. 107), has an absurd note that he first found the larva on *Salix aurita*, and afterwards in his garden on *Ribes sanguineum* and *Rhododendron lauricum*. I cannot take this seriously, and can only suppose that he did not know *Spilote grossulariata*, or some other species, from *Rheumaptera hastata*!

The range of this species is rather extensive. Staudinger gives (if we include *gothicata* and the var. *subhastata*) practically the whole of

northern and central Europe, S.-W. France, N. Italy, Ural, Armenia, Altai, Issyk Kul, Amur, W. and S.-W. China, Labrador, Kamtchatka and North America generally. In the far north of Europe there are almost exclusively the darkened forms*; Schilde, writing of North Finland (*Stett. Ent. Zeit.*, xxxv., p. 74), says "only in the smaller varying forms, var. *gothicata*, Gn., and *subhastata*, Nolek.," by the former of which he doubtless intends the form *hoffgreni*, Lampa; and Schöyen's and Schneider's experience for Arctic Norway has been practically the same. It seems to find its environment in these high latitudes particularly favourable, for Schöyen (*Troms. Mus. Aars.*, v., p. 35) has noted it as there the commonest of all Geometers, and Schneider (*Ibid.*, xv., p. 83) records it as in incredible profusion in 1883 and 1884, though (like most species in such regions) its abundance is only sporadic. "Like its relative *hastata*," says Schneider, "it is entirely heliophil and visits flowers in the sunshine quite like a butterfly, at night I have found it sitting quite sluggish on stems and branches. . . . Only on one single occasion have I noticed it flying of its own free will at night, namely in Harstad one charming July night in 1884." By the way, as would be expected, it appears later in the summer than the *hastata* of the lowlands; Zetterstedt (*Ins. Lapp.*, p. 961) even gives August as the month for Lapland (also, under the name of *tristata*, the end of July).

The variation of *Rhenaptera hastata* is not easy to work out in detail; the very broken black pattern of the paler, or *type* forms, of course lends itself to an infinitude of permutations, and it would be ridiculous to endeavour to impose a varietal name on each different one with which one chanced to be acquainted. Mr. South has given a concise summary of the general trend of the variation in the *Entomologist* for 1892 (xxv., pp. 87-88). The darkened forms have suffered somewhat from over-naming, but I do not think any name has been proposed for those forms in which there is an abnormal *suppression* of the black. The following is the best scheme I can submit of the varieties and aberrations known to me:—

1. *Hastata* Linn. (*betularia* Gladb.).—Central fascia of forewings more or less interrupted with white between veins 1 and 2, otherwise fairly normal in extent, outer white band unmarked (Haworth's var. B—"absque striga punctorum atrorum) or weakly dotted with black, subterminal line interrupted, hastate mark nearly always connected with outer white band.

2. (var.) *Subhastata* Nolek. (**tristata* Ström, *Nye Saml. Dansk. Vid. Selsk. Skr.*, ii., p. 83, fig. 35, 1783, Zett., *Ins. Lapp.*, p. 961; **hastulata* Hb., *Samml.*, fig. 356, 1796; *hastata* var., Newm., *Brit. Moths*, p. 157 *cum fig.*, 1869; *nigrescens* Ckll., *Entom.*, xxii., p. 75, 1889; *sagittifera* Gmppbg., *Nora Acta*, liv., p. 292, 1890; ?*continuata* Fuchs, *Jabrb. Nass. Ver. Nat.*, liv., p. 56, 1901, sec. Püng. *in litt.*).—Generally smaller, central fascia hardly ever completely interrupted, outer band traversed (generally on both pairs of wings) by a series of dark dots, not infrequently joining to form a continuous line, hastate mark nearly always separated from band by a dark line, subterminal

* Further south these tend to become restricted to the mountains, and in some places to be more aberrational than varietal. Some writers indicate the two forms, *hastata* and *subhastata*, as occurring together, others as never doing so; probably both observations may be right, according to the local circumstances.

line often almost continuous (quite so in ab. *undulata* Strand). In our British examples, however, there is a very general tendency for the central fascia to be somewhat constricted or even semi-interrupted, and for the hastate mark to join the white band, and it is undoubtedly on these grounds that Guenée and his friend Doubleday refused to recognise them as true *subhastata* (*vide* Newman, *loc. cit.*), with the result that Cockerell imposed on them a new name, var. *nigrescens*. But my Finmark series and one from Lapland (Guenée's own locality for *subhastata*) show how inconstant these points are, and var. *nigrescens* is at best only a subvariety.

3. (var.) *Chinensis* Leech, *Ann. Mag. Nat. Hist.* (6) xix., p. 570, 1897 (*moerens* Alph., *Rom. Mém.*, ix., p. 147, 1897).—Black, with very little white excepting the outer band (which is dotted with black) and an interrupted subterminal. I have only seen this variety from western China; it stands between *hastata* and var. (?) *gothicata*, the outer boundary of the central area showing more of the *hastata* contour than in *gothicata* and the white band of the hindwings being broader and cleaner than in Guenée's "*gothicata* var. A." It seems a fairly constant form, but might easily be approached (except perhaps in size) by chance aberrations of var. *subhastata*.

4. (var. ?) *Gothicata* Guen. (*furcifascia* Walk.)—"Wings black, the superiors with a strongly angulated white band . . . often connected, between veins 3 and 4, with a triangular or sagittate subterminal spot" (Guenée). I have already discussed this form, and would only add that perhaps the fact that it presents such a different aspect from the other black var. (*chinensis*) lends some support to the idea that it is not strictly co-specific. I do not propose at present to give names to Guenée's "vars." (abs.) A and B. Ab. *furcifascia* Walk. (*List Lep.*, xxv., p. 1294, 1862) is a rather extreme form, with no white except the band of the forewings, but practically no black dots in this.

