

(a)

TRANSACTIONS

# ENTOMOLOGICAL SOCIETY <br> OF <br> LONDON 



## TRANSACTIONS

OF THE

## ENTOMOLOGICAL SOCIETY

of

LONDON<br>FOR THE YEAR

## 1897.

LONDON:<br>PRINTED FOR THE SOCIETY BY SLMMONS AND BOTTEN, LIMITED, 4a, shoe lane, london, e.c.<br>SOLD AT THE SOCIETY'S ROOMS, 11, CHANDOS STREET, cavendish square, w.,<br>AND BY LONGMANS, GREEN, AND CO., paternoster row, e.c. ; AND New york.

## DATES OF PUBLICATION IN PARTS.

Part I. (Trans., pp. 1-112, Proc., i-xii) was published 9th April, 1897.

| " | II. ${ }^{\prime}$ | " | 113-248, | " | xiii-xxxvi) | " | 2nid July, | " |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| " | III. | " | 249-332, | " | xxxvii-xliv) | $"$ | 1st Sept., | " |
| " | IV. ( | " | 333-434, | $"$ | xlv-lx) | " | 16th Dec., | " |
|  | V. |  | - | " | lxi-lxy | " | 2nd Feb., | 898 |

## ENTOMOLOGICAL SOCIETY OF LONDON．

Founded， 1833.
Incorporated by Royal Charter， 1885.

OFFICERS and COUNCIL for the Session 1897－98．

> 解resident．
> ROLAND TRIMEN，F．R．S．，F．L．S．

## Hifr－非residents．

The Rev．Canon Fowler，M．a．，F．L．S． robert McLachlan，F．R．S．，F．L．S． Professor RaphaEl MELDOLA，F．R．S．，F．C．S．

Treasurer．
robert McLachlan，F．R．S．，F．L．S．
Ferretaries．
Walter F．H．BLandFord，M．A．，F．z．S． FREDERIC MERRIFIELD．

Pifitrarian．
GEORGE C．CHAMPION，F．Z．S．
Cramail．
WALTER F．H．BLANDFORD，M．A．，F．Z．S． GEORGE CHARLES CHAMPION，F．Z．S． The Rev．Canon Fowler，M．a．，F．L．S． HERBERT GOSS，F．L．S．，F．G．S．
Sir George f．Hampson，Bart．，B．a． MARTIN JACOBY．
robert McLachlan，F．R．S．，F．L．S．
Prof．RaphaEl MELDOLA，F．R．S．，F．C．S．
FREDERIC MERRIFIELD．
osbert salvin，M．a．，F．R．S．，F．L．S．
ROLAND TRIMEN，F．R．S．，F．L．S．
JaMES WILLIAM TUTT．
GEORGE HENRY VERRALL．

Resident Librarian．
w．R．HALL．

$$
\begin{gathered}
(\mathrm{vi}) \\
\text { TRANSACTIONS } \\
\text { ENE THE } \\
\text { ENTOMOLOGICAL SOCIETY OF LONDON. } \\
\text { 1833-1897. }
\end{gathered}
$$



Any single volume from 1862 to 1877 half-price to Fellows.
First Series, vol. v., is out of print. First Series, vols. i.-iv., and Second Series, vol. iv., cannot be sold separately.

The other volumes may be obtained separately, also the following :-
Pascoe's 'Longicornia Malayana' ............... £2 120 £1 190
Baly's ' Phytophaga Malayana, Pt. I., Aposta-
sicera'….......................................... 0160012 0
Saunders' ' British Heterogyna and Fossorial
Hymenoptera'
$\begin{array}{llllll}0 & 4 & 6 & 0 & 3 & 4\end{array}$
Saunders' 'Synopsis of British Hymenoptera,'
Part I. ............................................
$\begin{array}{llllll}0 & 6 & 0 & 0 & 4 & 6\end{array}$
Newport's 'Athalia centifolice ' (Prize Essay)
$\begin{array}{llllll}0 & 1 & 0 & & 0 & 1\end{array} 0$
The Journal of Proceedings is bound up with the Transactions.
Fellows who have paid their Subscription for the current year, are entitled to receive the Transactions for the year without further payment, and they wili be forwarded free, by post, to any address.

## CONTENTS.

| Explanation of the Plates | ... | $\cdots$ | ... | ... | ... | ... |  | ${ }_{\text {pagii }}^{\text {var }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Errata | ... | ... | ... | ... | ... | ... | ... |  |
| Charter and Bye-Laws... | ... | ... | ... | ... | ... | ... | ... |  |
| List of Fellows ... | ... | ... | ... | ... | ... | ... | ... |  |
| Additions to the Library | ... | $\cdots$ | $\ldots$ | ... | ... | ... |  |  |

## MEMOIRS.

I. A Monograph of British Braconidæ. Part VII. By the Rev.
Thomas A. Marshall, M.A., F.E.S., Member of the
Société Entomologique de France
...
II. Western Equatorial African Micro-lepidoptera. By The Right
Honble. Lord W ALsing harr, Mr.A., LL.D., F.R.S.... ${ }^{\text {.. }} \quad 33$
III. On Lepidoptera from the Malay Archipelago. By Enward
Meyrick, B.A., F.Z.S. ...
M. ...
IV. New Coccidæ collected in Algeria by the Rev. Alfred E.
Eaton. By R. Newstead, F.E.S., Curator of the Grosvenor
Museum, Chester
V. Seasonal Dimorphism in African Butterflies. By Arthur G.
Butler, Ph.D., F.L.S., etc. ... ... ... ... ... 105
VI. The Prothoracic Gland of Dicranura vinula, and other Notes.
By Oswald H. Latter, Assistant Master at Charterhouse,
formerly Tutor of Keble College ...
VII. On the Classification of two Subfamilies of Moths of the
Family Pyralidæ: the Hydrocampinx and Scopariana.
By Sir George F. Hampson, Bart., B.A...

$$
\begin{aligned}
& \text { VIII. Descriptions of New Species of Central and South American } \\
& \text { Rhopalocera. By F. Du CANE Godman, F.R.S., F.L.S., } \\
& \text { and Osbert Salvin, M.A., F.R.S. ... ... ... ... } 241
\end{aligned}
$$

IX. A List of the Phytophagous Coleoptera obtained by Mr. H. H.
Smith at St. Vincent, Grenada, and the Grenadines, with
Descriptions of New Species: Crioceride-Galerucidie.
By Martin Jacoby, F.E.S. (Hispidæ-Cassidide. By
G. C. Champion, F.Z.S.) .. ..... 249

X. On the Serricorn Coleoptera of St. Vincent, Grenada, and the
Grenadines. By George Charles Champion, F.Z.S. ..... 281

XI. Quelques Formicides de l'Antille de Grenada récoltés par
M. H. H. Smith. Par le Dr. Auguste Forel, professenr
à l'Université de Zürich ..... 297

XII. New or little-known Sphegidæ from Egypt. By the Rev. F. D.
Morice, M.A., F.E.S....
XIII. Mimetic Attraction. By Frederick A. Dixey, M.A., M.D., F.E.S., Fellow of Wadham College, Oxford ..... 317
XIV. The Changes in the Structure of the Wings of Butterflies. By
A. Radcliffe Grote, A.M. ..... 333XV. The Structure and Life-history of Phalacrocera replicata.By Professor L. C. Miall, F.R.S., and R. Shelford, B.A.With an Appendix on the Literature of the earlier stages ofthe Cylindrotomina, by Baron C. R. Osten Sacken, Hon.F.E.S.343
XVI. Descriptions of New Lepidoptera from Australia and New Zealand. By Edward Meyrick, B.A., F.Z.S., F.E.S. ..... 367
XVII. Description of a New Coleopterous Insect of the Family Paussidæ. By Charles O. Waterhouse, F.E.S. ..... 391
XVIII. Revision of the Notonectide. Part I. Introduction, and Systematic Revision of the Genus Notonecta. By G. W. Kirkaldy ..... 393
XIX. The Butterflies of Aragon. By Mrs. MI. De la B. Nicholl. Communicated by Sir George F. Hampsox, Bart., B.A. ... ..... 427
XX. New or little.known Sphegide from Egypt-a Correction. By the Rev. F. D. Morice, M.A., F.E.S. ..... 434

| Proceedings for 1897 | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Annal Meeting... | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | Ixi-lxi |  |
| President's Address | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | lxvi-xcvii |  |
| Index | .. | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ |
| .... |  |  |  |  |  |  |  |  |  |

## EXPLANATION OF THE PLATES.

## FRONTISPIECE.

The late JOSEPH WILLIAM DUNNING, M.A., F.L.S.,
(Born, Nov. 5, 1833. Died, Oct. 15, 1897.)

Secretary, 1862-1871. President, 1883-1884.<br>(See Page lxx.)

| Plate I. | See pages 1-31 | Plate VI | Sce pages 301-316 |
| :---: | :---: | :---: | :---: |
| ," II. \& III. | ,, $33-67$ | ,, VII | , 317-332 |
| , IV. | 93-103 | VI | X., \& XI. |
| V. | ,, 113-126 |  | See pages 343-366 |

## ERRATA.

## TRANSACTIONS.

Page 94, line 14 from bottom, for napax read rapar.
Pages 131, 132, 134, 135, for Mixophila read Mixophyla.
Page 223, line 17, for Maasen read Maassen.
Page 235, line 5 from bottom, for Milliere's read Millières.
Page 237, lines 1 and 3, for Melis's read Melliss's.
Page 306, line 2 from bottom, for au read an.
Page 313, line 26, for nigro-natatur read nigro-notatur.
Page 318, line 2 from bottom, for demophile to read demophile $\circ$.
Page 394, lines $20-21$, for pronoti read prosterni; line 24, for pronotum read prosternum.

Page 420, line 17, for 1891 read 1871.

## PROCEEDINGS.

Page iv., last line, the species referred to by Mr. Tutt should be Platyptili metzneri.

Page viii., first line, for Brauer read Brunner.
Page lvii., line 2 from bottom, for brachycephala read barycephula.

#  

OF THE

## ENTOMOLOGICAL SOCIETY OF LONDON.

## CHARTER.

Wirtoria, by the Grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith. TO ALL TO WHOM these presents shall come Greeting:

Whereas Joseph William Dunning, of Lincoln's Inn, in the County of Middlesex, Barrister-at-Law, Esquire, Master of Arts, formerly Fellow of Trinity College, Cambridge, Fellow of the Cambridge Philosophical Society and of the Linnean and Zoological Societies of London, has by his Petition humbly represented unto US, That in the year 1833 certain of our loyal subjects formed themselves into a Society for the Improvement and Diffusion of Entomological Science, and subscribed and expended considerable sums of money for such purposes, and have collected and become possessed of a valuable library and other property, and have been and continue to be actively employed in promoting the objects for which the said Society was founded, especially by the publication of Volumes of Transactions composed of Original Memoirs, read before the Society. And wherfas the said Petitioner, believing that the well-being and usefulness of the said Society would be most materially promoted by obtaining a Charter of Incorporation, hath therefore, on behalf of himself and the other Members of the said Society, most humbly prayed that WE would be pleased to grant a Royal Charter for incorporating into a Society the several persons who have already become Fellows, or who may at any time hereafter become Fellows thereof, subject to such Regulations and Restrictions as to US may seem good and
expedient. NOW KNOW YE that WE, being desirous of encouraging a design so laudable, and of promoting the improvement and diffusion of Science in all its branches, have of Our especial Grace, certain Knowledge and mere Motion, given and granted, and We do hereby give and grant, That the said Joseph Williain Dunning and such others of Our loving subjects as are now Fellows of the said Society, or who shall at any time hereafter become Fellows thereof in pursuance of the provisions of this Our Charter and according to such Bye-Laws as are hereinafter mentioned, shall be a Body Corporate by the name of "The Entomological Society of London," having perpetual succession and a common seal, with power to sue and be sued in their Corporate name, and to acquire and hold any goods and chattels whatsoever.

And our Will and Pleasure is, That John Obadiah Westwood, Esq., Master of Arts, Hope Professor of Zoology in the University of Oxford, shall be Honorary President of the said Corporation during the term of his natural life. And that Robert MacLachlan, F.R.S., shall be the first President of the said Corporation and shall continue such until the Annual Meeting to be held in the month of January next.

And our Will and Pleasure is, And we do hereby declare, that there shall always be a Council to direct and manage the concerns of the said Corporation. And that the thirteen persons, who were elected to form the Council of the said Society at the Annual Meeting held in the month of January last, shall form the first Council of the said Corporation, and shall continue in Office until the Annual Meeting to be held in the month of January next.

And our Will and Pleasure is, And we further grant and declare, that the existing Bye-Laws of the said Society, as revised and amended at a General Meeting held on the 2nd day of May, 1883, shall be the Bye-Laws of the said Corporation, until the same shall be revoked or altered as hereinafter mentioned. And that it shall be lawful at General Meetings of the said Corporation to revoke or alter any former Bye-Laws, and to make such new Bye Laws as
shall be deemed useful and necessary for the regulation of the said Body Corporate.

Provided always: And we lastly declare it to be our Royal Will and Pleasure, That no Bye-Law or Resolution shall, on any account or pretence whatsoever, be made by the said Corporation in [opposition to the general scope, true intent, and meaning of this our Charter or the Laws and Statutes of this Realm, and that if any such Bye-Law or Resolution shall be made, the same shall be absolutely null and void.

In Witness whereof We have caused these our Letters to be made Patent.

Witness Ourself at Westminster the twentieth day of July, in the Forty-ninth year of Our Reign.

By Warrant under the Queen's Sign Manual.


## BYE-LAWS.

As Amended at a Special Meeting held 2nd June, 1897.'

> Снap. I. Object.

The Entomological Society of London is instituted for the improvement and diffusion of Entomological Science.

Chap. II. Constitution.
The Society shall consist of Honorary and Ordinary Fellows.

## Сhap. III. Management.

The affairs of the Society shall be conducted by a Council consisting of fifteen Fellows, to be chosen annually, five of whom shall not be re-eligible for the following year. Five shall be a quorum.

## Chap. IV. Officers.

The Officers of the Society shall consist of a President; three Vice-Presidents; a Treasurer; two Secretaries; and a Librarian. The Officers shall be chosen annually from amongst the Members of the Council, No Fellow shall be President, or a Vice-President, more than two years successively.

## Снap. V. Removal or Resignation of Officers.

1. For any cause which shall appear sufficient to a majority thereof, the Council shall have power to suspend any Officer of the Society from the exercise of his office, or to remove him and declare such office vacant.
2. In the event of any vacancy occurring in the Council or Officers of the Society, at the next meeting of Council
after such vacancy has been made known, the Council shall elect some Fellow to fill the vacancy till the Annual Meeting.

## Chap. VI. President.

1. The duty of the President shall be to preside at the Meetings of the Society and Council, and regulate all the discussions and proceedings therein, and to execute or see to the execution of the Bye-Laws and orders of the Society.
2. In case of an equality of Votes the President shall have a double or casting Vote.

Chap. VII. Vice-Presidents.

1. The Vice-Presidents shall be nominated by the President. Such nomination shall be declared at the Ordinary Meeting next after the election of the President in every year.
2. In the absence of the President a Vice-President shall fill his place, and shall for the time being have all the authority, power, and privilege of the President.
3. In the absence of all the Vice-Presidents a Member of the Council shall preside ; and if no Member of the Council be present at an Ordinary Meeting, the Fellows present shall appoint by a majority to be Chairman such Fellow as they shall think fit; and the Member of Council so presiding, or the Fellow so appointed, shall for the time being have all the authority, power and privilege of the President.