5. (ab.) *Demolita* mihi, n. ab.—I would propose this name, without hair-splitting, for those occasional aberrations in which the central fascia has nearly disappeared, only persisting in small blotches round the discal spot (or more rarely a few dashes on the nervures) and at the inner margin. This phase of variation occurs chiefly in the typical *hastata* race (*e.g.*, Barrett, *Lep. Brit.*, pl. 336, figs. 1, 1*b*, 1*c*; one from Edlington Wood, Doncaster, taken by Prest, and figured in *Entom.*, xiv., p. 1, and a second from the same locality the next year kindly shown me several years ago by Mr. William Brady of Barnsley; one in Rev. G. H. Raynor's collection recently exhibited in this room, and a second approaching it; a fine form bought by Mr. Sydney Webb from the S. Stevens collection; and one exhibited by Tugwell, *vide Entom.*, xxv., p. 296); but it also turns up occasionally among var. *subhastata*, two being figured by Schneider (*Troms. Mus. Aars.*, xv., plate, fig. 4*b*, 4*c*) and a somewhat similar phase mentioned by Gauckler (*Ent. Nachr.*, xxv., p. 17), while one of Barrett's figures (pl. 336, fig. 1*h*) tends decidedly in the same direction. Schneider also figures (*loc. cit.*, fig. 4*a*) a strange-looking rayed example, which probably deserves naming separately. Some other forms with an increase of white, to which I find references in literature (Esthonia, "smaller with more broken bands and more white than ordinary," Huene *teste* Nolcken, *Lep. Faun. Estl.*, p. 270; Ala Tau, "a very large

♀ with much white in its wings," Stgr., *Stett. Ent. Zeit.*, xliii., p. 72), need not be named.

6. (ab.) *Moestata* Nolek., *Verh. z-b. Ges. Wien*, xx., p. 62, 1870 (*hastulata* Guen., *Spec. Gén. Léop.*, x., p. 389, 1858; *taunicata* Fuchs, *Jahrb. Nass. Ver. Nat.*, liii., p. 61, 1900). Noleken's original description of this form is not worth quoting, as he differentiated it, not from *subhastata* but from *hastulata* Hb., *Btr.*, but it is clear that it simply covers the darker aberration of var. *subhastata*. It was described from Finmark, and a few which I have from there, as well as two from North Finland which Staudinger sent me as ab. *moestata*, agree well with Moleken's description. They are also the typical "*hastulata*" of Guenée, while Hübner's *hastulata* (the type figure for *subhastata* Nolek.) has just a little more white about it; but the line that one draws has to be quite arbitrary. Fuchs' *taunicata* was a single specimen from near Oberursch, and though Fuchs regarded it as different from *moestata* and probably nearer *gothicata*, his description shows clearly that it is simply a dark *moestata* with the central black band rather well consolidated. Herr Püngeler has seen the specimen and writes me that it is "a dark *subhastata*."

7. (ab.) *Hofgreni* Lampa, *Ent. Tid.*, vi., p. 113 (1885). I do not think Staudinger is justified in sinking this to ab. *moestata* Nolek.; rather should he have sunk that to *subhastata*. Ab. *hofgreni* is a very extreme form which I have never yet seen, and which it would be very interesting to compare with vars. *chinensis* and *gothicata*. Lampa by oversight erected it under *hastulata* Hb., *Btr.* (**luctuata* Hb., *nee Schiff.*) instead of under *subhastata*, but this was corrected by Aurivillius (*Nord. Fjär.*, p. 248). The specimen was from Jemtland, and was described as "soot black, outer white transverse band divided by a dentate line; for the rest, no other markings than a white spot at the outer margin in cell 4 and a small remnant of subterminal at tip of forewing." Thus it differs essentially from ab. *moestata* in having no inner white line, nor any white in the central area.

8. (ab.) *Undulata* Strand, *Nyt. Mag. Naturrid.*, xxxix., p. 63, 1901. This is erected under *subhastata*, which Strand is inclined to treat as a good species. "The subterminal of the forewings is not broken up into spots, but quite continuous, no distinct hastate mark, the hind margin of the forewings with numerous white dots." Two specimens from Langöen, one of the Loffoden Islands. The form is perhaps more important than appears at first sight, as it shows that one of the characteristic features of *R. thulearia* is not absolutely *distinctive* of that species. Gauckler also (*Ent. Nachr.*, xxv., p. 17) mentions an aberration (his ab. 3) in which the hastate marks are only weakly indicated on forewings and entirely wanting on the hind. He considers his series of var. *subhastata*, and this form in particular, as indisputably supplying the transitions between *hastata* and *tristata*.

There are possibly some traces of another southern and eastern local form or race, as two specimens from Achalzik and two from Amur, all in the British Museum collection, show quite a similar facies, *inter se*, being rather large, with the central fascia broad, much blotched with white in its inner half and rather straight at its outer margin, *i.e.*, rather like the lightest American forms; but this is very doubtful, as such a vast territory intervenes, and I possess examples from Sajan and N. Tibet not fitting in with these, and, moreover,

Leech (*Ann. Mag. Nat. Hist.* (6), xix, p. 570) considers his from Amur to agree well with the European, while blackened races exist in Western China (var. *chinensis*), and perhaps (cf. Fuchs, *Jahrb. Nass. Ver. Nat.*, liii., p. 62) about Krasnoiarsk.

DIFFERENTIATION OF T. TRIDENS AND T. PSI IN THE IMAGINAL STAGE.

(Read March 20th, 1906, by T. A. CHAPMAN, M.D.)

When our invaluable Secretary, Mr. Bell, asked me in his most Napoleonic manner to open this discussion, I saw escape was impossible, so at once acquiesced with the most cordial alacrity my innate churlishness permitted me to assume. A few years ago I paid some attention to the early stages of the *Acronyctas*, and so, though I possess the greatest ignorance of the imagines, nobody will give me credit for it. I reflected, however, that to open a good discussion, an exhaustive paper is the last thing to be desired, and that the introductory remarks are more effective if they are stuffed full of omissions and seasoned with a few glaring mistakes. I have felt it to be necessary, however, out of respect for the Society, to try and get together a few observations bearing on the subject.

There are certainly a good many differences between *psi* and *tridens* in the imaginal state; I will begin, however, by asserting that there are no differences whatever. If you ask me to lay down any characters by which someone unfamiliar with these two species may be able to say with absolute certainty to which species a specimen he has just taken belongs, I confess absolute inability to do so. There is no one character that always holds good, although it may furnish a correct conclusion in a large proportion of cases. A combination of characters, no doubt, will fail less frequently; nevertheless, it will fail sufficiently often to prevent entire dependence on it.

It is, notwithstanding, unquestionable that, if the specimen be a male, an examination of the ancillary appendages leaves no shadow of doubt as to which species the specimen belongs to.