## Сhap. VIII. Treasurer.

1. It shall be the duty of the Treasurer to demand and receive for the use of the Society all sums of money due or payable to the Society, and to disburse all sums payable by the Society out of the Funds in his hands.
2. No payment exceeding $£ 5$, excepting for rent or taxes, shall be made by the Treasurer without the consent of the Council.
3. The Treasurer shall keep a book of Cheque Receipts for admission fees and annual payments; each Receipt shall be signed by himself, the date of payment and name of the

Fellow paying being written both on the Receipt and on the part of the Cheque which is left in the book.
4. The Treasurer shall demand all arrears of annual payment after such payment shall have been due three months.
5. The accounts of the Treasurer shall be audited annually, previously to the Annual Meeting, by a Committee of six Fellows (of whom three shall be Members of the Council), to be appointed by the President at the Ordinary Meeting in December, of which Committee three (or two, provided that one of them is not a member of the Council) shall be a quorum. The Treasurer shall furnish the Auditors with a detailed account of all receipts and disbursements down to the 31st December.

## Сhap. IX. Secretaries.

1. It shall be the duty of the Secretaries to keep a list of all the Fellows of the Society, together with their addresses; to summon Meetings (when necessary) of the Society and the Council ; to conduct and produce to the Council all correspondence in any way connected with the Society at the next Meeting after such correspondence shall have been received or taken place; to take Minutes of the Proceedings at Meetings of the Society and the Council; to edit the Transactions and Journal of Proceedings : and, generally, to act under the direction of the Council in all matters connected with the welfare of the Society.
2. In the absence from any Meeting of the Society, or the Council, of both the Secretaries, Minutes of the Proceedings shall be taken by a Fellow whom the President shall appoint for the occasion.

## Chap. X. Librarian.

1. It shall be the duty of the Librarian to take care of the Library and MSS., and keep a Catalogue thereof, with the names of the Donors ; to call in all Books borrowed, and see that the Library regulations are carried into effect.
2. The Council may employ a Sub-Librarian, who shall
receive such remuneration as the Council shall from time to time determine, and shall be subject to such Rules and Orders as shall from time to time be given to him by the Council.

## Chap. XI. Library Regulations.

1. No Fellow shall, without special permission of the Council, be allowed to borrow from the Library more than four volumes at one time, or without leave of the Librarian, to retain any volume longer than one month.
2. If any book be torn, injured, lost, or not forthcoming when demanded by the Librarian, full compensation shall be made for the same by the borrower.
3. The Librarian shall call in all books borrowed from the Library on the 5th day of January and 5th day of July in each year ; and in case the same be not returned on or before the Ordinary Meeting of the Society in the following month, notice thereof shall be given by him to the Council, who shall then direct a second notice to be sent to the Fellow retaining any book, and in case the same be not returned within the further space of four weeks from the date of such second notice so sent, such Fellow shall in future be disqualified from borrowing books from the Library without the special permission of the Council.
4. Subject to such Regulations as may be made from time to time by the Council, the Library shall be open to the Fellows between the hours of one and .six p.m. on every week-day, except Saturday, and on that day between one and three p.m.
5. No stranger shall be allowed access to the Library unless introduced by a Fellow ; but a note addressed to the Librarian or Secretary shall be deemed a sufficient introduction.

## Сhap. XII. Election of Fellows.

1. Every Candidate for admission into the Society shall be proposed by three or more Fellows, to one of whom he shall be personally known, and they must sign a Certificate in recommendation of him. The Certificate shall specify the name and usual place of residence of the Candidate.
2. The Certificate having been read at one of the Ordinary Meetings shall be suspended in the Library, read again at the following Ordinary Meeting, and the person therein recommended shall be balloted for at the next Ordinary Meeting.
3. The method of voting shall be by ballot, and two-thirds of the Fellows balloting shall elect.
4. Fellows shall sign the Obligation Book of the Society at the first Ordinary Meeting of the Society at which they are present, and shall then be admitted by the President.

## Chap. XIII. Admission Fee and Annual Contribution.

1. The Admission Fee shall be $£ 22$ s., the Annual Contribution $£ 11$ s.
2. Fellows permanently resident out of the United Kingdom shall pay the Annual Contribution, but shall be exempt from payment of any Admission Fee.
3. The composition for Life Fellowship, in lieu of the Annual Contribution, shall be $£ 1515$ s.
4. The Annual Contribution shall become due on the 1st day of January in advance ; any Fellow elected after September will not be called upon for his Contribution for that year.

## Chap. XIV. Withdrawing and Remoral of Fellows.

1. Every Fellow, having paid all sums due to the Society, shall be at liberty to withdraw therefrom upon giving notice in writing to the Secretary.
2. Whenever written notice of a motion for removing any Fellow shall be delivered to the Secretary, signed by the President or Chairman for the time being on the part of the Council, or by six or more Fellows, such notice shall be read from the Chair at the two Ordinary Meetings immediately following the delivery thereof, and the next following Ordinary Meeting shall be made a Special Meeting and the Fellows summoned accordingly, when such motion shall be taken into consideration and decided by ballot; whereat if a majority of the Fellows balloting shall vote that such Fellow be removed, he shall be removed from the Society.
3. Whenever any Fellow shall be in arrear for three years in the payment of his Annual Contribution, notice thereof in writing shall be given or sent to him by the Treasurer with an intimation that at the expiration of three months he will be liable to have his name erased from the list of Fellows. In default of payment within that period, the Council may order his name to be erased accordingly, and he shall thereupon cease to be a Fellow of the Society.
4. The removal or erasure of the name of a Fellow shall not affect his liability for Contributions in arrear.

## Сhap. XV. Privileges of Fellows.

1. Fellows have the right to be present, to state their opinions, and to vote, at all General Meetings ; to propose Candidates for admission into the Society; to introduce Visitors at General Meetings of the Society ; to have personal access, and to introduce scientific strangers, to the Library; and Fellows who have paid the Annual Contribution for the year shall be entitled to receive a copy of the Transactions published during the year.
2. Fellows shall be eligible to any office in the Society, provided they are not more than one year in arrear in the payment of the Annual Contribution.
3. A Fellow shall not be entitled to vote on any occasion until he shall have paid his Contribution for the year last past.

## Chap. XVI. Honorary Fellows.

1. Every person proposed as an Honorary Fellow shall be recommended by the Council ; and shall be balloted for, and, if elected, be liable to be removed in the like form and manner, and be subject to the same rules and restrictions, as an Ordinary Fellow.
2. Honorary Fellows shall be exempt from the payment of Fees and Contributions, and shall possess all the privileges of Ordinary Fellows.
3. No British Subject shall be an Honorary Fellow.
4. The number of Honorary Fellows shall not exceed twelve.

## Chap. XVII. Ordinary Meetings of the Society.

1. The Ordinary Meetings of the Society shall be held on the first Wednesday in each month (except January), beginning at eight o'clock in the evening, or at such other days or times as the Council shall from time to time direct.
2. At the Ordinary Meetings the order of business shall be as follows :-
(1.) The names of the Visitors present at the Meeting shall be read aloud by the President.
(2.) The Minutes of the last Meeting shall be read aloud by one of the Secretaries, proposed for confirmation by the Meeting, and signed by the President.
(3.) The Presents made to the Society since the last Meeting shall be announced and exhibited.
(4.) Certificates in favour of Candidates for admission into the Society shall be read, and Candidates shall be balloted for.
(5.) Fellows shall sign their names in the Obligation Book, and be admitted.
(6.) Exhibitions of specimens, \&c., shall be made.
(7.) Entomological communications shall be announced and read either by the Author or one of the Secretaries.
(8.) Business not specified in the above order and discussions arising out of the exhibitions and communications shall be taken at such times and in such manner as the President shall direct.
3. All Memoirs which shall be read at any Meeting of the Society, and accepted for publication, shall become the property of the Society, unless otherwise stipulated before the reading thereof.
4. No Motion relating to the government of the Society, its Bye-Laws, the management of its concerns, or the election, appointment, or removal of its Officers, shall be made at any Ordinary Meeting.

## Chap. XVIII. Special Meeting.

1. Upon the requisition of six or more Fellows, presented to the President and Council, a Special General Meeting of the Society shall be convened; a notice thereof shall be sent to every Fellow whose last known residence shall be in the United Kingdom, at least seven days before such Meeting shall take place: and any motion to be sulmitted to such Meeting which involves a substantive proposition and is not of the nature of an amendment shall be stated at length in such notice.
2. No vote shall be taken at any Special Meeting unless nine or more Fellows shall be present.

## Chap. XIX. Annual Meeting.

1. The Annual Meeting of the Society shall be held on the third Wednesday in January.
2. The objects of the Meeting shall be to receive from the Council, and hear read, their Annual Report on the general concerns of the Society; and to choose the Council and Officers for the ensuing year.
3. The Council for the time being shall annually cause to be prepared two Lists, one of which (No. 1 in the Schedule hereto) shall contain the names of Fellows whom they shall recommend to be re-elected, and of other Fellows to be elected into the Council; and the other List (No. 2) shall contain the names of such Fellows as they shall recommend to fill the offices of President, Treasurer, Secretaries, and Librarian for the year ensuing; which Lists shall be read at the Ordinary Meeting in December, and shall then be fixed up in the room until the day of election. And copies of such lists shall be transmitted to every Fellow whose last known residence shall be in the United Kingdom, before the 20th December.
4. If any four or more Fellows shall desire to substitute the name or names of any other Fellow or Fellows to be elected into the Council or to fill any of the offices of President, Treasurer, Secretary, or Librarian, such four or more Fellows shall give notice in writing to that effect,
specifying the name or names of the Fellow or Fellows proposed to be substituted: such notice to be given on or before the 31st December to one of the Secretaries, who shall before the second Wednesday in January transmit a List of the names proposed to be substituted to every Fellow whose last known residence shall be in the United Kingdom.
5. If no such notice be given to either of the Secretaries on or before the 31st December, the Fellows named in the Lists prepared by the Council shall be the Council and Officers for the ensuing year.
6. If any such notice be given, the election shall be by Ballot at the Annual Meeting, and the President shall appoint two or more Scrutineers from the Fellows present, not being Members of the Council, to superintend the Ballots and report the results to the Meeting. The Secretaries, assisted by the Treasurer, shall prepare a list of the Fellows entitled to vote, and each Fellow voting shall give his name to the Scrutineers to be marked on the said List, and shall then put his balloting lists into the respective glasses to be provided for such occasion.
7. Any balloting List containing a greater number of names proposed for any office than the number to be elected to such office, shall be wholly void, and be rejected by the Scrutineers.
8. No Ballot shall be taken unless nine or more Fellows shall be present.
9. If from any cause an election shall not take place of persons to fill the Council, or any of the offices aforesaid, then the election of the Council and Officers, or the election of Officers, as the case may be, shall be adjourned until the next convenient day, of which notice shall be given in like manner as is directed for the Annual Meeting.

## Chap. XX. Transactions and Journal of Proceedings.

1. The Transactions shall consist of such papers communicated to the Meetings of the Society as the Council shall order to be published therein.
2. The Transactions shall be published quarterly, or at
such other times, and at such prices as the Council shall direct for each Part or Volume.
3. Authors of Memoirs published in the Transactions shall be allowed twenty-five copies of their communications gratis. If any additional number be required, the permission of the Council shall be first obtained, and the entire expense thereof shall be paid for by the Authors.
4. A Journal of Proceedings of the Society shall also be published, containing Abstracts of the Papers read and Notices of other Matters communicated at the Ordinary Meetings of the Society. The Proceedings shall be bound up with the Transactions.

## Chap. XXI. Alteration of the Bye-Laws.

Any of the Bye-Laws of the Society may at any time be repealed or altered, or others adopted in lieu thereof, at a Special Meeting of the Society, to be held after a Notice given to the President and Council, signed by six Fellows at least, and specifying the intended repeal or alteration, has been read at three Ordinary Meetings of the Society.

## THE SCHEDULE REFERRED TO IN CHAPTER XIX.

No. 1.
Form of List for the Council.
List of Members of the present Council recommended to be re-elected at the Election on the day of January, 18 *:-

| A. B. |  |
| :--- | :--- |
| C. D. |  |
| E. F. |  |
| G. H. |  |
| I. J. |  |
| K. L. |  |
| M. N. |  |
| O. P. |  |
| Q. R. |  |
| S. T. |  |

List of Fellows recommended to be elected into the Council:-

| U. V. |  |
| :--- | :--- |
| W. X. |  |
| Y. Z. |  |
| B. A. |  |
| D. C. |  |

* If any of the Names in this List be objected to, they must be struck out before the Ballot, and other names, notified as provided by Sec. 4 of Chapter xix. of the Society's Bye-Laws, may be substituted in the blank spaces left for that purpose.

No. 2.
Form of List for the O.ficers.
List of Fellows recommended by the present Council to be appointed to the Offices of President, Treasurer, Secretaries and Librarian, at the Election on the day of January, 18 *:-

| President $\ldots . . . . . . .$. Z. A. |  |
| :--- | :--- |
| Treasurer ............Y. B. |  |
| Secretaries .........\{林. X. |  |
| W.D. |  |
| Librarian ...........V. E. |  |

* If auy of the names in this List be objected to, they must be struck out before the Ballot, and other names, notified as provided by Sec. 4 of Chapter xix. of the Society's Bye-Laws, may be substituted in the blank spaces left for that purpose.


# Pist of Tflloums 

## of rive

## ENTOMOLOGICAL SOCIETY OF LONDON.

Date of Election. HONORARY FELLOWS. 1894 Forel, Professor Auguste, M.D., The Unirersity, Zürich.<br>$188 \pm$ Osten Sacken, Baron C. R., Wredeplatz, Heidelberg.<br>1884 Packard, Dr. Alphæus S., Providence, Rhode Island, U.S.A.<br>1872 Saussure, Henri F. de, Tertasse, 2, Geneva.<br>1895 Scudder, Samuel Hubbard, Cambridge, Muss., U.S.A.<br>1871 Selys-Longchamps, Baron M. E. de, Liége.<br>1885 Snellen, Pieter Carl T., Rotterdam.<br>1895 Thomson, Dr. C. G., The University, Lund, Sweden.<br>1893 Wattenwyl, Hofrath Dr. Carl Brunner Von, Trautsolugasse, 6, Vienna.

## FELLOWS.

Marked is an Original Member. Marked $\dagger$ have compounded for their A nnual Subscriptions.

## Date of

## Election.

1877 Adams, Frederick Charlstrom, F.Z.S., 68, St. Ermin's Mansions, Caxton-street, Westminster, S.W.
1877 Adams, Herbert J., Roseneath, London-road, Enfield, N.
1885 Adinin, Robert, Wellfield, Lingards-road, Lewisham, S.E.
1897 Alderson, Hope, Hilda Vale, Farnborough, Kent.
1886 Atmore, E. A., 48, High-street, King's Lynn, Norfoll.
1892 Baily, William Edward, Lynwood House, Paul Churchtown, near. Penzance, Cornwall.
1894 Baker, Walter F., Trent House, Gainsborough.
1886 Bankes, Eustace R., M.A., The Rectory, Corfe C'ustle, Wareham, Dorset.
1890 Barclay, Francis H., F.G.S., Knott's Green, Leyton, Essex.

1886 Bargagli, Nobile Cavaliere Piero, Piazza S. Maria, Palazzo
1895 Barker, Cecil W., Rownham, Malvern, Natal, South Africa.
1887 Barker, H. W., 147, Gordon-road, Peclham, S.E.
1884 Balarett, Charles Golding, Inland Revemue Office, Newington Butts, S.E., and 39, Linden-grove, Nunhead, S.E.

1865 Barton, Stephen, 114, St. Michuel's Hill, Bristol.
1897 Bates, F., 417, High-road, Chiswich, W.
$1894 \dagger$ Bateson, William, M.A., F.R.S., Fellow of St. John's College, St. John's College, Cambridye.
1896 †Beare, Prof. T. Hudson, B.Sc', F.R.S.E., Park House, King's-road, Richmond, Surrey.
1851 † Beaumont, Alfred, The Red Cottage, Pond-road, Blackheath, S.E.
1893 Beddard. Frank E., M.A., F.R.S., Zoological Gardens, Regent's Park, N.W.
1897 Bennett, W. H., 15, Wellington-place, Hastings.
1882 Berg, Prof. Dr. Carlos, Director del Museo Nacional, Buenos Aires (Rep. Argent.), South Americu.
1885 Bethune-Baker, George T., F.L.S., 19, Clarendon-road, Edgbaston, Birmingham.
1895 Bevan, Lieutenant H. G. R., R.N., 2, Lansdown-place, Cheltenham.
1892 Biddell, Walter Cuthbert, 32 , The Grove, Bolton Gardens, S.W.
1886 Biddle, F. W., M.A., 3, Knole Paddock, Sevenoaks.
1880 Bignell, George Carter, 69, Union-street, Stonehouse, Plymouth.
1879 Billups, T. R., 20, Swiss Villas, Coplestone-road, Peelham, S.E.
1895 Bingham, Lt.-Col., F.Z.S., Bombay Staff Corps, c/o Messrs. King \& Co., 65, Coruhill, E.C.
1897 Bird, George, W., The Manor-house, West Wickham, Deckenham.
1896 Bishop, Luke, F.R.G.S., 3, Tokenhouse-Uuildings, E.C.
1891 Blaber, W. H., F.L.S., 34, Cromwell-road, West Brighton.
$1894 \dagger$ Blachburne-Maze, W. P., Shaw House, Newbury, Berlishire.
1889 Blandford, Walter F. H., M.A., F.Z.S., Secretary, 48, Wimpolestreet, W.
1890 Blatch, W. G., Knowle, near Birmingham.
1885 Blathwayt, Lieut.-Col. Liuley, F.L.S., Eagle House, Batheuston, Bath.
1886 Bloomfield, The Rev. Edwin Newson, M.A., Guestling Rectory, Hastings.
1876 Borre, Alfred Preudhomme de, Villa la Fauvette, Petit Saconnex, Genera.
1875 Borrer, Wm., junr., F.G.S., Palynns Manor House, Hurstpierpoint, Sussex.
1876 Boscher, Edward, Bellevue House, Twickenham.
1891 Bootir, George A., Fern Hill, Grange-over-Sands, Carnforth, Lancashire.
1892 Bouskell, Frank, Market Bosworth, Nuneaton.

1888 Bower, B. A., Langley, Eltham-road, Lee, S.E.
1894 + Bowles, E. Augustus, M.A., Myddelton House, Waltham Cross, Hertfordshire.
1852 + Boyd, Thos., Woodvale Lodlge, South Norvood Hill, S.E.
1893 Brabant, Edouard, Chateau de Morenchies, par Cambrai (Nord), France.
1894 Breyer, Professor H. G., M.D., Gymnasium, Pretoria, Transvaal, Africa.
1877 Briggs, Charles Adolphus, 55, Lincoln's Inn Fields, W.C. ; and Rock House, Lynmouth, North Devon.
1870 Briggs, Thomas Henry, M.A., Rocli House, Lynmouth, North Devon.
1894 Bright, Percy M., Roccabruna, Bournemouth.
1897 Brightwen, Mrs. E., The Grove, Great Stanmore.
1890 Bristowe, B. A., Durlstone, Champion Hill, S.E.
1879 Broxgnlart, Le Chevalier Dr. Charles, Assistant d'Entomologie au Musée d'histoire naturelle de Paris, Foreign Corr. Geol. Soc. Lond., Hon. Mem. Geologists' Assn. Lond., \&c., 9, Rue Linné, Paris.
1878 Broun, Capt. Thomas, Drury, Auckland, New Zealand.
1897 Brown, F. N., M.R.C.S., The Elms, Chobham, Woking ; and Natal.
1887 Brown, Henry Rowland, M.A., 3, Pump-court, Temple, E.C.
1886 Brown, John, 5, King's Parade, Cambridge.
1892 Browne, Capt. Clement Alfred Righy, R.E., Southern Mahratta Railway, Dharwar, India.
1890 Bryant, George, Somerset Lodge, Old Shirley, near Southampton.
1883 Buckton, George Bowdler, F.R.S., F.L.S., Weycombe, Haslemere, Surrey.
1889 Burns, Henry, 34, Byrne-road, Balham, S.W.
1896 † Burr, Malcolm, F.Z.S., Bellagio, East Grinsteald, Sussex.
$1868 \dagger$ Butler, Arthur Gardiner, Ph.D., F.L.S., F.Z.S., British Museum, South Kensington, S.W.; and The Lilies, Penge-road, Beckenham, Kent.
1883 Butler, Edward Albert,B.A.,B.Sc.,39, A shley-road, Crouch Hill,N.
1886 Calvert, Wm. Bartlett, Liceo de Quillota, Quillota, Chili, South America.
1886 Cameron, Peter, Union Road, New Mills, Derbyshire.
1885 Campbell, Francis Maule, F.L.S., F.Z.S., \&c., Brynllwydwyn, Machynlleth, Montgomeryshire.
1860 Candèze, Dr. E., Glain, Liége.
1880 Cansdale, W. D., Sunny Bank, South Norwood, S.E.
1889 Cunv, A., c/o Fredk. Du Cane Godman, Esq., F.R.S., 10, Chandosstreet, Cavendish-square, W.
1890 Capper, Samuel James, F.L.S. (President of the Lancashire and Cheshire Entomological Society), Huyton Parl, near Liverpool.

1886 Capron, Edward, M.D., Shere, Guildford, Surrey.
1894 Caracciolo, H., H.JI. Customs, Port of Spain, Trinidad, British West Indies.
1892 Carpenter, The Honble. Mrs. Beatrice, Kiplin, Northallerton, Yorkshire.
1895 Carpenter, G. H., B.Sc., Museum of Science and Art, Dublin.
1868 Carrington, Charles, Carylls, Fay Gate, Horsham.
1890 Carter, George Wm., M.A., F.L.S., Cliff End House, Scarboro'.
$1895^{\circ}$ Carter, Sir Gilbert, K.C.M.G., 43, Charing Cross, W.C., and Government House, Nassuu, Bahamas.
1889 + Cave, Charles J. T., Binstead, Cambridge.
1871 Champion, George C., F.Z.S., Librarian, Heutherside, Horsell, Woking, Surrey ; and 10, Chandos-street, Cavendish-square, W.
1891 Chapman, Thomas Algernon, M.D., Elmscroft, Elms-roct, Redhill.
1890 Cifatterton, Frederick J. S., 78, Clissold-road, Stole Newington, N.
1897 Chawner, Miss Ethel F., Forest Bank, Lyndhurst.
1891 + Chitty, Arthur J., M.A., 27, Hereford-square, S.W.
1889 Christy, W. M., M.A., F.L.S., Watergate, Emsworth, Hants.
1886 + Clark, John Adolphus, The Broadway, London Fields, N.E.
1867 Clarke, Alex. Henry, 109, Warwick-road, Earl's Court, S.W.
1886 Clarke, Charles Baron, M.A., F.R.S., F.L.S., F.G.S., 13, Kew Gardens-road, Kew, S.W.
1891 Clarke, Henry Shortridge, 2, Osborne-terrace, Douglas, Isle of Man.
1891 Cockerell, Theodore D. A., F.Z.S., Mesilla, New Mexico, U.S.A.
$187 \pm$ Cockle, Major George, M.A., B.Mus., Oxon., 9, Bolton-gardens, S.W.
1873 Cole, William, 7, Knighton Villas, Bucłhurst Hill, Essex.
1892 Cowan, Thomas William, F.L.S., F.G.S., F.R.M.S., 31, Belsize Parli Gardens, Hampstead, N.W., and Penleaze, Fowey, Cornwall.
1886 Cowell, Peter (Librarian of the Liverpool Free Public Library), William Brown-street, Liverpool.
1867 Cox, Herbert Ed., c/o F. S. Eve, Esq., 125, Harley-street, W.
1895 Crabtree, Benjamin Hill, The Oaklands, Levenshulme, Manchester.
1888 Cregoe, J. P., Fredinich, Mayow-road, Sydenham, S.E.
1890 Crewe, Sir Vauncey Harpur, Bart., Calke Abbey, Derlyshire.
1880 †Crisp, Frank, LL.B., B.A., Treasurer L.S., F.G.S., Treasurer R.M.S., 5, Lansdowne-road, Notting Hill, W.

1888 Croker, A. J., 90, Albert-road, Walthamstow.
1895 Crompton, Sidney, Salamunca, Santa Cruz, Teneriffe, Canary Islands.
1883 Crowley, Philip, F.L.S., F.Z.S., Waddon House, Croydon.
1873 Dale, C. W., Glanville's Wootton, Sherborne, Dorset.
1887 Daltry, The Rev. Thomas W., M.A., F.L.S., Madeley Vicarage, Newcastle, Staffordshire.
1886 Dannatt, Walter, F.Z.S., Iry Dene, Westcombe Park, Blacliheath, S.E.

1885 Devt, Hastings Charles, C.E., F.L.S., 20, Thurloe-square, S.W.
1886 Dicksox, The Rev. Prof. William Purdie, D.D., LL.D., Professor of Divinity in the University of Glasgow, Glasgow.
1875 Distant, Wm. Lucas, 4, Westbourne-terrace, Lower Addiscombe, Surrey.
1887 Dixey, Frederick Augustus, M.A., M.D., Fellow and Bursar of Wadham College, Wadham College, Oxford.
1895 Dobson, H. T., Ivy House, Acacia Grove, New AIalden, Surrey.
1896 Dolby-Tyler, Charles H., F.R.G.S., Corresponding Member of the Italian Anthropological Society, British Vice-Consul, Panama.
1891 Donisthorpe, Horace St. John K., F.Z.S., 73, West Cromwellroad, S.W., and Durandesthorpe, Chiddingfold.
1885 Donovan, Surg.-Captain Charles, M.D., Mangulore, South Cunara, India.
1873 Doria, Marquis Giacomo, Strada Nuovu, Genoa.
1886 Dormer, The Right Honourable Lord, Cox's Hotel, Jermyn-street, S.W.

1845 Douglas, John Wm., Dartmouth Lodge, 153, Lewishan-road, Lewisham, S.E.
1884 Druce, Hamilton H. C. J., F.Z.S., 43, Circus-roud, St. John's Wood, N.W.
1867 Druce, Herbert, F.L.S., F.Z.S., 43, Circus-road, St. John's Wood, N.W.

1894 Dudaeon, G. C., Fugoo Tea Estate, Suilihat P.O., vià Julpiguri, India.
1883 Durrant, John Hartley, The Cottage, Merton Hall, Thetforl, Norfolk.

1890 Eastwood, John Edmund, Enton Lodge, Witley, Godalming.
1865 Eaton, The Rev. Alfred Edwin, M.A, Woodlands, Seaton, Axminster.
1886 Edwards, James, Colesborne, Andoversford, R.S.O., Gloucestershire.
1884 Edwards, Stanley, F.L.S., F.Z.S., Kidlorook-lorlge, Blackheath, S.E.

1886 Ellis, John W., M.B., L.R.C.P., 18, Rodney-street, Liverpool.
1878 Elwes, Henry John, J.P., F.R.S., F.L.S., F.Z.S., Colesborne, Andoversforl, R.S.O., Gloucestershire.
1886 Evock, Frederick, F.L.S., 13, Tufuell Park-rocul, IIolloway, N.

1890 Farn, Albert Brydges, Mount Nod, Greenhithe, Kent; and Medical Department, Local Government Board, Whitehall, S.W.
1801 Fenn, Charles, Eversden House, Burnt Ash Hill, Lee, S.E.
1886 Fenwick, Nicholas Percival, Holmwoor,, South Bark, Surl位on Hill, Kingston-on-Thames.

1881 Fereday, R. W., Christchurch, Canterbury, New Zealand.
1889 Fervald, Prof. C. H., Amherst, Mass., U.S.A.
1878 Finzi, John A., Hanover Lodge, 77, St. Helen's-gardens, N. Kensington, W.
1874 Fitci, Edward A., F.L.S., Brick House, Maldon, Essex.
1886 Fitch, Frederick, Hudleigh House, Highbury New Park, N.
1865 Fletcher, J. E., 2, Bedwardine-road, St. Johns, Worcester.
1883 + Fletcher, William Holland B., M.A., Fairluwn, Worthing, Sussex.
1892 Fleutiaux, Edmond, 6, Avenue Suzanue, Nogent-sur-Marne, France.
1885 Fоккеr, A. J. F., Zierikzee, Zeeland, Netherlands.
1880 Fowler, The Rev. Canon, M.A., F.L.S., Vice-President, The School House, Lincoln.
1883 Freeman, Francis Ford, Abbotsfield, Tavistock, South Devon.
1896 Freke, Percy Evans, Step House, Borvis, Co. Carlow, Ireland.
1888 Fremlin, H. Stuart, M.R.C.S., L.R.C.P., Mereworth, Maidstone, Kent.
1891 Frohawr, F. W., 34, Widmore-road, Bromley, Kent.
1855 Fry, Alexander, F.L.S., Thoruhill House, Dulwich Wood Park, Norwood, S.E.
1889 Fryer, Charles John, 410, Wandsworth-road, S.W.
$188 \pm$ Fuller, The Rev. Alfred, M.A., The Lodge, 7, Sydenhum-hill, Sydenham, S.E.

1887 Gairan, Charles Joseph, M.A., British Museum (Nutural History), South Kensington, S.W.; and 16, Ashchurch-grove, Shepherll's Bush, W.
1896 Gale, C. H., Public Worlis Department, Hong Kong.
1887 Galton, Francis, M.A., D.C.L., Sc.D., F.R.S., F.G.S., 42, Rutlemed Gate, S.W.
1892 Garde, Philip de la, R.N., H.M.S. "Waterwitch," Australian Station.
1890 Gardner, John, 6, Friars-gate, Hurtlepool.
1893 Gibbs, Arthur Ernest, F.L.S., Avenue House, St. Albans, Hertfordshire.
1865 +Godman, Frederick Du Cane, F.R.S., F.L.S., F.Z.S., South Lodge, Lower Beeding, Horsham, Sussex ; 7, Carlos-place, Groseconorsquare ; and 10, Chandos-street, Cavendish-square, W.
1890 Goldthwait, Oliver, 3, Duke of Edinburgh-road, Carshalton, Surrey.
1886 +Goodrich, Captain Arthur Mainwaring, Lennox Lodge, Malvern Links.
1855 Gorham, Rev. Henry Stephen, F.Z.S., The Chestnuts, Shirley Warren, Southampton.