The inner chitinous processes of the clasps are abundantly different, and though there are considerable variations in each species, they in no way approximate the two forms. I presume both species derive their names from the "dagger" on the wings, a three-pronged marking that is like the letter psi (ψ) or like a trident, but it is curious that *tridens* may be distinguished from *psi* by usually having, in the pupa, *three* spines on a certain portion of the cremaster, instead of *four*, and in these ancillary appendages *tridens* is furnished with *three* branches to the inner spine of the clasps, and *psi* has only *two*.

There is another male character that is less to be depended on, although in some of my Hereford broods it was practically without

exception. This is the colour of the hindwings. In *tridens* the hindwings are without any dark scales, except in the actual hind margin, *psi* has dark shading along the veins in the spaces, and often has a dark "central shade." Well, you will find a good many *tridens* that resemble *psi* very much in this matter, that have, in fact, more dark scaling than occurs in a fair proportion of *psi*. On the other hand, a specimen of *psi* with pure white hindwings is certainly very rare, but does occur. A male specimen, therefore, with quite white hindwings, is almost, if not quite, certainly *tridens*, with very slight dark scaling is probably *tridens*, with moderately dark scaling is probably *psi*, and with very dark scaling is nearly certainly *psi*.

There is one character which affects both sexes, and which, I think, is fairly distinctive, but then, nevertheless, there is some overlapping, and, what places a greater difficulty in the way, it is very difficult to define and apply. This is the form of the wing. *Psi* has, altogether, a broader wing; I have tried to find some way of defining this and have measured some specimens. The measures I have compared are the length of the wing (from centre of thorax to apex) with the breadth (from anal angle to costa). In eight specimens taken as they came, I find, in *tridens*, the breadth is 40 per cent. of the length, whereas, in *psi*, it is 42 per cent. This is quite a definite difference and can be seen without measurement, but it is quite, indeed, very much less than differences that may occur in measurements by different persons at different times, owing to want of precise agreement as to points of measurement, etc. It has, however, a further defect, and that is that among so few as these eight specimens of each, *tridens* varied from 39 per cent. to 42 per cent., and *psi* from 41 per cent. to 44 per cent. I think the eye suggests that there is a difference in the relative lengths of the costa and inner margin, but I have failed to verify this by measurement.

When we consider markings, I have no hesitation in saying that the markings present no differences. I do not know how many distinctions in markings between the two species I have not read or heard of, and of these some are unquestionably very constant throughout whole broods of one or the other species; but then they may equally be found to be similarly constant in the other species. The point on the costa from which the outer line starts, the distance between the orbicular and reniform stigmata, the lengths and breadths of the several branches of the several daggers, the marginal dots, etc., vary, I think, in practically the same way in both species. It must be admitted, however, that the separation of the marginal dots from the anal dagger in *psi*, and their junction, especially the upper one, with it, in *tridens*, is more constant than any other in the markings; still, it has not infrequent exceptions.

A more trustworthy character is coloration. *Psi* is pure black and white; *tridens* has red, green, brown, and yellow. The pale form of *psi*, with white predominating, is probably always unmistakable. So in *tridens*, when richly suffused with pink, brown, or olive. On the other hand, it is difficult to feel sure that some darker specimens of *psi* have not some brown tinting, and *tridens* does not always present quite definitely anything but white and black. *Tridens* very commonly has the interior of the orbicular stigma coloured, or definitely of a different tint from the rest of the wing; *psi*, I think, almost always

has it of the same colour as the rest of the wing. Some dark specimens of *psi* have a series of pale patches down the hind margin. This is well seen in some of Mr. Raynor's Brentwood specimens, and in the dark ♂ of *cuspis*. Something of the same sort may be detected in *tridens*, but it is never so pronounced. Still, all these matters of colour are, in fact, questions of degree rather than absolute differences.

Mr. Burrows lent me some mounted wings of the two species, and examining these, I found that in the neighbourhood of the anal dagger the scales of *tridens* had the four (or other number) of serrations at the end of the scales quite level, *i.e.*, of equal lengths. In *psi* the marginal were much shorter than the central ones. I thought I had discovered a further proof of the genius and insight of our beloved pastor, but alas, on pushing the research a little further, I found that these were individual and not specific variations.

In Tutt's *British Noctuae*, i., p. 18, there are some remarks of mine on this question, to all of which I think I would still adhere, especially emphasising the fact that I had only certain races of the two species at my disposal. The more critical remarks by Mr. Tutt, that follow mine, are open to the same observation, and whilst they are equally valid now as they were when they were written, they must be read with the proviso I have several times called your attention to, that, whilst generally applicable, there are a good proportion of specimens of both species that present not the markings here predicated of them, but those of the other species.

I think I have referred to all the points in which I can report differences between the two species, and one or more of them will suffice, in most instances, to enable which species some examples belong to to be determined.

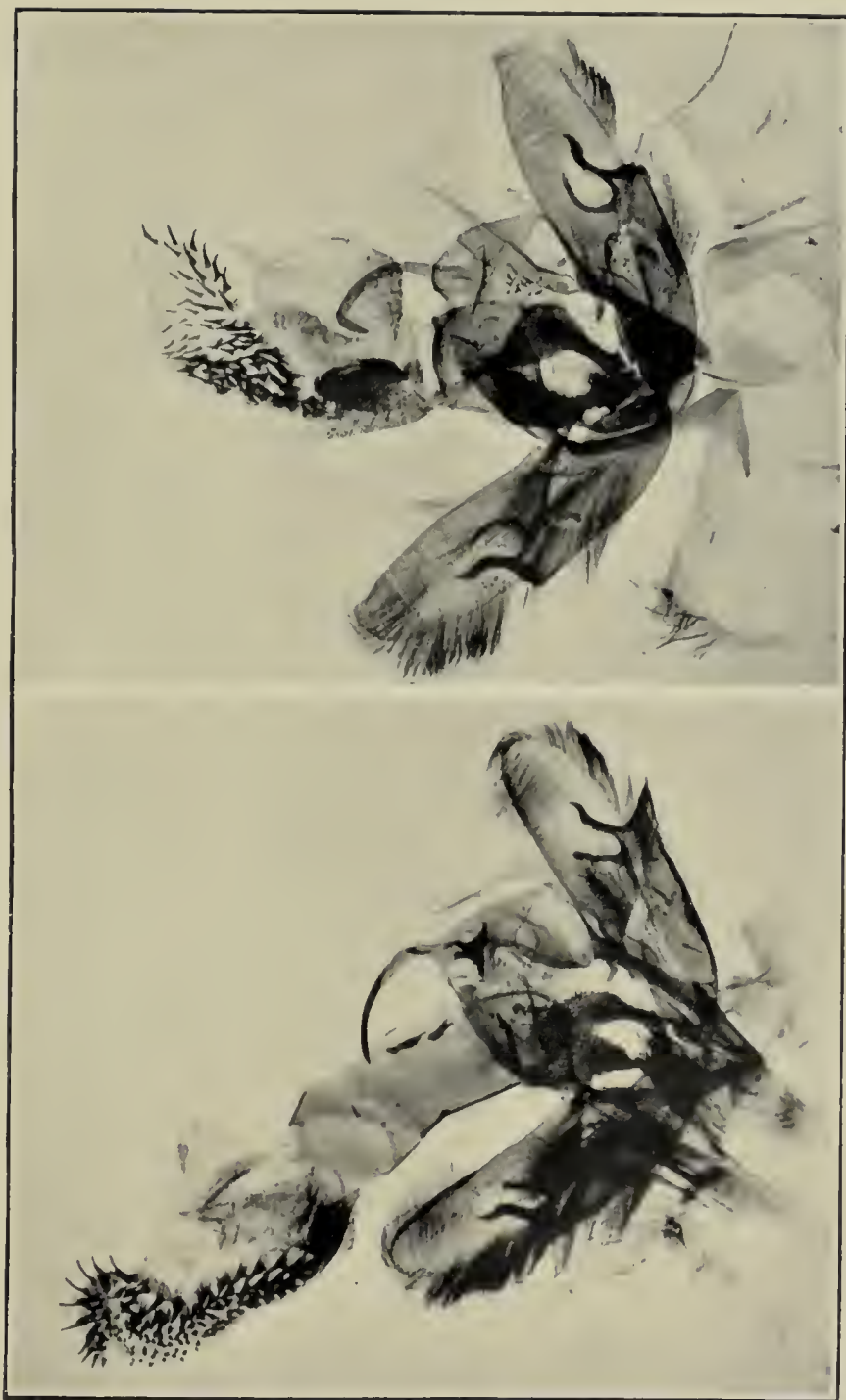
At Hereford I learnt to discriminate between them easily. When I picked up a moth, I always knew which one I had got. But then it will be observed that the Hereford form of *psi* is only the pale one, and Hereford *tridens* was usually well coloured. Unfortunately, for purposes of illustration this evening, most of my *tridens* have been given away, many of my friends desiring authentic specimens, and especially those parted with included nearly all the most richly coloured ones.

The discrimination would certainly be less facile between the dark London form of *psi* and the splendid large dark *tridens*, bred by Mr. Burrows; but I think I could usually distinguish between them.

In one of the boxes are the duplicates of these species from Dr. Mason's collection; amongst these I picked out several that appeared wrongly placed, and an examination of the appendages in the ♂ specimens verified my surmise in each case.

Amongst the specimens exhibited are the series of *tridens* from Mrs. Bazett's collection. They are all, eight in number, dark specimens of *psi*; there is only one ♂, and this opinion was verified by examination of this specimen. It is obvious that to discriminate the species must be difficult, when the "*tridens*" to be differentiated are, in fact, *psi*.

I exhibit also the series of the two species from the Barrett collection. They include eighteen specimens of *tridens* of my own breeding, and one specimen of the *bidens* var. of *psi*. I found of these, and verified by examination of the appendages, that two specimens of

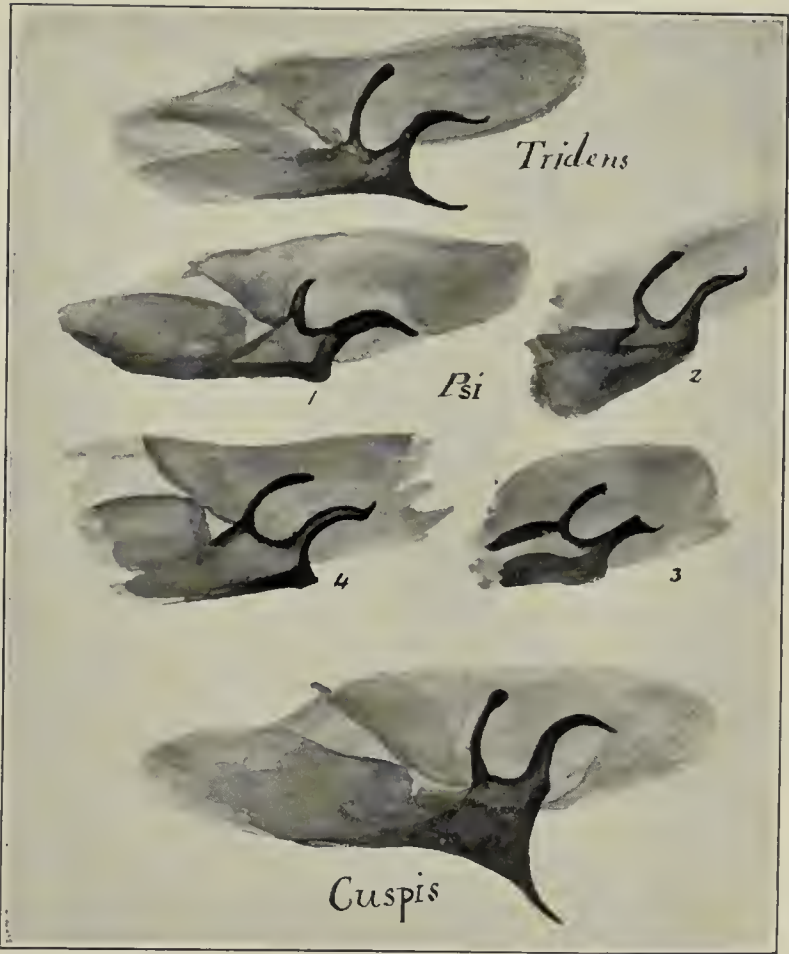


TRIDENS.