1874 Goss, Herbert, F.L.S., F.G.S., The Avenue, Surbiton-hill, Kingston-on-Thames.
1886 Green, A. P., Colombo, Ceylon.
1891 Green, E. Ernest, Eton Estate, Punduloya, Ceylon.
1894 Green, Joseph F., F.Z.S., West Lodge, Blacliheath, S.E.
1865 Greene, The Rev Joseph, M.A., Rostrevor, Clifton, Bristol.
1893 + Greenwood, Henry Powis, F.L.S., care of Thomas Greenwood, Esq., Alderbury Farm-house, Salisbury.
1888 Griffiths, G. C., 43, Caledonian-place, Clifton, Bristol.
1894 Grinshaw, Percy H., Natural History Department, Edinzurgh Muscum of Science und Art, Edinburgh.

1897 Hague, Henry, 83, Leyland-road, Southport.
1890 + Hall, A. E., Norbury, Pitsmoor, Sheffield.
1885 Hall, Thomas William, "Stanhope," The Crescent, Croydon.
1891 Hanpson, Sir George Francis, Bart., B.A., 36, Terlworth-square, Chelsea, S.W.
1891 Hanbury, Frederick J., F.L.S., 69, Clapton Common, Clapton, N.E.
1877 Harding, George, The Grove, Fishponds, Bristol.
1897 Harrison, Albert, F.C.S., 72, Windsor-road, Forest Gate, E.
1889 Harrison, John, 7, Gawber-road, Barnsley, Yorkshire.
1892 Headly, Charles Burnard, Two Elms, Alexandra-road, Stoneygate, Leicester.
1892 Heath, Edward Alfred, M.D., F.L.S., 114, Ebury-street, Pimlico, S.W.

1889 Henn, Arnold Umfreville, Box 1282, Post Office, Sydney, N.S.W.
1881 Henry, George, 38, Wellington-square, Hastings.
1888 Higgs, Martin Stanger, F.C.S., Eastleigh Gold Mines, Ltd., Klerksdorp, Transvaal.
1891 Hill, Henry A., 9, Addison Mansions, Kensington, W.
1876 + Hillman, Thomas Stanton, Eastgate-street, Lewes, Sussex.
1896 Hocking, The Rev. John, M.A., Copdock Rectory, Ipswich.
1888 Hodson, The Rev. J. H., B.A., 32, Milton-place, Halifax.
1887 Holland, The Rev. W. J., D.D., Ph.D., 5th Avenue, Pittsbury, Penn., U.S.A.
1897 Horne, Arthur, Ugie Bank, Aberdeen.
1876 †Horniman, Fredk. John, M.P., F.L.S., F.Z.S., \&c., Surrey Mount, Forest Hill, S.E.
$1865+$ Hudd, A. E., "Clinton," Pembroke-road, Clifton, Bristol.
1888 Hudson, George Vernon, The Post Office, Wellington, New Zealand.
1897 Image, Selwyn, M.A., 6, Southampton-street, W.C.
1893 Irby, Lieutenant-Colonel Leonard Howard Loyd, F.L.S., F.Z.S., 14, Cornwall-terrace, Regent's Park, N.W.
1891 Isabell, The Rev. John, 65, Waddon Old-road, Croydon.
$1886 J_{\text {Acoby, Martin, 7, Hemstall-road, West Hampstead, N.W. }}$
1892 Jaffrey, Francis, M.R.C.S., L.R.C.P., 8, Qucen's Ride, Burnes, S.W
1869 Janson, Oliver E., Cestria, Claremont-road, Highgute, N.; and 44, Great Russell-street, Bloomsbury, W.C.
1886 Jenner, James Herbert Augustus, 4, East-strect, Lewes.
1886 John, Evan, Llantrisant, Pontypridd, Glamorganshire.
1889 Johnson, The Rev. W. F., M.A., Acton Rectory, Poyntz Puss, Newry, Ireland.
1888 Jones, Albert H., Shrublands, Eltham, Kent.
1894 Jones, Frederic Whitworth, Cleef, Vryburg, British Bechuanaland, Africa.
$1894+$ Jordan, Dr. K., The Museum, Tring, Hertfordshire

1884 Kane, W. F. de Vismes, M.A., M.R.I.A., Drumleaslie House, Monaghan, Ireland.
1884 Kappel, A. W., F.L.S., Hitden, 20, Sutton Court-road, Chiswick, W.
1876 + Kay, John Dunning, Leeds.
1896 + Kaye, William James, Worcester Court, Worcester Purk, Surrey.
$188 t$ Keays, F. Lovell, F.L.S., 2́6, Charles street, St. James's, S.W.
1894 Keeble, Henry.
1890 Kexrick, G. H., Whetstone, Somerset-roud, Edgbuston, Birmingham.
1890 Kimber, Miss M., Cope Hall, Enborne, Newbury, Berks.
1889 King, J. J. F. X., 207, Sauchiehall-street, Glasgow.
1861 Kirby, William F., F.L.S., Hilden, 20, Sutton Court-roud, Chisuich, W.

1893 Kirkaldy, George Willis, St. Abbs, Worple-road, Wimbledon, S.W.

1889 Klapálek, Professor Franz, Trebon, Wittingau, Bohemia.
1887 + Klein, Sydney T., F.L.S., F.R.A.S., The Red House, Stanmore, Middlesex.
1876 Krahtz, Dr. G., 28, Link-strasse, Berlin.
1895 Krantz, Paul, Box 413, Pretoria, Transvaal, South Africa.

1868 Lang, Colonel A.M., R.E., Box Grove Lodge, Guildford, Surrey.
$1895^{\circ}$ Latter, Oswald H., M.A., Charterhouse, Godalming, Surrey.
1887 † Leech, John Henry, B.A., F.L.S., F.Z.S., F.R.G.S., \&c., Iford Manor, Lewes, Sussex.
1883 Lemann, Fredk. Charles, Blackfriars House, Plymouth.
1892 Leslie, J. H., 58, Foxbourne-road, Upper T'ooting, S.W.
1876 Lewis, George, F.L.S., St. Regulus, Archer's-road, Southampton
1892 Lightfoot, R. M., Bree-st., Cape Town, Cape of Good Hope.
1886 Livett, H. W., M.D., Wells, Somerset.

1865 + Llewelyn, Sir John Talbot Dillwyn, Bart., M.A., M.P., F.L.S., Penllergare, Swansea.
1881 + Lloyd, Alfred, F.C.S., Thie Dome, Boynor, Sussex.
1885 + Lloyd, Robert Wylie, St. Cuthberts, Thurleigh-roud, Nightingulelane, Clapham Common, S.W.
1894 Lowe, The Rev. Frank E., Mr.A., St. Stephrn's Vicarage, Guernsey.
1850 Lowe, W. H., M.D., Woodcote Lodge, Inner Park-road, Wimbledon Park, S.W.
1893 Lower, Oswald B., Bleak House, Park Side, Adelaide, South Australia.
$1850+$ Lcbbock, The Right Houble. Sir John, Bart., M.P., D.C.L., F.R.S., F.L.S., F.G.S., etc., High Elms, Farnborough, Kent.

1880 Lupton, Henry, Lyndhurst, North Grange-roud, Heudingley, Leeds.

1887 M‘Dovgall, James Thomas, Dunolly, Morden-roud, Blackheath, S.E.
$1851+$ M•Intosh, J.
1888 Mackinnox, P. W., Lymndale, Mrussoorie, N.W.P., India.
1892 Mackonochie, The Rev. J. A., B.A. (Chaplain to the Earl of Home), Douglas Castle, Lunarlishire; and The Hirsel, Coldstream.
1858 McLachlan, Robert, F.R.S., F.L.S., F.Z.S., Vick-President and Treasurer, Westriew, 23, Clavendon-road, Lewisham, S.E.
1887 Mandérs, Surgeon-Captain Neville, L.R.C.P., M.R.C.S., Colombo, Ceylon.
1891 Manger, William T., 100, Manor-road, Brockley, S.E.
1892 Mansbridge, William, 9, The Green, Stratford, E.
$189 \pm+$ Marshall, Alick, Auchinraith, Bexley, Kent.
1895 Marshall, G. A. K., The Master's Office, Salisbury, Mashonaland, South Africa.
1896 Marshall, P., M.A., B.Sc., F.G.S., G'rammar School, Auckland, New Zealand.
1865 Marshall, The Rev. Thos. Ansell, M.A., Poste restante, Ajaccio, Corsica.
$1856+$ Marsialle, William, Auchinraith, Bexley, Kent.
1897 Martineau, Alfred H., Solihull, Birminghum.
$187+\dagger$ Mason, Philip Brookes, M.R.C.S., F.L.S., Trent House, Burton-on-Trent.
1895 Masser, Herbert, Ivy-Lea, Burnage, Withington, Manchester.
1865 Mathew, Gervase F., R.N., F.L.S., F.Z.S., F.R.G.S., Lee House, Dovercourt, Harwich.
1887 Mattheiss, Coryndon, Plympton St. Mary, South Devon.
1860 May, John William, K.N.L., Blenhein House, Parson's Greenlane, Fulham, S.W.
$1872+$ Meldola, Professor Raphael, F.R.S., F.C.S., Vice-President, 6, Brunswick-square, W.C.
1885 Melvill, James Cosmo, M.A., F.L.S., Brook House, Prestrich, Lancashire.
1887 Merrifield, Frederic, Secretary, 24, Vernon-terrace, Brighton.
1888 Meyer-Darcis, G., c/o Sogin \& Meyer, Wohlen, Switzerland.
1880 Meyrick, Edward, B.A., F.Z.S., Elmswood, Marlborough, Wiltshive.
1894 Miall, Professor Louis Compton,F.R.S., Ciag Foot, Ben Rhydding, Leeds.
1883 Miles, W. H., The New Club, Calcutta.
1896 Moberly, J. C., M.A., 9, Roclistone-place, Southampton.
1879 Moxteiro, Senhor Antonio Augusto de Carvalho, 72, Ruu de Alecreon, Lisbon.
1853 Moore, Frederic, D.Sc., A.L.S., F.Z.S., Claremont House, Arenueroad, Croydon-road, Penge, S.E.
1886 Morgan, A. C. F., F.L.S., 24, Leinster-square, W.
1889 † Morice, The Rev. F. D., M.A., Fellow of Queen's College, Oxford, Brunswicl, Mount Hermon, Woling.
1895 + Morley, Claude, 34, Berners-street, Ipswich.
1893 Morton, Kenneth J., 13, Blacleford-roud, Edindurgh.
1889 Mosley, S. L., Beaumont Park, Huddersfield.
$1869+$ Müller, Albert, F.R.G.S.
1872 + Murray, Lieut.-Colonel H., 43, Cromwell Houses, Cromwellroad, S.W.

1896 Nesham, Robert, Utrecht House, Queen's-roud, Clapham Parli, S.W.
1889 Nevinson, Basil George, M.A., F.Z.S., 3, Tedworth-squere, Chelsea, S.W.
1887 Newman, The Rev. W. J. H., M.A., The Vicarage, Stepple Burton, Oxon.
1890 Newstead, R., The Museum, Chester.
1882 Nicéville, Lionel de, F.L.S., C.M.Z.S., Indiun Mfuseum ; and 13, Kyd-street, Calcutta.
1895 Nicholson, Charles, 202, Evering-road, Claptom, N.E.
1886 Nicholson, William E., School Hill, Lewes, Sussex.
1893 Nonfried, A. F., Rakonitz, Bohemia.
1897 Norris, Albert, Church-lane, Napier, New Zealand.
1886 Norris, Herbert E., 15, Marlet-place, Civencester.
1878 Nottidge, Thomas, Ashford, Kent.
1895 Nurse, Captain C.G., F.R.G.S., Indian Staff Corps, 5, St. Mury'ssquare, Bury St. Élmunds.

1869 Oberthür, Charles, Rennes, France.
1877 Oberthürs, René, Remes, France.

1893 + Ogle, Bertram S., Steeple Aston, Oxfordshire.
1883 Oldfield, George W., M.A., F.L.S., F.Z.S., 21, Longridgeroad, Earl's Court, S.W.
1893 Oliver, John Baxter, 12, Avenue-road, St. John's Wood, N.W.

1873 Olivier, Ernest, Ramillons, près Moulins (Allier), France.
1878 Ormerod, Miss Eleanor A., F.R.Met.S., Torrington House, Holywell Hill, St. Albans, Herts.

1895 Page, Herbert E., 25, Casella-road, New Cross, S.E.
1893 Piulcke, Wilhelm, 4, Marienstrasse, Freiburg im Breisgau, Germany.
1897 Peers, C. H., M.A., Harrow Weald, Middlesex.
1897 Pegler, Stephen, Retford.
1897 Pemberton, Charles H., 4, Kent's-terrace, Torquuy.
1883 Péringuey, Louis, South African Museum, Cape Town, South Africa.
1879 Perkins, Vincent Robt., Wotton-under-Edge, Gloucestershire.
1887 Pirllips, Charles Edmund Stanley, Castle House, Shooter's Hili, Kent.
1897 Pirllips, Hubert C., M.R.C.S., 83, Shirland-yurdens, Paddington, W.

1891 Pierce, Frank Nelson, 1, The Elms, Dingle, Liverpool.
1885 Poll, J. R. H. Neerwort van de, Heerengracht 476, Amsterdam.
$1870+$ Porrittr, Geo. T., F.L.S., Crosland Hall, Huddersfield.
1884 + Poulton, Professor Edward B., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., Hope Professor of Zoology in the University of Oxford, Wykeham House, Banbury-road, Oxford.
1851 Preston, The Rev. Thomas Arthur, M.A., F.L.S., Thurcaston Rectory, Leicester.
1878 Price, David, 48, West-street, Horsham, Sussex.
1893 Prout, Louis Beethoven, 246, Richmond-road, Dalston, N.E.

1882 + Ramsden, Hildebrand, M.A., F.L.S., 26, Upper Berlford-place, Russell-square, W.C.
1874 Reed, Edwyn C., C.M.Z.S., Baños de Cauquenes, Chili.
1893 Reid, Captain Savile G., late R.E., The Elms, Yalding, Maidstone, Kent.
1891 Reid, William, Pitcaple, Aberdeenshive.
1890 Rendlesuam, The Right Honble. Lord, Rendlesham Hall, Woodbridge, Suffolk.
1886 Rhodes, John, 360, Blacliburn-road, Accrington, Lancushire.

1891 Richardson, Nelson M., B.A., Monte Video, neur Weymouth, Dorset.
1894 Riding, William Steer, B.A., M.D., Buckerell Lodye, Buclierell, near Honiton, Devon.
1853 Ripon, The Most Noble the Marquis of, K.G., D.C.L., F.R.S., F.L.S., etc., 9, Chelsea Embankment, S.W.

1889 Robinson, Arthur, B.A., 1, Mitre Court Buildings, Temple, E.C.

1892 Robinson, Sydney C., Goldsmith's Hall, E.C.
1869 + Robinson-Douglas, William Douglas, M.A., F.L.S., F.R.G.S., Orchardton, Castle Douglas, N.B.
1890 Robson, John Emmerson, Hartlepool.
1886 Rose, Arthur J., Sharrou House, Hutherley Crescent, Sidcup.
1868 Rotiney, George Alexander James, 8, Versailles-road, Anerley, S.E.