PSI.

ANGILLARY APPENDAGES X 12, FROM PHOTOS BY F. N. CLARK, ESQ.





SPINES ON CLASPS OF ANCILLARY APPENDAGES OF TRIDENS, PSI (4 VARS),
AND CUSPIS, $\times 16$, FROM CAMERA OUTLINES.



psi were placed with *tridens*, and three specimens of *tridens* were in the series of *psi*. For greater certainty, I also examined two specimens of *psi* that might be taken for *tridens*, according to some criteria, and found that Mr. Barrett's and my own opinion of them was correct.

I think, therefore, that anyone who handles a good number of specimens from any one locality, and probably if he has still more material, then from any locality, will rarely, if ever, be wrong in deciding which species any given specimen may be.

I may, however, conclude as I began, by saying that no criteria can be laid down that will enable anyone without this experience to name a doubtful specimen, except with a large margin of probable error. My own experience is sufficiently defective, as regards the fine dark forms of both species found in the London district, to make me hesitate before pronouncing, and I should sometimes expect to prove wrong in my determinations of doubtful specimens, especially if females.

The photographs presented herewith of the appendages of the two species (taken by Mr. F. N. Clark) show very well the difference of the spines of the claspers, and they also show a structure that is less frequently demonstrated, *viz.*, the membranous structure that is eversible from the *Ædœagus*, and that is armed with a beautiful arrangement of spines; it will be noticed that these spines are not of an identical arrangement in the two species, those of *psi* being all of a large, somewhat uniform, size, whilst those of *tridens* have an area in which they are distinctly smaller. It is, of course, accidental in mounting the specimens, that the *Ædœagus* is pushed out comparatively free of the other structures in the specimen of *tridens*, whilst it is amongst them so as to produce less clear outlines in that of *psi*. The other photo is from camera sketches of the clasps, and includes one of the spines of the allied *cuspis*, and also tries to illustrate some of the variation that occurs in *psi*, there being equal variation in *tridens*.

NOTES ON THE MICRO-LEPIDOPTEROUS FAUNA OF THE LONDON DISTRICT—TINEINA.

(Read April 3rd, 1906, by ALFRED SICH, F.E.S.).

The district of which this paper treats may be described as all that portion of the Thames Valley which lies between Charing Cross and Kingston. It is within the ten-mile radius from Charing Cross. The Thames here, flowing from Kingston, takes a serpentine course in a northeasterly direction. That portion of the district north of the river lies in the county of Middlesex, while the portion south of the Thames belongs to Surrey. In an area lying in such close proximity to the largest city in the world, it is quite natural that the Micro-lepidoptera should mostly be confined to the parks, commons, and other open

spaces. On the north, in Middlesex, we have Hyde Park, a good deal of still open land round Chiswick, and Osterley Park. In Surrey, Putney Heath, Wimbledon Common, Barnes Common, Richmond Park and Kew Gardens are all legitimately included.

In order to study the present Micro-lepidopterous Fauna of the London District it seems unnecessary to go back far into geological times, for I do not believe the strata lying below the present surface will be likely to yield us any knowledge bearing directly on the micro-lepidoptera which now inhabit the district. We have, then, only to deal with the actual soil which nourishes the vegetation on which these small insects almost entirely depend.

The subsoil everywhere in the area is the Blue clay of the lower Eocene period. This is nearly always capped by sands or gravels, the oldest of which is the Bagshot sand, which occurs as an outlier in the south end of Richmond Park.

The Plateau gravels, which were deposited at a very much later period, occur on the higher parts of the district in Richmond, Putney, and Wimbledon, while those known as the Low level gravels, a still later deposit, are found at Charing Cross, Hammersmith, Chiswick, Kew, and other parts. In some places, such as Fulham, Shepherd's Bush, parts of Chiswick and Acton, and the south part of Kew Gardens, the gravel takes a more argillaceous character and forms a rich soil, known as brick earth, from the facility with which it can be burnt into builder's bricks. Lastly, in stretches along some portions of the river side, there is a fine deposit known as alluvium. The bearing of these different formations on the micro-lepidoptera is of a secondary nature, apparently affecting them only so far as the different soils are more or less suitable to different plants. In the heavier clay lands we find rather wet meadows with oaks, elm, and wild roses in the hedges, while in the more sandy or gravelly districts we have heath lands with broom, gorse, and the finer-leaved grasses, the trees being birches and firs, with here and there, dwarf willows (*Salix repens*) in the damper spots. With regard to its physical features, the district may be looked on as a level valley, with the Thames flowing at the bottom and the land sloping more or less gradually upwards on each side. As the tides flow up from the sea, practically throughout the whole district, it must of necessity be fairly level in its lowest portion, and the flats along the river side do not rise above 13 feet above sea level in many places, and are frequently covered with water at the flood tides. The highest points in the district lie, I believe, under 200 feet. Hyde Park may be taken as lying between 50 and 100 feet, while Barnes Common ranges from 20 to 46 feet. In the mile of road between the river and Putney Heath there is a rise of 130 feet, and this rise is continued over Wimbledon Common nearly to 200 feet. Richmond Park rises to 165 feet near Richmond Hill Gate, but is mostly under 100 feet above sea level. The mean annual temperature is about 49°, and the rainfall about 25 inches per annum, but the average amount of sunshine is decidedly low, being little more than a quarter of what might be experienced. The climate may then be considered, compared with the rest of England, as rather warm, fairly dry but for the river mists, though deficient in sunshine. It will be seen then that the whole district lies at a very low level, that there is

nowhere any chalk or limestone exposed on its surface, and that there are no forests, but only the remnants of them, now left.

There can, of course, be no doubt whatever that the lepidoptera followed in the wake of vegetation as it spread from various sources over the London District. Therefore a study of the Flora of the district will be almost sure to throw some light on the immigration and progress of the lepidoptera, which at the present time constitute that part of the Fauna.

The earliest accounts of this district go to show that the river wound its way among the marshes, swamps, and ponds, which extended on each side from somewhere about the spot we now call Blackwall to the place we now know as Mortlake. A good deal of heathland lay between the present sites of Westminster and Fulham, while beyond the fens to the north stood the great forest of Middlesex, with outlying portions spreading down to the river. The higher, less swampy, parts of the district which were not forest, being perhaps more sandy and poorer soil, were probably covered with heath and scrub. Such was the general idea of the landscape, as far as we can gather, when in the 4th century the Romans built Augusta on the banks of the Thames, somewhere on the site of the present Walbrook.