1894 Rotuschild, The Honble. Nathaniel Charles, F.Z.S., 148, Piccudilly, W. ; and Tring Park, Tring, Herts.
1888 + Rothschild, The Honble. Walter, F.Z.S., 148, Piccadilly, W.; and Tring Park, Tring, Herts.
1890 Routledge, G. B., Tam Lodge, Heads Nonk, Carlisle.
1892 Russell, S. G. C., 19, Lombard-street, E.C.
1894 Rye, Bertram George, 212, Upper Richmond-road, Putney, S.W.

1894 Rylands, Thos. Glazebrook, F.L.S., F.G.S., Highfields, Thelvall, Warrington.

1866 + Salvin, Osbert, M.A., F.R.S., F.L.S., 10, Chandns-street, Cavendish-square, W. ; and Hawlesfold, Fernhurst, Sussex.
1886 Salwey, Reginald E., Sungate, Hool-road, Kingston-on-Thames. 1865 + Saunders, Edward, F.L.S., St. Ann's, Mount Hermon, Woking, Surrey.
1861 + Saunders, G. S., 20, Dents-road, Wandsworth Common, S.W.
1886 Saunders, Prof. Wm., Central Experimental Farm, Ottawa, Canada (President of the Entomological Society of Ontario).
1881 Scollick, A. J., Boldrewood, Ditton Hill, Surbitm, Kingston-onThames.
1864 Semper, George, care of Bernhard Beer, Esq., 10, Newgatestreet, E.C.
1862 Sharp, David, M.A., M.B., F.R.S., F.L.S., F.Z.S., Hawthorndene, Hills-road, Cambridge; and University Museum of Zoology and Comparative Anatomy, Cambridge.
1883 Shaw, A. Eland, M.R.C.S., Fakenhum, Norfoll.
1883 + Shelley, Capt. George Ernest, F.G.S., F.Z.S., 10, Thurloesquare, S.W.
1887 Sich, Alfred, Brentwood, 65, Burrowgute-roud, Chiswick, W.

```
1887 Singwick, Arthur, M.A., Fellow of Corpus Christi College, Oxford,
        64, Woodstock-road, Oxford.
1869 Smith, Henley Grose, F.Z.S., 5, Bryanston-square, Hyde Parl, W.
1895 Smith, W. W., Ashburton, Canterbury, New Zealand.
1885 South, Richard, 100, Ritherdon-road, Upper Tooting, S.W.
1897 Spalike, E. G. J., B.A., 1, Christchurch Villas, Tooting Bec-roud,
        S.W.
    - +Spence, William Blundell, Florence, Italy.
1889 Standen, Richard S., F.L.S., Thorpe Hall, near Colchester.
1890 Stearns, A. E., 99, Gloucester-terrace, Hyde Park, W.
1897 Stebbing, E. P., Indian Forest Service, c/o King, Hamilton
        and Co., Calcutta.
1862 Stevens, John S., 4, Pope's-grove, Twickenham.
1837 Stevens, Samuel, F.L.S., Lounda, Beulah Hill, Upper Norwood,
        S.E.
1889 Straton, C. R., F.R.C.S., West Lodge, Wilton, Salisbury.
1896 Stricklind, A. Gerald, 28, Elm Park-gardens, S.W.
1895 Stcdd, E. F., M.A., B.C.L., Oxton, Exeter.
1882 Swanzy, Francis, Stanley House, Granville-road, Sevenoals.
1884 Swinhoe, Colonel Charles, M.A., F.L.S., F.Z.S., Avenue House,
        Oxford.
1894 Swinhoe, Ernest, Avenue House, Oxford.
1876 Swinton, A. H., c/o General Callender, Clovernooke, Redbridge,
        Southampton.
```

    1893 Taylor, Charles B., Rae-street, Rae Town, Kingston, Jamaica.
    1892 Taylor, The Rev. George W., F.R.S. (Canada), St. Alban's Rectory,
        Nanaimo, British Columbia.
    1886 Theobaln, F. V., M.A., Lecturer in Economic Entomology and
        Zoology to the South Eastern Agricultural College, Wye Court,
        near Ashford, Kent.
    1892 Thornley, The Rev. A., M.A., South Leverton Vicarage, Lincoln.
    1897 Tomlin, B., 59, Liverpool-road, Chester.
    1893 Townsend, Professor C. H. Tyler, Las Cruces, Nerv Mexico,
        U.S.A.
    1859 + Trimen, Roland, F.R.S., F.L.S., President, 87, Gloucester-
        place, W.
    1895 Tunaley, Henry, 30, Fairmont-road, Brixton Hill, S.W.
    1897 Tunstall, Wilmot, Brook-house, Meltham, Huddersfield.
    1893 Turner, Henry Jerome, 13, Drakefell-road, St. Catherinc's Park,
        Hutcham, S.E.
    1894 Turner, Thomas, Cullompton, Devon.
    1886 Tutt, J.W., Rayleigh Villa, Westcombe Park, Blackheath, S.E.
    1893 Urich, Frederick William, Railway Extension Office, Arimu, Trinidad, British West Indies.

1866 Verrali, George Henry, Sussex Lodge, Newmarket.
1897 Vice, William A., M.B., Belvoir-street, Leicester.
1889 Vivian, H. W., Glenafon, Taibach, South Wales; and Trinity College, C'ambridge.
1895 Wacher, Sidney, F.R.C.S., Dane John, Canterbury.
1897 Wainwright, Colbran J., 2, Hundsworth Wood-road, Handsworth, Birmingham.
1876 Wakefield, Charles Marcus, F.L.S., Belmont, Uxbridge.
1870 Walker, The Rev. Francis Augustus, D.D., F.L.S., Dun Mallard, Cricklewood, N.W.
1878 Walker, James J., R.N., F.L.S., 23, Ranelagh-road, Marine Toun, Sheerness.
1863 † Wallace, Alfred Russel, D.C.L., Oxon., F.R.S., F.L.S., F.Z.S., Corfe View, Parlistone, Dorset.
1866 † Walsingham, The Right Hon. Lıord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., High Steward of the University of Cambridge, Merton Hall, Thetford, Norfoll; and 66a, Eaton-square, S.W.
1886 Warren, Wm., M.A., 80, Frith cille Gardens, Shepherd's Bush, W.
1869 Waterhouse, Charles O., Ingleside, Avenue Gardens, Acton, W.; and British Museum, Cromwell-road, S.W.
1893 Webb, John Cooper, 32, Henslowe-roall, Dulwich, S.E.
1876 + Western, E. Young, 36, Lancuster Gate, Hyde Parl, W.
1886 Wheeler, Francis D., M.A., LL.D., Paragon House School, Norwich.
1865 White, The Rev. W. Farren, M.A., Stonehouse Vicarage, Gloucestershire.
1884 White, William, The Ruskin Museum, Meersbronk Park, Sheffield.
1896 Wileman, A. E., c/o J. W. B. Wileman, Abridge, Romford.
1894 Wilson, Edwin, Post Office-terrace, Cambridge.
1894 Wolley-Dod, F. H., Box 225, Calgary, Alberta, N.W.T. Canada.
1881 Wood, The Rev. Theodore, 23, Broderick-road, Upper Tooting, S.W.

1894 Woolf, Michael Yeatman, 1, Marlborough-place, St. John's Wood, N.W.

1897 Wright, Dudley D'A., M.R.C.S., I..R.C.P., 55, Queen Anne-street, W.

1891 Wroughton, R. C., Conservator of Forests, Indian Forest Service, Bombay, India.

1888 Yerbury, Colonel John W., late R.A., F.Z.S., Army and Navy Club, Pall Mall, S.W.
1892 Youdale, William Henry, F.R.M.S., 52, IFain-street, Cockermouth, Cumberland.

## ADDITIONS TO THE LIBRARY

## During the Year 1897.

Adamson (C. H. E.). Catalogue of Butterflies collected in Burmah up to the end of 1895. 8vo, Neweastle-on-Tyne, 1897. The Author.

Avdré (Ed. et Ernest). Species des Hyménoptères d'Europe et d'Algérie. Tome V., par le Rev. T. A. Marshall. 8vo, Gray, 1891.

The Author.
Ashiread (W. H.). Descriptions of nerv Cynipidous Galls and Gall-Wasps in the United States National Museum.
[Proc. U. S. Nat. Mus., Vol. XIX., 1896.] The Author.
Barrett (C. G:). Lepidoptera of the British Islands. Vol. IV. Heterocera : Noctur. 8vo, London, 1897. The Publishers.

Berg (C.). Contribucion al estudio de los Hemipteros de la Tierra del Fuego.
[An. Mus. Nac. Buenos Aires, Tomo V., 1896.]
Comunicaciones Lepidopterologicas acerca de Veinticinco Ropaloceros Suda-Americanos.
[An. Mus. Nac. Buenos Aires, Tomo V., 1897.] The Author.
Berlese (Ant.). Le Cocciniglie Italiane viventi sugli agrumi. Parte I.-III. 8vo, Firenze, 1893-1896.

The Author.
Beutenmüller (W.). Descriptive Catalogue of the Sphingidæ found within Fifty Miles of New York City.
[Bull. Am. Mus. Nat. Hist., Vol. VII., 1895.]
Critical Review of the Sesiidæ found in America, North of Mexico. [Bull. Am. Mus. Nat. Hist., Vol. VIII., 1896.] The Author.

Brocchi (Dr.). Rapport sur les observations faites en $189 \check{\text { à }}$ la station entomologique de Paris. 8vo, Paris, 1896. The Author.

Blandford (W. F. H.). [See Godman (F. D.) and Salvin (O. Biologia Centrali-Americana.]
[See Grassi (B.) and Sandias (A.).]

Buckton (G. B.). Notes on Indian Aphides (1893).
The Mango Shoot Psylla (1893).
Notice of a New Indian Homopteron (1895).
Notes on Two New Species of Gall-Aphids from the N. IV. Himalayan Region (1896).
[Ind. Mus. Notes, 1893-1896.] The Author:
Burr (M.). On New Species of Forficularia.
[Ann. \& Mag. N. H., Ser. 6, Vol. XIX., 1897.7 The Author.
Cambridge (F. O.). [See Godman (F. D.) and Salvin (O.). Biologia Centrali-Americana ]
Cambridge (O. P.). [See Godman (F. D.) and Salvin (O.). Biologia Centrali-Americana.]
Cameron (P.). Hymenoptera Orientalia, or Contributions to a knowledge of the Hymenoptera of the Oriental Zoological Region. P't. V.
[Mem. \& Proc. Manchester Lit. \& Philos. Soc., Vol. XLI.]
The Author.
[See Godman (F. D.) and Salvin (O.). Biologia CentraliAmericana.]
Casey (T. L.). Coleopterological Notices. No. VII.
[Ann. N. York Acad. Sci., Vol. IX., 1897.] The Author.
Champion (G. C.). List of Tenebrionidæ supplementary to the "Munich" Catalogue.
[Mém. Soc. Ent. Belge, III., 1895.] By Exchange.
List of the Ægialitidæ and Cistelidæ supplementary to the "Munich" Catalogue.
[Mém. Soc. Ent. Belge, VI., 1897.] The Author.
[See Godman (F. D.) and Salvin (O.). Biologia CentraliAmericana.]

Chittenden (F. H.). Some little-known Insects affecting Stored Vegetable Products. The Asparagus Beetles.
[Year Book U. S. Dept. Agric. for 1896.]. S. Dept. Agriculture.
Cockerell (T. D. A.). On the danger to American Horticulture from the introduction of Injurious Insects. 4to, Mesilla, New Mexico, 1897.

The Author:
The Food Plants of Scale Insects (Coccidæ).
[Proc. U. S. Nat. Mus., Vol. XIX., 1897.]
Directions for Collecting and Preserving Scale Insects.
[Bull. U. S. Nat. Mus., No. 39, Pt. I., 1897.]
Smithsonian Institution.
Notes on New Mexican Flowers and their Insect Visitors.
[Botanical Gazette, Aug., 1897.]
The San José Scale and its nearest allies.
[Bull. U. S. Dept. Agric. Div. Ent. Teehn. Ser., Bull. No. 6.]
The Author.
Coquillett (D. W.). Revision of the Tachinidæ of America, North of Mexico, a Family of Parasitic Two-winged Insects.
[U. S. Dept. Agric., Div. Ent., Techn. Ser., Bull. No. 7, 1897.]
U. S. Dept. Agriculture.

Dalla Torre (C. G. de). Catalogus Hymenopterorum hucusque descriptorum
systematicus et synonymicus. Vol. VIII. 8vo, Lipsiæ, 1897. Purchased.

## Druce (Herbert). Descriptions of New Species of Lepidoptera Heterocera from Central and South America.

[P. Z. S. Lond., 1893.]
Descriptions of some New Species of Heterocera from Central America. (2 parts).
[Ann. \& Mag. N. H., Ser. 6, Vol. XIII., 1894.]
Descriptions of some New Species of Heterocera from the Eastem Islands and Tropical America.
[Ann. \& Mag. N. H., Ser. 6, Vol. XV., 1895.]
Descriptions of some New Species of Heterocera from Tropical America.
[Ann. \& Mag. N. H., Ser. 6, Vol. XVI., 1895.]
Descriptions of Five New Species of Castnia from Tropical South America.
[Ann. \& Mag. N. H., Ser. 6, Vol. XVII., 1896.]
Descriptions of some New Species of Heterocera from Tropical Africa.
[Ann. \& Mag. N. H., Ser. 6, Vol. XVII., 1896.]
Descriptions of some New Genera and Species of Heterocera from Central and Tropical South America.
[Ann. \& Mag. N. H., Ser. 6, Vol. XVIII., 1896.] The Authon.
[See Godman (F. D.) and Salvin (O.). Biologia CentraliAmericana.]
Durrant (J. H.). [See Walsingham (Lord).]
Dy.ir (H. G.). Larvæ of the Higher Bombyces (Agrotides, Grote).
[Proc. Boston Soc. N. H., Vol. XXVII., 1896.] The Author.
Edwards (James). The Hemiptera-Homoptera (Cicadina and Psyllina) of the British Islands. 8vo, London, 1896. The Publishers.
Elwes (H. J.), \& Edwards (J.). A Revision of the Oriental Hesperiidæ.
[Trans. Z. S. Lond., Vol. XIV., Pt. 4, 1897.] The Authors.

## Forel (A.). Zur Fauna und Lebensweise der Ameisen im columbischen Urwald.

[Mit. Schweiz. Ent. Gesell, Bd. 9, 1896.]
Deux Fourmis d'Espagne. Communication verbale sur les mœeurs des Fourmis de l'Amérique Tropicale.
[Ann. Soc. Ent. Belge, Tome XLI., 1897.]
Ameisen aus Nossi-Bé, Majunga, Juan de Nova (Madagaskar), den Aldabra-Inseln und Sansibar. Gesammelt von Herrn Dr. A. Voeltzkow.
[Abhandl. Senck, nat. Gesell. Bd. XXI., Frankfort am M., 1897.]
The Author:
Fowler (W. W.). [Sce Godman (F. D.) and Salvin (O.). Biologia Centrali-Americana.]
Godman (F. D.) and Salvin (O.). Biologia Centrali-Americana. Araneidea by O.P. and F. O. Cambridge. Insecta by W. F. H. Blandford, P. Cameron, G. C. Champion, H. Druce, W. W. Fowler, F. D. Godman, A. Pictet, O. Salvin, H. de Saussure, D. Sharp, and F. M. van der Wulp. Paris CXXXI.-CXXXIX.