Long after this town had decayed, and the germ of the city of London had come into existence, we get another glimpse of the district, and find that much alteration has taken place. A good deal of the forest land, which appears to have existed till the end of the 12th century, has been cleared and converted into meadows and pasture land. Hence arose the pastures and farm lands which used to be one of the great features of Middlesex. As London grew, and required more vegetables, the farm land was gradually turned into market garden grounds, and as London and its suburbs spread wider, many of the market gardens were covered with houses, and those lepidoptera which were not exterminated during the building operations had to continue their existence in the few square yards devoted to the private gardens or public parks and recreation grounds.

Besides the forest, and occupying probably a larger total area, were the more sandy grounds covered with heath, gorse and broom, with brambles, blackthorn, and other low bushes. These were also gradually enclosed, especially at the end of the 18th century, and have now mostly shared the same fate as the forests.

A once famous locality, which was in this district, must be mentioned. It was known as Hammersmith marshes, and was one of the special hunting grounds of the late Mr. Samuel Stevens. Here *Larerna phragmitella* was taken, as well as *Leucania obsoleta*, *L. straminea*, and *Senta maritima*. (See President's Address, 1906.)

The present micro-lepidopterous fauna of this district is probably only the remnant of a much more extensive one. Though we appear to have few actual records of the smaller species, yet, judging from the old records of the macro-lepidoptera, I think we may fairly argue that the Tineina were also more numerous, both in species and individuals, in days gone by. Many species must have become extinct in the district, and though doubtless a few have immigrated, their numbers have probably not counter-balanced the loss sustained through the species that have died out.

The number of species mentioned in this paper is less than one-

fourth of the total number of species occurring in Britain and about one-fifteenth of the European Tineina. I feel sure that if the Tineina were properly worked for, another 60 or more species might be obtained in the district. In support of this supposition I can point to the fact that we have 28 out of the 80 species of the genus *Coleophora*, and this is the only group that has really been worked at so far. The Gelechiads, the genera *Elachista*, *Lithocolletis*, and *Nepticula*, will surely furnish several additional species when proper search is made.

Nearly all the species found in the district belong to the Mid-European Fauna; a few such as *Oecophora sulphurella*, *Lithocolletis messaniella*, and *Elachista rufocinera* appear to lean towards the south or west in their distribution, as does *Gelechia domestica*, *Gelechia costella*, and *Coleophora bicorella*, and *albicosta* seem to favour England and Holland, while *Tinea pallescentella* particularly patronises England and the neighbourhood of Vienna. *Coleophora glaucicolella*, an easily overlooked species, has as yet only been recorded in England. *Coleophora saturatella* was also confined to England till it was discovered in Belgium, and this is more remarkable because it is a conspicuous insect and feeds on the common broom, a plant of European distribution. However, the history of the Tineina has been written by so comparatively few hands, and these small insects so easily escape observation, that the records must necessarily be very incomplete, and it does not follow that, because a species is not recorded from a certain area, that it does not exist there.

Among the oldest micro-lepidopterous inhabitants are doubtless the rush feeders, such as *Glyphipteryx thrasonella* and the *cespitiella* group of the Coleophorids, these doubtless abounded in the marshes of the Thames Valley long before even the early Briton wandered beside the river. As soon as the deciduous trees became established they were probably mined by *Lithocolletis* and *Nepticula*.

Indeed there seems no reason to doubt that nearly all the species which are now found in the district were also inhabitants of it in those early days.

Among the trees the whitethorn seems to have been later in returning to Britain after the last glacial period, and its re-introduction, in whatever way it occurred, may have brought a few additional species into the area, though many of the whitethorn-feeding species also eat wild apple. The Romans may have brought a few species with them, such as *Lithocolletis messaniella* when they introduced the *Quercus ilex* into Britain, or possibly one or two of the House moths (*Tinea*).

Oinophila v-flavum, which occurs in wine vaults and similar situations, and is not usually met with away from towns, may be looked on as an importation, and was probably introduced in the corks of wine bottles. The larva often bores into the cork while the wine is still in the bottle, and it seems to have a partiality to old port and champagne.

Commerce is doubtless responsible for the introduction of *Borkhausenia pseudospretella*, *Tineola biselliella*, and *Tinea pallescentella*, and possibly also for *Endrosis lacteella*; these species, feeding in the larval state on feathers, skins, or dry goods, are very liable to be imported.

We have seen to how great an extent the original heathlands and forests have been converted into streets and human dwellings, and this process is now going on with greater rapidity. The meadows and

market garden grounds get less in extent year by year; the old mansions with extensive gardens are pulled down, and rows of cottages with little else but back yards built over the sites; while even the parks and commons first become more frequented, and then more strictly kept, and then levelled, provided with paths, and generally improved, as it is called, out of all recognition. The consequence is that every plant which is neither of economic nor ornamental value, eventually becomes exterminated, and naturally the lepidoptera which are dependent for their existence on such plants share the same fate. Among these plants may be mentioned one or two species of *Chenopodium* and *Atriplex*, and the moths dependent on them here are—*Aristotelia hermannella* and *A. stipella*, *Scythris chenopodiella* and *Coleophora laripennella*. *Solanum dulcamara*, which nourishes *Gelechia costella*; *Stellaria holostea*, the foodplant of *Coleophora solitariella*; and even *Ballota nigra*, to which *Coleophora lineola* is attached, are further examples. These plants are now found in waste corners of the roadsides, or in hedges, but are destroyed when the roads are taken over by the various Councils, or when a hedge is grubbed up and a wire rail substituted. From a collector's point of view these wire rails are useless, and I am sorry to say that in some of the parks they are taking down the old oak palings, on which so many moths used to rest by day, and substituting for them these cold, comfortless, metal abominations.