The Editors.

Grannidier (A.). Histoire Physique, Naturelle et Politique de Madagascar; Vol. XXVII. Histoire Naturelle des Myriapodes-Atlas. Par H. de Saussure. 4to, Paris, 1897.

The Author.
Grassi (B.) \& Sandias (A.). The Constitution and Development of the Society of Termites. Observations on their Habits; with Appendices on the Parasitic Protozoa of Termitidæ, and on the Embiidæ. Translated by W. F. H. Blandford.
[Qr. Journ. Micros. Sci., Vols. XXXIX., XL., 1897.]

Green (E. Ernest). The Coccidæ of Ceylon. Part I. Svo, London, 1896. The Author.

Grimshaw (Percy H.). I. On some Type Specimens of Lepidoptera and Coleoptera: and II. On a Melanic Specimen of Hestina nama (Doubleday) in the Edinburgh Museum of Science and Art.
[Trans. Royal Soc. Edinb., Vol. XXXIX., Pt. I., 1897,]
The Author.
Grote (A. Radcliffe). Entwurf eines diphyletischen Stammbaumes der europäischen Tagfalter.
Die Schmetterlingsfauna von Hildesheim.
Classification der Schmetterlinge-Die Nachtpfauenaugen mit besonderer Berücksichtigung ihrer Flügelbildung.
[Mittheil. Rœmer-Mus. Hildesheim, 1897.]
Hind Wings of the Day Butterflies.
[Canadian Entom., Vol. XXIX., 1897.] The Author.
Guérin-Méneville (M. F. E.). Species et Iconographie Générique des Animaux Articulés : 1e partie. Insectes Coléoptères. Nos. 1-35 (wanting Nos. 30-32). 8vo, Paris, 1843-49. Purchased.
Hampson (Sir G. F.). Fauna of British India including Ceylon and Burma. Moths.-Vol.IV. 8vo, London, 1896.

The Author.
Holygren (Emil). Studier öfver hudens och de körtelartade hudorganens morfologia.
[Kongl. Sv. Vet. Akad. Handlingar, Bd. XXVII, No. 4, 1895.]
The Academy.
"Hope Reports," edited by E. Poulton, Vol. I., 1893-97. 8vo, Oxford, 1897. The Editor.

Howard (L. O.). A Study of Insect Parasitism, \&c.
[U. S. Dep. Agric. Div. Ent. Tech. Ser. Bull., No. 5, 1897.]
The use of Steam Apparatus for Spraying.
[Year Book, U. S. Dep. Agric., 1896.
U.S. Dept. of Agriculture.

Jacoby (Martin.) Further Contributions to the knowledge of the Phytophagous Coleoptera of Africa, including Madagascar. Part II.
[P. Z. S. Lond., 1897.]
The Author.
Janet (C.). Les F'ourmis. 8vo, Paris, 1896.
Études sur les Fourmis, les Guêpes, et les Abeilles. Note 13. 8vo, Limoges, 1897.
Sur les Rapports du Discopoma comata, Berlese, avec le Lasius mixtus, Nylander.
Sur les Rapports de l'Antennophorus Uhlmanni, Haller, avec le Lasius mixtus, Nylander.
[C. R. Acad. Sci. Paris, Tome CXXIV., 1895.] The Author.

Lethierry (L.) et Severin (G.). Catalogue Général des Hémiptères. Tome III.-Hétéroptères. 8vo, Berlin, 1896. Purchased.

Linell (Martin L.). Descriptions of New Species of North American Coleoptera in the families Cerambycidæ and Scarabæidæ.
[Proc. U. S. Nat. Mus., Vol. XIX., 1896.]
On the Insects collected by Dr. Abbott on the Seychelles, Aldabra, Glorioso, and Providence Islands, with descriptions of nine New Species of Coleoptera
〔Proc. U. S. Nat. Mus., Vol. XIX., 1897.]
The Author.
Lintner (J. A.). Eleventh Report on the Injurious and other Insects of the State of New York for 1894. 8vo, Albany, N. Y., 1896.

The Author.
Marchal (Paul). La glande coxale du Scorpion, et ses rapports morphologiques avec les organes excréteurs des Crustacés.
[C.R. Acad. Sci., Paris, 1892.]
Etude sur la reproduction des Guêpes.
[C.R. Acad. Sci., Paris, 1895.]
La Cécidomyie de l'avoine.
[C.R. Acad. Sci., Paris, 1895.]
Les Coccinellides Nuisibles.
[Rev. Sci. Nat. Applıquées, Paris, 1895.]
Observations sur les Polistes.
[Bull. Soc. Zool. France, 1896.]
La Reproduction et l'Evolution des Guêpes Sociales.
[Rev. Sci., Paris, 1896.]
Sur deux Cécidomyes Nouvelles vivant sur la pomme de terre et sur le lierre.
[Bull. Soc. Eut. France, 1896.]
Recherches anatomiques et physiologiques sur l'appareil excréteur des Crustacés Decapodes.
[Arch. Zool. Expérimentale, Paris.]
La Castration Nutriciale chez les Hyménoptères Sociaux.
[C.R. Soc. Biologie, 1897.]
Notes d'Entomologie Biologique sur une excursion en Algérie et en Tunisie.
[Mém. Soc. Zool. France, 1897.]
L'Entomologie appliquée en Europe.
[Bull. Soc. Nat. d'Acclimatation de France, 1896.]
Sur les Insectes nuisibles de Tunisie et d'Algérie.
[Assoc. pour l'avancement des Sci., 1896.]
The Author.
Marlatt (C. L.). Insect Control in California.
[Year Book, U. S. Dept. Agric., 1896.]
U. S. Dept. Agriculture.

Marshall (T. A.). [See André (Ed. et Ernest).]
Mayer (A. G.), On the Colour and Colour-Patterns of Moths and Butterflies.
[P. Boston Soc. N. H., Vol. XXVII., 1897.] The Author.
Ormerod (Eleanor A). Report of Observations of Injurious Insects and Common Farm Pests, for 1896. Svo, London, 1897.

The Author.
Osborn (H.). Insects affecting Domestic Animals.
[U. S. Dept. Agric. Div. Entom., Bull. No. 5, N. S., 1896 ]
U. S. Dept. Agriculture.

Osten Sacken (C. R.). Bibliographische und theilweise psychologische Untersuchung über die zwei Ausgaben der Erstlingsarbeit von H. Loew: Ueber die Posener Dipteren.
[Berliner Ent. Zeit., Bd. XLI.,'1896.]
Notice on the terms tegula, antitegula, squama, and alula, as used in Dipterologv.
[Berliner Ent. Zeit., Bd. XLI., 1896.]
A New Genus of Cyrtidar (Dipt.) from New Zealand.
[Ent. Monthly Mag., 2 Ser., Vol. VII., 1896.]
A Cecidomyia living in Pine-resin.
[Ent. Nachr. XXII., 1896.
Prof. Mik's Genus Paracrocera (Cyrtidæ).
[Berliner Ent. Zeit., Bd. XLI., 1896.]
On the terms Calypterate and Acalypteratæ, Calypta and Calyptra, as they have been used in Dipterology.
[Berliner Ent. Zeit., Bd. XLI., 1896.]
Preliminary notice of a Subdivision of the Suborder Orthorrhapha Brachycera (Dipt.) on chætotaetic principles.
[Berliner Ent. Zeit., Bd. XLI., 1896.]
The genus Phyllolabis (Dipt., Tipul.) a remarkable case of disconnected areas in geographical distribution.
[Berliner Ent. Zeit., Bd. XLI., 1896.〕
Identification of two genera of Nemestrinidæ published by Bigot.
[Berliner Ent. Zeit., Bd. XLII., 1897.]
The Author.
Péringuey (L.). Descriptive Catalogue of the Coleoptera of South Africa. Part II. Cicindelidæ, Supplement: Carabidæ. Svo, London, 1896.

The Author.
Pictet (A.). [See Godman (F. D.) and Salvin (O.). Biologia CentraliAmericana.]
Piepers (M. C.). Nouvelles observations sur les vols des Lépidoptères. Svo, Batavia \& s'Gravenhage, 1897.

The Author.
Porritt (G. T.). Preliminary List of the Neuroptera and Trichoptera of Yorkshire (omitting Psocidæ and Ephemeridæ),
[Naturalist, 1897.]
The Author.
Poulton (E. B.). [See "The Hope Reports, Vol. I."]
Preudhomme de Borre. Pyrrhocoris Marginatus.
[Arch. Sci. Phys. Nat., Genève, 1896.] The Author.
Régimbart (M.). Dytiscidæ et Gyrinidæ d'Afrique et de Madagascar.
[Mém. Soc. Ent. Belge, IV., 1895.] By Exchange.
Richardson (Nelson M.). Report on Observations on the First Appearances of Birds, Insects, \&c., in Dorset during 1894.
Tinea Vinculella, H.-S.
$\lfloor$ Proc. Dorset N. H. \& Antiq. Field Club, Vol. XVI., 1895.]
List of Portland Lepidoptera.
[Proc. Dorset N. H. \& Antiq. Field Club, Vol. XVII., 1896.]
The Author.
Robertson (C.). Flowers and Insects.
North American Bees :-Descriptious and Synonyms.
[Trans. Acad. Sci. of St. Louis, Vol. VII., 1896.] The Academy.

Salvin (O.). [See Godman (F. D.). Biologia Ceutrali-Americana.]
Saussure (H. de). Note Supplémentaire sur le genre Hemimerus.
[Rev. 'Suisse Zool., 'Tome IV., 1896.]
Révision du genre Tridactylus.
[Rev. Suisse Zool., Tome IV., 1897.] The Author.
-. [See Godman (F. D.) and Salitin (O.). Biologia CentraliAmericana.]
——. [See Grandidier (A.).]
Schiödte (J. C.). De Metamorphosi Eleutheratorum Observationes. Parts I.-XII. (in 3 vols.). 8vo, Copenhagen, 1861-1883.

Purchased.
Scudder (S. H.). List of Exotic Orthoptera described by S. H. Scudder, 1868-1879, with a revision of their nomenclature.
[Proc. Boston Soc. N. H., Vol. XXVII., 1896.]
The Genera of North American Melanopli.
[Proc. Am. Acad. Arts \& Sci., Vol. XXXII., 1897.]
The Species of the Genus Melanoplus.
[Proc. Am. Philos. Soc., Vol. XXXVI., 1897.]
Synonymical and Descriptive Notes on North-American Orthoptera.
[CCauadian Entom., 1897.]
The Author.
Sharp (D.). [See Godman (F. D.) and Salvin (O.). Biologia CentraliAmericana.]

Theobald (F. V.). Parasitic Diseases of Poultry. 8vo, London, 1896.
The Apple-Blossom Weevil (Anthonomus pomorum) and suggestions for its destruction, together with a list of other beetles injurious to the apple; also the method of preparing the new Insectide, Arsenate of Lead. 8vo, Ashford \& London, 1897.
Notes on Injurious Insects.
[Journal S. E. Agric. Coll., No. 5, 1897.] The Author.
Thomson (C. G.). Opuscula Entomologica. Fasc. 22. Svo, Lundæ, 1897. The Author.
Tosquinet (J.). Ichneumonides d'Afrique.
[Mém. Soc. Ent. Belge, V., 1896.] By Exchange.
Tutt (J. W.). Stray Notes on the Noctuæ. Svo, London, 1892.
Papers on certain species of the Zygæuidæ.
[Proc. S. Lond. Ent. Soc., 1894.]
On Agrotis tritici, Linn., Ab. subgothica, Haw., and Agrotis jaculifera, Gn.
[Caradian Entom., 1896.]
Notes on some of the Noctuæ in the British Museum Collection. [Canadian Entom., 1896.]
British Butterflies. 8vo, London, $1896 . \quad$ The Author.
Uhler (P. R.). Summary of the Hemiptera of Japan, presented to the United States National Museum by Professor Mitzukuri.
[Proc. U. S. Nat. Mus., Vol. XIX., 1896.]
U. S. Dept. Agriculture.

## United States Department of Agriculture (Division of Entomology) Bulletins (New Series) 1897.

No. 5. Insects affecting Domestic Animals. (H. Osborn.)
No. 6. Proceedings of the Eighth Amnual Meeting of the Association of Economic Entomologists.
No. 7. Some Miscellaneous Results of the Work of the Division of Entomology.
No. 8. Some Little-known Insects affecting stored Vegetable Products. (F. H. Chittenden.)
No. 9. Proceedings of the Ninth Annual Meeting of the Association of Economic Entomologists.

Firmers' Bulletins, Revised Editions, 1897.
No. 45. Some Insects injurious to Stored Grain.
(F. H. Chittenden.)

No. 47. Insects affecting the Cotton Plant. (L. O. Howard.)
Bibliography of the more important contributions to American Economic Entomology. (S. Henshaw) Part V.; L-Z, 1896.
General Index to "Insect Life." U. S. Dept. Agriculture.
United States Department of Agriculture (Division of Entomology), Technical Series, 1897.
No. 5. A study of Insect Parasitism: a consideration of the Parasites of the White-marked Tussock Moth, with an account of their habits and inter-relations, and with descriptions of New Species. (L. O. Howard.)
No. 6. The San José Scale and its nearest allies.

> (T. D. A. Cockerell.)

No. 7. Revision of the Tachinidæ of America, North of Mexico. (D. W. Coquillett.)
U. S. Dept. of Agriculture.

Walker (J. J.). List of the Coleoptera of the Rochester District.
[Rochester Naturalist, Vol. II., 1897.]
The Author.
Walsingham (Lord) and Durrant (J. H.). An attempt to elucidate and to fix the types of Tortrix, Tinea, and Alucita, three of the Linnæan Subdivisions of Phaliena, L.
[Ent. Monthly Mag. Ser. 2. VIII., 1897.] The Authors.
Weed (Clarence, M.). Some Dangerous Fruit Insects.
[Bull. No. 23, New Hampshire Coll. Agric. Exp. Stn., 1894.]
Remedies for the Horn Fly.
Two Shade-Tree Pests.
[Bull. Nos. 29 \& 34, N. H. Coll. Agric. Exp. Stn., 1890.]
The Codling Moth and the Apple Maggot.
Analyses of Three Common insecticides.
The Tent Caterpillar.
The Army Worm.
[Bull. Nos. 35, 36, 38, 39, N. H. Coll. Agric. Exp. Stn., 1896.]
The Canker Worm.
[Bull. No. 44, N. H. Coll. Agric. Exp. Stn., 1897.]
The Author:
Wulp (F. M. vain der). [See Godman (F. D.) and Salivin (O.). Biologia Centrali-Americana.]

## Periodicals and Publications of Societies.

## AFRICA.

$$
\begin{aligned}
& \text { Capetown. South African Philosophical Society. Transactions, Vol. VII., } \\
& \text { Pt. 2; Vol. IX., Pt. 1; Vol. X., Pt. 1. The Society. }
\end{aligned}
$$

## AMERICA (NORTH).

CANADA.

Halifax. Nova Scotian Institute of Science. Proceedings and Transactions. Vol. IX., Pt. 2.<br>The Institute.

London, Ontario. The Canadian Entomologist. Vol. XXIX., 1897.<br>By Exchange.

Montreal. Royal Society of Canada. Proceedings and Transactions. Ser. 2, Vol. II., 1896.
The Society.