Another class of species that will probably soon become much diminished in the number of individuals, is that which is attached to plants of ornamental value, but which does not find the condition under which such plants are grown a suitable one. Several species of the genus *Lithocolletis* may be cited as examples of this class. The larvæ of these little moths, at one time known as "Stainton's ducks," mine the leaves of trees and pass the winter in cocoons in the dead leaves lying on the ground. In the early summer they emerge and fly up to the trees, and so the race is continued. Now in gardens and some parks, these leaves are all swept up in the autumn and carried away, naturally, most of the *Lithocolletids* are borne away too, and thus the race is gradually diminished. *Adela viridella* will share the same fate, but where *Lithocolletis messaniella* is provided with an ilex tree, it will probably continue, as this tree retains its leaves through the winter, with the *Lithocolletis* inside some of them. *Phyllocnistis suffusella* mines the leaves of poplars, but as this species hibernates in the perfect state, it has a much better chance of escaping destruction. Another set of species which are fast becoming restricted to the damper parts of parks and commons are the rush-feeders, such as *Glyphipteryx fuscoviridella* and *G. thrasonella*, *Coleophora caespitiella*, *C. glaucicolella*, and *C. alticolella*. When the commons are taken over by the authorities, the lower and damper spots are sometimes filled up and levelled, and the rushes and rush-feeders consequently destroyed.

Thus we see how, in all probability, we shall soon lose some of the species which now still inhabit the district. On the other hand, there are many species which will probably survive the alterations from rural to suburban conditions. One set of these consists of those species which are able to accommodate themselves to cultivated substitutes of their original foodplants when the latter are no longer obtainable. Perhaps one of the most notable instances of this class is

furnished by the common *Yponomeuta cognatellus*. This species, whose natural foodplant in this country is the *Euonymus europæus*, seems to have taken most kindly to the *Euonymus japonicus*, which is so abundantly planted in the suburbs. *Depressaria costosa*, which feeds on broom and furze, will also flourish on at least one ornamental *Cytisus*, which is, I believe, of south European origin. In the woods, the blackthorn furnishes the foodplant to *Nepticula plagiolella*, but in Chiswick its mines may be found in the leaves of the Victoria plum, which is so much grown in the market gardens.

A second set of survivors is formed by those species which are more or less polyphagous, and therefore when one foodplant fails they readily accustom themselves to another. Thus *Coleophora paripennella* will eat bramble, blackthorn, and rose. *Carcina quercana* is, however, a better example. I have found the larva in Chiswick on almost every kind of tree. It seems to have taken a special fancy to *Arbutus* and *Laurestinus*, owing probably to these plants being evergreen, for this species is in the larval state throughout autumn and winter. It may be worthy of remark that among the *Tineina* there is a much smaller proportion of general feeders than among the *Tortrices* or *Macro-lepidoptera*.

A third class of species that will probably continue consists of those moths whose larvæ feed on plants commonly cultivated in gardens, or on shade plants grown in the streets. *Gelechia malvella*, for instance, feeds on the seeds of the hollyhock, *Nepticula anomalella* mines in the leaves of roses, and *Gracilaria syringella* feeds on the lilac. The last often makes the lilac bushes quite unsightly by the numerous large brown blotches which its depredations cause in the leaves. The beautiful red and black *Chrysoclista linneella* feeds in the bark of lime trees, and may be found in July on the trunks, even in the metropolis. Of course, *Gelechia malvella* and *Gracilaria syringella* have accustomed themselves to these cultivated foodplants, but they have now become so attached to them, and their original foodplants have become scarce in the suburbs, so that hollyhock and lilac have now become their natural foodplants.

A fourth group, not likely to die out, is composed of those species which are not dependent on growing vegetation for their sustenance. The clothes moths are familiar examples of this group.

Several species of the genus *Tinea* and others feed on fur, feathers, hair, and other non-vegetable substances, but it appears doubtful whether these species always consumed such food. It seems probable that the earliest haunts of this group were decaying trees and fungoid growths, and that the larvæ wandered by chance into a deserted bird's nest, and thus acquired a taste for their present food. It is possible that they shared the cave dwellings with Paleolithic man, and they were doubtless inhabitants of the huts of the ancient British. Some species of this group appear to have spread with commerce, and several are now less abundant in the country than in the towns, where they can often obtain more congenial surroundings. The clothes moth par excellence is undoubtedly *Tineola biselliella*. This is a small pale ochreous moth with a rough-haired bright ochreous head. It is well named, as it will make its home in the most palatial residences among the finest curtains and carpets that art can produce and money procure, but it will flourish apparently quite as happily in the smallest

and stuffiest of cottages as well as in disused bird's nests. *Tinea fuscipunctella*, *T. pellionella* and *Trichophaga tapetzella* are also of frequent occurrence in houses. All these species will probably continue in the district as long as cloth, horse hair, and feathers are made use of in our dwellings.

With regard to the clothes moths it is next to impossible to keep them out of the house. Their chief mode of entrance is through the open windows after dark. They will not, however, do any great amount of damage so long as the materials on which they feed are not neglected. If a garment is left hanging in the corner for months at a time, or in a room with doors and windows closed for weeks together, or materials even shut up in a box for years, the clothes moths will probably find these things out and play havoc with them, so that the last state of those things will be worse than the first. The best way to prevent attacks is to constantly move or shake things, and to expose them to as much air and light, especially sunlight, as possible. Clothes moths love the dark and the stagnant air. If it be necessary to leave cloth or furs packed away for months in cupboards, it is an excellent plan to wrap them up in *unbleached* linen as one would wrap up a parcel in brown paper.

This will not avail if the garment has already been attacked and moths, in any stage, are wrapped up with it. It is surprising in how small a space the clothes moths will flourish, and they will continue for several generations feeding in a small box till all is reduced to dust, even the remains of the last parents and all the ancestors. They are emblems of destruction and seem to point to the idea that things not used by their owners must be made use of by others.

Besides the clothes moths there are two other species that will probably continue to haunt our houses. Though they feed on a great variety of substances, such as seeds, dry plants, pupæ, etc., they do not habitually, if ever, attack clothes. *Endrosis lacteella*, a grey speckled moth with a snow-white head, may be found any time throughout the year in houses and on trunks of trees. I have specimens bred from an old tits nest and also from the rind of a stilton cheese. The other species is *Borkhausenia pseudopretella*, a much larger moth, brown with black spots. Perhaps its chief characteristic is the agility it displays. Most moths fly towards the light, but this one runs towards the darkest corner, if disturbed, and as the wings are laid very flatly in repose, it is easily able to hide itself in any cracks or crannies.

Of the 162 species hitherto observed, 52 per cent. have been found in the larval state; 135 species occur so regularly that they may be considered as residents of the district, while 27 species have either been taken once only or not in sufficient numbers to entitle them to qualify as regular inhabitants.

Although the district becomes every year less and less suitable as a habitat for micro-lepidoptera, I still believe that there are yet a great many species in the district that have so far escaped detection, and that we shall, in the future, be able to add many species to the list of "*Tineina*" of South-West London.

DESIDERATA FOR THE SOCIETY'S CABINET.

LEPIDOPTERA.

1. *In Micros*.—Many species are not represented by a single specimen, and in only a few species is the series complete.
2. *In Macros*.—In the case of nearly all rarities only a type or no example. Of less rare species many series will bear improvement.

RHOPALOCERA.—All good specimens, with data, acceptable. New series specially required of *L. arion*, *H. actaeon*, and *H. sylvanus*.

HETEROCERA.—(South list, 1884.)

C. Porcellus	P. Leucophea	A. Cordigera
T. Apiformis	M. Albicolon	H. Peltigera
T. Crabroniformis	M. Furva	E. Fasciana
S. Scoliiformis	A. Connexa	T. Craccæ
S. Sphegiformis	A. Ophiogramma	B. Notha
S. Asiliformis	C. Haworthii	B. Cinctaria
S. Myopiformis	C. Ambigua	D. Obfuscaria
S. Formiciformis	A. Corticea	G. Papilionaria
S. Ichneumoniformis	A. Cinerea	P. Pustulata
S. Chrysidiformis	A. Rapæ	T. Lactearia
N. Strigula	A. Aquilina	Z. Porata
N. Albulalis	A. Obelisca	Z. Annulata
N. Centonalis	A. Præcox	Z. Orbicularia
N. Senex	A. Obscura	A. Luteata
N. Mundana	A. Ashworthii	A. Candidata
L. Muscerda	N. Depuncta	A. Sylvata
L. Lutarella	N. Ditrapezium	E. Obliterata
L. Deplana	N. Dahlii	N. Cambrica
E. Cribrum	N. Sobrina	A. Ochrata
H. Asella	N. Castanea	A. Bisetata
D. Fascelina	T. Orbona	A. Contiguarua
T. Cratægi	A. Pyramidea	A. Dilutaria
P. Populi	P. Leucographa	A. Holosericata
E. Lanestris	P. Hyperborea	A. Circellata
B. Quercus	T. Populeti	A. Marginepunctata
D. Furcula	T. Pulverulenta	A. Straminata
D. Bifida	O. Suspecta	A. Immutata
N. Trepida	O. Croceago	A. Fumata
N. Trimacula	X. Fulvago	A. Strigilaria
C. Duplaris	T. Retusa	A. Degeneraria
C. Fluctuosa	C. Pyralina	C. Rotundaria
A. Ridens	D. Irregularis	M. Alternata
A. Tridens	D. Templi	M. Liturata
A. Leporina	E. Lichenea	F. Carbonaria
A. Aceris	A. Nigra	O. Filigrammaria
A. Strigosa	H. Adusta	E. Afinitata
A. Ligastri	H. Glauca	E. Alchemillata
A. Auricoma	H. Dissimilis	E. Tarniata
A. Menyanthidis	H. Contigua	E. Minorata
L. Obsoleta	H. Rectilinea	E. Consignata
L. Favicolor	X. Areola	E. Pulchellata
M. Flammea	X. Socia	E. Pygmæata
S. Maritima	C. Verbasci	E. Subfulvata
T. Extrema	C. Lychnitis	E. Plumbeolata
N. Neurica	C. Asteris	E. Scabiosata
N. Arundinis	C. Absinthii	E. Helveticaria
C. Lutosa	C. Chamomillæ	H. Satyrata
H. Micacea	H. Triplasia	E. Castigata
L. Exigua	P. Interrogationis	E. Pusillata
N. Reticulata	A. Melanopa	E. Irriguata

E. Constrictata	L. Sexalisata	A. Nigrofasciaria
E. Albipunctata	L. Halterata	A. Berberata
E. Expallidata	L. Viretata	C. Fluviata
E. Absinthiata	L. Carpinata	P. Lapidata
E. Minutata	L. Polyommata	P. Vittata
E. Lariciata	T. Simulata	S. Vetulata
E. Dodoneata	T. Firmata	C. Miata
E. Exiguata	H. Ruberata	C. Sagittata
E. Sobrinata	H. Trifasciata	C. Silaceata
E. Togata	H. Sordidata	C. Prunata
E. Coronata	M. Ocellata	C. Dotata
E. Debiliata	M. Albicillata	C. Paludata
C. Sparsata	M. Galiata	L. Griseata

THOS. H. L. GROSVENOR,
GERALD HODGSON,

Hon. Curators.

PRESENTED

14 MAY 1907



City of London Entomological & Natural History Society.

THIS SOCIETY has for its object the diffusion of the science of Natural History, by means of papers, discussions, exhibitions, and the formation of collections for reference. Since its commencement in 1858, a valuable and useful Library has been formed, which comprises, amongst other works, sets of the "Zoologist" (1843—1895), "Entomologist" (Vols. 1—38), "Entomologist's Monthly Magazine" (Vols. 1—40), and the "Entomologist's Record and Journal of Variation" (Vols. 1—16). There is also a collection of British Lepidoptera, and collections of other orders are now in course of formation.

The meetings take place on the first and third Tuesdays in each month, EXCEPT JULY AND AUGUST, from 7.30 to 10 p.m., at the London Institution, Finsbury Circus, E.C., which is easily accessible from all parts. Exhibits are made at every meeting, and papers read on various Natural History Subjects, a special feature being the systematic discussion and exhibition of interesting groups of insects, etc.

The Entrance Fee is Two Shillings and Sixpence, and the Annual Subscription Seven Shillings and Sixpence, payable in advance, being fixed at as moderate a sum as is possible, consistent with the proper maintenance of the Society and its work, in order that all may avail themselves of the benefits offered. The Society therefore looks with confidence for the support of all who are interested in the study of Natural History.

The year commences on the first Tuesday in December, but intending members may join at any time, the ballot being taken at the next ordinary meeting after that on which they are proposed.

Further information may be obtained from the corresponding Secretary.