## UNITED STATES.

Cambridge, Mass. Museum of Comparative Zoology at Harvard College, Aunual Report, 1895-96.
Davenport, Iowa. Academy of Natural Sciences. Proceedings, 1897.
The Academy.
New York. N.Y. Entomological Society. Journal, 1897. Purchased.
Philadelphia. Academy of Natural Sciences of Philadelphia. Proceed-ings, 1897.
Vol. VIII.
By Exchange.
American Entomological Society. Transactions, 1897. By Exchange.
Washington. Entomological Society. Proceedings, 1897. Purchased.

## WEST INDIES.

Jamaica. Institute of Jamaica. Journal, Vol. II. The Institute.

## AMERICA (SOUTH). <br> ARGENTINE REPUBLIC.

Buenos Aires. Academia Nacional de Ciencias, Cordova. Boletin. Tomo XV. By Exchange.
Museo Nacional de Buenos Aires. Tomo V., 1896--97. Dr. C. Berg.

ASIA.
INDIA.
Bombay. Natural History Society. Journal. Vol. XI. By Exchange. Calcutra. Indian Museum Notes. Vol. IV., No. 2.

Trustees of Muserm.

## AUSTRALASIA.

## Adelaide. Royal Society of South Australia. Transactions, Proceedings and Reports. Vol. XX. By Exchanye.

Sydney. The Agricultural Gazette of New South Wales, 1897.
Agric. Dept.
Linnean. Society of New South Wales. Proceedings, 1897.
By Exchange.

## NEW ZEALAND.

Wefingaton. New Zealand Institute. Transactions and Proceedings. Vol. XXIX.

The Institute.

## EUROPE.

## AUSTRLA-HUNGARY.

Brüns. Naturforschender Verein in Brünn. Verhandlungen. Band XXXIV.-V. By Exchange.

Vienna. K. k. zoologisch-botanische Verein (Gesellschaft) in Wien. Verhandlungen. Band XLVII.

By Exchange.
Wiener entomologische Zeitung, 1897. By Purchase.

## BELGIUM.

Brussels. Académie Royale des Sciences de Belgique-
Bulletins, ze Sér., Tomes XXX.-XXXIII.
Annuaires 1896 et 1897.
Memoires Couronnées. 4to, Tome LIV.
" , 8vo, Tomes XLVIII.-LIV.
Société Entomologique de Belgique. Annales, 1897. Mémoires, III.-V. By Exchunge.

## FRANCE.

CaEn. Société Françuise d'Entom slogie. Revue. Tome XVI. 1897. Purchased.
Chateauroux. Le Frélon, 1891-1897. By Purchase.
Pakis. L'Abeille, 1897. By Purchase.

## GERMANY.

Berlin. Entomologischer Verein in Berlin. Berliner entomologische Zeitschrift. 1897.

By Exchange.
Deutsche entomologische Gesellschaft. Deutsche entomologische Zeitschrift. 1897.

By Exchange.
Dresden. "Iris." Deutsche entomologische Zeitschrift Bd. IX., Hft. 2 ; Bd. X., Hft. 1. By Exchange.

Frankfort. Senckenbergische uaturforscheude Gesellschaft. Bericht. 1896.

Abhandlungen, Bd. XXIJI., Hft. 1 \& $2 . \quad$ By Eachange.
Stertin. Entomologischer Verein. Entomologische Keitung. Jahrg. LV1I. By Exchange.
Wiesbaden, Nassauischer Verein für Naturkunde. Jahrbücher. Jahrg. L. By Exchange.

## GREAT BRITAIN AND IRELAND.

Buckhurst Hill. Essex Naturalist, Vol. IX., 15-24. The Essey Field Club.

Glasgow. Natural History Society. Trausactions, Vol. IV., Pts. 2, :3; Vol. V., Pt. 1.

By Exchange.
Leeds. Yorkshive Naturalists' Union. 'Trausactions. Pt. 20.
The Society.
London. Aumals and Magazine of Natural History: 1897. By Purchase.

Athenæum.
City of Loudou Entomological and Natural History Societs: Trumsactions for 1896.
Entomologist (The). 1897.
Eintomologist's Monthly Matgazine, 1897.
Limean Society of London. Trimsactious, Vol. V1., Pts. +-6. Journal, Nos. 165-168.
Nature. 1897.
Nature Notes. 1897.
Naturalist.
Quekett Microscopical Club. Journal. 1897.
Royal Agricultural Society. dournal. 3rd Ser., Vol. VIII. The Sociely.
Royal Microscopical Society. Journal. 1897. By Evchenge.
Royal Society. Proceedings. Nos. 36:3-381. By Erchange.
South Loudon Eintomological and N. H. Society. Proceedings, 1896.

Year Book of Scientitic Societics. 1897. By Purchase.
Zoological Record for 1895 and 1896.
Zoological Society. Proceclings, 1897. 'Transactions, Vol. XIV., Pts. 2, 3, 4.
Zoologist (The). 1897.

By Exchunge.
The Publisher. d

$$
(1)
$$

## HOLLAND.

The Hague. 'lijdschrift voor Entomologie. Jahr. 1897. By Exchunye.

I'TALY.
Florence. Societa Entomologica Italiana. Bullettino. 1897. By Exchunge.
Genoa. Museo Civico di Storia Naturale di Genova. Amuali. Ser. è, Vol. XVII. By Exchange.

## RUSSIA.

Noscow. Société Impériale des Naturalistes de Moseou. Bulletin. 1896. By Exchange.
St. Petersburg. Societas Entomologice Rossicw. Hore. Tome XXX. By Euchange.

-     - ........Académie Impériale des Sciences. Annuaire du Musée Zoologique, 1897.

The Acudemy.

## SWEDEN.

Stockhols. Entomologiska Förenigen i Stockholm. Entomologisk Tidskrift. 1897.

By Exchunge.

## SWITZERLAND.

Geneva. Société de Physique et d'Histoire Naturelle. Mém. Tome XXXII., 2e Partic.

By Exchange.
Sohafmausex. Schweizerische entomologische Gesellschaft. Mittheilungen. 1897.

# ENTOMOLOGICAL SOCIETY 

OF

## LOND()N

For the Year 1397

I. A Monograph of British Braconidæ. 1'art VII. By the Rev. Thomas A. Marshall, M.A., F.E.S., Nember of the Société Entomologique de France.
[Read October 21st, 1896.]

## Plate I.

IV. DACNUSA, Ifal. (Continued from Trans. Ent. Soc. Lond. 1895, p. 398.)

## 1. Dacnusa adducta, Hal.

D. adducta, IIal., Hym. Brit., ii., v. 13 (1839), \&ิ 울 Marsh., Species des Hym. d'Eur. et d'Alg. Bracon., vol. ii., p. 461, of 우.
of Black, shining, finely pubescent, middle of the abdomen brownish. Head wider than the thorax ; palpi obscure. Antenne twice as long as the body, slender, setiform, 31-32-jointed, blackish, testaceous at the base. Thorax short, gibbous; furrow of the mesopleure smooth, very short and narrow ; metathorax pubescent, not shining. Wings ample, hyaline with a brownish tinge; squamulæ testaceous; nervures and stigma dull ferruginous ; basal areolets short and small; radial areolet longer than the prebrachial, dilated in the middle, sinuated and contracted at both ends ; stigma elongate, linear, emitting the radial nervure near its base; 2nd ${ }^{\circ}$ cubital areolet sessile, i.e., touching the stigma, which

[^0]cuts off its upper angle together with the 1st abscissa; "nd discoidal areolet short, subquadrate; recurrent nervure rejected. Legs flavotestaceous; tips of the tarsi obscure. Abdcmen as loug as the thorax, spathulate, subtruncate at the apex; 1st segment black, linear, twice as long as its apical width, hardly aciculate, not shining, its tubercles situated in the middle; the following segments piceous, becoming darker towards the anal extremity. Terebra very short. of Antennæ longer, 32-jointed; 2nd cubital areolet still further invaded by the stigma; abdomen narrower, depressed. Length, 1 line ; exp., $2 \frac{1}{2}$ lines.

This species is easily distinguished from all others by the peculiarity of the $2 n d$ cubital areolet. It forms by itself the genus Agonia, Eürst. Rare in Ireland, according to Haliday. I have taken both sexes in England, at St. Alban's, Herts, and Bishop's 'T'eignton, Devon. See Trans. Ent. Soc. Lond. 1895, pl. vii., fig. 12.

## 2. Dacnusa phomicura, Hal.

D. phenicura, Hal., Hym. Brit., ii., p. 6 (1833), © ; Marsh., lib. cit., p. 461, む.
of Abdomen rufous with the 1 st segment blackish, 2-3 piceous, the rest testaceous; radial areolet nearly reaching the tip of the wing. Body black, with long hairs; head stout, punctured, wider than the thorax; front smooth; face and cheeks scabrous; mandibles reddish ; palpi testaceous. Antennæ blackish, shorter than the body, 26-jointed, the 2 nd joint rufescent. Thorax subcylindric, narrowed at both euds, punctured anterionly; furrows of the mesothorax humeral only, incomplete, not meeting posteriorly ; a longitudinal channel before the scutellum ; antescutellar fovea smooth, bipartite; metathorax scabrous, sloping, narrowed posteriorly; mesopleuræ rugulose anteriorly, smoother in the middle, their furrow rugulose, subobsolete. Wings hyaline; squamulæ brownish testaceous; nervures and stigma fuscous, the latter linearlancoolate, emitting the radial nervure before one-third of its length ; radial areolet oblong, attenuated towards the apex. Fore legs testaceous; middle pair the same, but with the fexora and tibiæ darker ; hind legs incrassated, blackish, with the trochanters and tarsi rufescent; hind femora one-half shorter than their tibir. Abdomen not so wide as the thorax, depressed, pubescent; 1st segment scarcely twice as long as its apical width, not much narrowed at the base, blackish, finely rugulose, having a longi-
tudinal carina which is bifurcate at the base ; tubsrcles minute, placed near the base ; segments $2-3$ brown, very finely rugulose, carinate, smooth, bordered posteriorly with testaceous, which is the colour of the following segments. If unknown. Length, $1 \frac{1}{4}$ lines.

Taken once only by Haliday in Ireland, and not seen since by any one. The author adds that it is a singular species, forming perhaps a section apart, but imperfectly described from an injured specimen.

## 3. Dacnusa talaris, Hal.

D. talaris, Hal., Hym. Brit., ii., p. 8 (1839). © 우; Marsh., lib. cit., p. 464, के \&.
of Mesonotum with the mere commencement of a medial furrow, the two ordinary furrows subobsolete, converging towards a fovea in front of the scutellum. Black, with dark pubescence; mandibles rufescent; palpi testaceous. Antennæ of both sexes about 32 -jointed, hardly longer than the body. Thorax oblongoval, pubescent, the mesothoracic furrows punctulate ; on the fore margin is a short liuear impression ; metathorax obtuse, rugosepunctate, with yellowish pubescence, scarcely carinate in the middle. Wings slightly infumated ; squamulæ brownish ; nervures and stigma fusco-ferruginous; the latter linear, emitting the radial mervure not far from the base ; radial areolet elongate, sinuated, attenuated towards the extremity. Legs fusco-testaceous; all the coxæ, upper margin of the 4 posterior femora towards the apex, tips of the 4 anterior tarsi, and the whole of the hind tarsi, fuscous. Abdomen as broad as the thorax, and scarcely longer, oblong, subsessile, narrowed at the base ; 1st segment of the ot almost linear, of the $q$ obconic, robust, somewhat gibbous, one-half longer than its apical width, punctate-rugose, pubescent, with hardly visible tubercles; 2 nd segment pubescent, ragosely punctate at the extreme base, but occasionally smooth, in both sexes. Terebra scarcely exserted. Length, $1 \frac{1}{3}$ lines ; exp., $2 \frac{2}{3}$ lines.

Var. Scape of the antennæ, and legs, dull testaceous; last joint of the tarsi blackish.

This is extrem $\rightarrow$ like $D$. lateralis (sp. 15), but differs in having much surter anternæ, and the base of the 2nd abdominal segine: usually, though not always, rugose. It is moderately (\%) umon, and has been taken in England, Ireland, and Cen al Europe ; many specimens are in the present writer's llection.

## 4. Dacnusa semirugosa, Hal.

D. semirugosa, Hal., Hym. Brit., ii., p. 7 ; Marsh., lit. cit., p. 463, के ㅇ.
of of Radial nervure not sinuated, forming a parabolic curve, remote from the tip of the wing. Black, shining. Antennæ about 36 -jointed, somewhat shorter than the body in the $\rho$, longer in the f; the subapical joints short and oval. Mesothoracic furrows very slender, smooth, converging towards a fovea in front of the scutellum ; metathorax rugose, carinated in the middle, covered with not very dense pubescence ; furrow of the mesopleuræ rugose. Wings slightly infumated; squamulæ brownish ; nervures and stigma fuscous, the latter linear-lanceolate, gradually attenuated to the apex, emitting the radial nervure before onethird of its length ; radial areolet lanceolate; 2ud discoidal areolet open on the outer side ; posterior wings with a punctiform vestige of a recurrent nervure, not found in other species. Legs brownish red ; coxæ and base of the trochanters black; femora often streaked with black on the upper edge, the 4 posterior frequently blackishr altogether. Abdomen subsessile, oblong, depressed, not much narrowed at the base; 1st segment obconic, one-half longer than broad, longitudinally rugulose, with scattered pubescence and almost invisible tubercles; 2nd segment finely rugulose, the rest smooth. Terebra concealed. Length, 2 lines ; exp., $3 \frac{1}{4}$ lines.

A large species, and easy to determine. Not uncommon: found in Ireland by Haliday; in Fingland by Rudd, Walker, and myself, in Yorkshire, it Wales, and Wiltshire.

## 5. Dacnusa striatula, Hal.

D. striatula, Mal., Hym. Brit., ii., p. 7 ; Marsh., lib. cit., p. 465 , ${ }^{\lambda}$.
of Mesonotum impressed longitudinally with a deep medial furrow ; the two ordinary furrows distinct, but not extending to the point of junction in front of the scutellum. Wiack, pubescent; mandibles brownish; palpi blackish. Antemæ comewhat longer than the body (in my specimen), as long as the horiy (according to Haliday), 28 -jointed. Mesothoracic furrows pmetnte, incomplete posteriorly ; metathorax obtuse, without a merini carina, coarsely rugose, reticulated; furrow of the mesopleum road, rugose. Wings slightly infumated; squamulæ brownich; pervures and stigma dark fuscous; the latter linear, rather stout, emitting
the radial nervure near the base ; radial areolet acuminate ; radial zervure sinuated ; 2nd discoidal areolet completely closed. Legs testaceous; coxæ blackish; hind tibiæ infuscated at the apex, their tarsi blackish. Abdomen somewhat narrower and longer thau the thorax, oblong, depressed, contracted at the base, shining ; 1st segment more than twice as long as its breadth, punctaterugose, the tubercles obsolete ; 2nd striolate in the middle, smooth at the sides, somewhat narrowed towards the base; 3rd and following segments smooth, very shiuing. \& unknown. Length, $1 \frac{1}{2}$ lines; exp., 3 lines.

This and the three preceding species are distinguished from the rest by the rugosity of the Ind segment at its base. D. striatula müch resembles sp . 4, but is smaller. According to Haliday it is rare in the north of Ireland: my only specimen was taken at Niton, in the I. of Wight.

## 6. Ducnusa tristis, Nees.

| Marsh., lib. cit., p. 467, ô of. <br> D. ampliator, Hal., Hym. Brit., ii., p. 8, î ㅇ (nec Nees). |
| :---: |
|  |  |

to D Deep black, shining, with whitish pubescence; palpi dusky. Head transverse, wider than the thorax. Antennæ longer than the body, 25 -jointed in the $q, 31$-jointed in the $\delta$. Furrows of the mesothorax merely inchoate, humeral ; mesonotum faintly impressed with a longitudinal channel termiuating before the scutellum in an oval fovea, deep and elongate; furrow of the mesopleure crenulate ; metathorax very short, rounded, granclated and dull, somewhat densely covered with whitish pubescence. Wings ample, hyaline, sometimes with a lacteous tinge, sometimes more cinereous; squamulæ, nervures, and stigma black, this last elongate, rather stout, acuminate at the apex ; radial nervure slightly sinuated; radial areolet longer than the prabrachial ; recurrent nervure interstitial; 2nd discoidal areolet not quite closed on the outer side. Fore legs brownish testaceous, their femora and tibiæ with a black streak above, or almost wholly hlackish ; tarsi obscure; 4 posterior legs black, with the 2nd joint of the trochanters and the base of the tibiæ dull testaceous. First abdominal segment ohconic, twice as long as its apical width, narrowed at the base, margined, finely striolate, furnished with two carinæ, convergent and meeting before the hind margin,
enclosing a triangular space; tubercles not prominent; the following segments form together a short oval, smooth and shining. Terebra concealed. す similar ; antennæ longer; 1st segment sublinear. scarcely wider behind; the following segments oblong, longer than those of the $\mathcal{q}$. Length, $1-1 \frac{1}{3}$ lines ; exp., $2-3$ lines.

Haliday seems to have confused this species with the following, especially in his account of the antenne, taking the number of joints from $D$. tristis, and the length from $D$. ampliator, whereby the description is rendered doubtful. According to Haliday the number of joints $\hat{o}$ it is $21-23$; according to Nees it is $-24-25$ for the $\hat{\}}$, the $\&$ not being mentioned. As to length, the antennæ of are shorter than the body, according to Haliday, while those of the of are hardly longer than the head and thorax ; a character belonging only to the following species. D. tristis is common in England; Goureau states it to be a parasite of the dipteron Agromyza niyripes, Macq.; and it is included by Giraud in his list of observed cases of parasitism, where it is reported to have issued from galls made by some dipterous insect on the roots of Artemisia campestris. D. lugens, Hal. (Hym. Brit., ii., p. 26), from Norway (Hammerfest), is a closely allied species, if not the same.

## 7. Dacmusa ampliator, Nees.' (Pl. I., figs. 1, 1a.)

Alysin ampliator, Nees, Mon., i., p. 258, ô t; $D$. ampliator, Marsh., lib. cit., p. 468, of of (nec Haliday).
Antennæ $q$ not longer than the head and thorax, 15-17-jointed; those of the ot not quite as long as the body, 21-jointed. O Form short and stout; deep black, shining, with whitish pubescence; palpi dusky ; mandibles reddish. Head large, transverse, wider than the thorax ; face covered with whitish down; front excavated, with a minute fovea at the bottom of the hollow. Antennæ moniliform after the 7th joint, incrassated towards the extremity, the extremity itself being slender. Mesothoracic furrows hardly inchoate ; no fovea, nor channel, before the ssutellum ; metathorax very short, not shining, eovered with whitish down, vertically truncate behind ; a transverse carina separates the horizontal from the vertical surface, the former of which is again divided iuto two compartments by a longitudinal carina. Wings whitish, almost lacteous ; nervures and stigma testaceous or pale brown,
the latter short (for the genus), not more than four times as long as its breadth, which is equal to the length of the 1st abscissa : radial areolet not longer than the præbrachial, remote from the tip of the wing, acuminate; radial nervure slightly sinuated; recurrent nervure distinctly rejected. Fore legs brownish, with the upper edge of the femora, the tips of the tibiæ, and the tarsi, blackish ; 4 posterior legs, or sometimes all the legs, blackish, with the 2nd joint of the trochanters, and the knees, reddish. Abdomen small, narrower and not longer than the thorax, subclaviform, convex; 1st segment twice as broad at the extremity as at the base, tinely aciculate and margined ; the following segments smooth and shining. Terebra almost concealed. of Antennæ not thickened before the extremity; fore legs entirely testaccoas; abdomen forming a longer oval. Length, $\frac{3}{4}$ line ; exp., 2 lines.

The autennæ alone are decisive of this species, though it is otherwise abundautly distinct from the preceding. It may have been known to Haliday, as his description of $D$. amplintor contains some of its characters, mixed with those of D.tristis. However that may be, Dr. Capron discovered several specimens at Shiere, near Guildford, some of which he gave to me ; he considered them to represent Förster's genus Brachystroplia (Synopsis, p. 274). The plate gives, I believe, a faithful likeness of this curious little insect ; at least Dr. Capron has expressed his approval of the figure. The species was originally taken in Franconia by Nees von Esenbeck.

## 8. Dacnusa petiolata, Nees. (Pl. J., fig. 2.)

Alysia petiolata, Nees, Mon., i., p. 256, $\hat{\delta}$.
1). putiolata, Hal., Hym. Brit., ii., p. 10, t̂ $q$; Marsh., lib. cit., p. 470, iे 우.
Abdomen spathulate ; 1st segment linear, almost four times as long as the hind coxæ ; antennæ of 4 -jointed, of 49 -jointed; 2nd discoidal areolet not closed on the inner side. By far the largest species. $q$ Blazk, pubescent; abdomen, after the 1st segment, rufo-testaceous. Head broadly transverse, profoundly excavated behind ; face punctate, with a faint carina ; mandibles blackish ; ocelli red; palpi testaceous. Antennæ as long as the body, obscurely reddish, with dark articulations. Thorax short, gibbous, narrower than the head; mesothoracic furrows hardly inchoate; on the mesouotum a longitudinal medial channel terminates in a deep; fovea before the scutellum ; metathorax short,
obtuse, rugu'ose, almost truncated behind, with some yellowish pubescence, and a shortened medial cariua. Wings subhyaline : squamulæ brownish; nervures and stigma dark brown; the latter moderately incrassated in the middle, elongate, asumiuate at both ends, emitting the radial nervure before one-third of its length : radial nervare thickened towards its base : radial areolet lanceolate, hardly attenuated and sinuated towards the extremity; recurrent nervure considerably rejected. Fore legs testaceous, the femora sometimes streaked with black above; legs of the middle pair testaceous, their femora more or less blackish towards the base; hind legs blackish, the tips of the trochanters and extreme base of the tibiæ doll testaceous; all the coxæ blackish. Abdomen longer than the head and thorax, depressed, spathulate; 1st segment black, sleuder, as long as one-third of the abdomen, striolite, canaliculate in the middle, with prominent tubercles; the following segments testaceous, smooth, thos near the extremity more or less darkened, or cinctured with fuscous, each segment traversed, near the hind border, by a line formed of minute impressed points. Terebra hardly exserted. of similar ; antennæ longer and more slender, blackish ; 1st segment comparatively longer. Length, $2 \frac{1}{2}$ lines; exp., 5 lines.

This species exceeds in size the largest Alysia; it is rivalled, but not surpassed, by the following. Förster has made for its reception the genus Phrolexis. It occurs somewhat rarely in woorls; my six specimens were taken in Wilts, Devon, and S.Wales; Nees captured it in the Sudetsche Gebirge. In Wesmael's unnamed collection are several Belgian specimens.

## 9. Dacnusa egregia, Marsh.

D. egregia, Marsh., lib. cit., p. 4i2, ㅇ.

ㅇ Abdomen oblong, not spathulate; 1st segment linear, about twice as long as the hind coxæ ; antennæ 36-jointed ; 2nd discoidal areolet closed at both ends. Black, pubesceut; abdomen, after the 1st segment, brownish-red, more obscure towards the extremity. Head transverse, wider than the thotax, profoundly excavated behind; palpi testaccous. Antenne as long as the body, slender, setiform, black, with the first 5 joints testaceous. Thorax gibbous, very pubescent ; mesothoracic furrows complete but shallow, converging hindwards into a small round fovea, from which proceeds a shallow medial channel, not reaching the middle of the disk; metathorax short, rugulose, beset with whitish hairs, almost
trurcate posteriorly, carinated at the base. Wings subhyaline; squamule brownish; nervures and stigma dark brown ; the latter much attenuated, acuminate at both ends, emitting the radial nervure before one-third of its length; radial nervure thickened towards the base; radial areolet broader near the extremity than in $D$. petiolata ; recurrent nervure interstitial. Legs testaceous ; middle femora somewhat infuscated, the hind femora blackish ; all the tarsi fuscescent. Abdomen longer than the head and thorax, hardly wider behind, somewhat compressed; 1st segment much shorter than in D. petiolutu, linear, finely punctate-rugulose ; the tubercles subobsolete. Terebra briefly exserted, falciform. ô unknown. Length, 2 liues; exp., $3 \frac{1}{2}$ lines.

Formerly I regarded this as the Alysia navicularis, Nees, but the description of that insect differs in too many particulars to justify the identification. Taken on the banks of the Usk, near Abergavenny, and unique in my collection.

## 10. Dacmusa temula, Hal.

D. temula, Hal., Hym. Brit., ii., p. 14, ó; Marsh., lib. cit., p. 472, o.
Stigma thicker than the length of the 1 st abscissa, dull ferruginous, more than four times as long as its breadth; recurrent nervure hardly rejected ; 2nd discoidal areolet oblong. of Black, shining, hardly pubescent; middle of the abdomen brownish testaceous. Maudibles and palpi ferruginous. Antennæ scarcely longer than the body, blackish, with the three basal joints ferruginous, except at their extremities, 25 -jointed; all the joints cylindric, after the 2ud. Thorax oblong oval; furrows of the mesothorax abbreviated, humeral ; an impressed line before the scutellum ; metathorax finely scabrous; furrow of the mesopleure smoot'. Wings hyaline; squamulæ pale testaceous; nervures stout, ferruginous; stigma large, linear-lanceolate, obtuse at the base, acuminate at the extremity, emitting the radial nervure before one-third of its length; radial areolet attenuated and sinuated before the apex; and nervure scarcely inchoate. Legs pale testaceous. Abdomen oval ; 1st segment black, finely scabrous, twice as long as its breadth, somewhat contracted at the base, rectangular at the extremity; intermediate segments testaceous brown, the posterior infuscated. $O$ unknown. Lengtb, $1-1 \frac{1}{3}$ lines.

Found in the woods of North Ircland ; rare in England.

I have not seen this species, which seems closely allied to the following ; the two together constitute Forster's genus Pachysema.

## 11. Dacmusa macrospila, Hal

D. macrospila, Hal., Hyın. Brit., ii., p. 14, \} ; Marsh., lib. cit., p. 473, $\widehat{\delta}$.
Stigma blackish, hardly threa times as long as its breadth; recurrent nervure sensibly rejected; Ind discoidal areolet, short, nearly quadrate. © Very similar to $D$. temulu, differing only by the nervulation and the darker colour of the legs. Black, shining ; middle of the abdomen, and sometimes the 1st segment, testaceous brown. Base of the antennæ testaceous. Wings slightly infumated ; squamulæ dull, ferruginous; wervures stout, blackish; stigma large, thick, oval-lanceolate, bulging out beyond the margin of the wing, acuminate at the extremity, emitting the radial nervure before the middle. Legs testaceous. of unknown. Length, 1 line.

Not known to me. England and Ireland; very rare.

## 12. Dacnusa senilis, Nees.

Bassus senilis, Nees, Mag. Ges. Berl., 1814, p. 209.
Alysia senilis, Nees, Mon., i., p. 2ri0, ô fo, and $A$. rufipes, Nees, lib. cit., p. 261, of 오.
D. senilis, Hal., Hym. Brit., ii., p. 11 ; Marsh., lib. cit., p. 474, ô +

Metathorax and 1st abdominal segment densely covered with pale down, concealing the sculpture; hind femora blackish, or streaked with blackish above. Body black, with dense whitish pubescence. Head broader than the thorax; mandibles dull reddish; palpi ferruginous. of antennæ longer than the body, blackish, with the 2 nd joint rufescent, $32-36$-jointed. Thorax subcylindric ; mesothoracic furrows f.intly impressed, extending over the disk, but not quite reaching the hind border; an oblong fovea before the scutellum ; furrow of the mesopleuræ crenulate ; metathorax excavated behind, rugulise, with a basal carina. Wings slightly infumated; squamule brownish; nervures and stigma dark brown ; the latter sublinear, not so thick as the length of the 1st abscissa, obtuse at the base, acuminate at the extremity,
emitting the radial nervure before one-fourth of its length ; radial areolet hardly attenuated and sinuated before the apex; recurrent nervure interstitial. Fore legs ferruginous, their coxæ often infuscated ; middle legs ferruginous, their coxæ, the base of the trochanters, the upper edge of the femora, and the tarsi, blackish ; hind legs blackish, with the 2nd joint of the trochanters, and the tibix, ferruginous, these last dark at the tips, the femora sometimes reddish underneath. Abdomen longer and narrower than the thorax, convex, pointed at the extremity; 1st segment sublinear, carinated in the middle, rugulose, the tubercles hardly visible ; 2nd and following segments very smooth, baving each a series of minute impressed points along the hind border. Terebra briefly exserted, curved, with stout, compressed valves. of anteunæ longer, :37-40-joiuted; abdomen depressed, somewhat spathulate. Length, $1 \frac{1}{2}$ lines ; exp., $3 \frac{1}{\frac{1}{4}}$ lines.

Var. of A Alysia rufipes, Nees. Ferruginous parts of lighter tint ; mandibles, base of antennæ, squamulæ, and legs, red ; hind coxæ and tips of hind femora either red or blackish. Pubescence of the metathorax and first segment very fine. In one of of my collection the Ind segment is reddish at the base.

Not uncommon in marshes; a parasite, according to Rondani, of Plytomyaa alliceps, Meigen. Besides England, it has been noticed in Germany, Italy, and Norway.

## 13. Dacnusa misella, Marsh.

D. misella, Marsh., lil. cit., p. 475̃, đ f

Metathorax less densely covered with down, often nearly bare ; hind femora entirely pale, or rarely and faintly streaked with fuscous. The smallest species, very minute. Body short, black, shining, with pale pubescence ; base of the 2nd abdominal segment somewhat reddish. Head large, transverse, wider than the thorax ; mandibles 3 -denticulate, red ; palpi red. $\uparrow$ antennæ much longer than the body, black, $20-22$-jointed ; scape pale at the extremity. Tborax short, gibbous; mesonotum divided by an indistinct medial channel, sometimes effaced, which terminates in a fovea before the scutellum ; pectus and pleure covered with whitish pubescence; furrow of the mesopleure smooth ; metathorax very short, not shining, abruptly truncate behind, carinated at the base, furnished at each posterior angle with a tuft of whitish woolly hair. Wings subbyaline; squamulæ, nervures, and stigma pale
brownish ; the latter elongate, linear, acuminate extarnally, not so thick as the length of the 1st abscissa, emitting the radial nervare before one-fourth of its length ; radial areolet lauceolate, hardly sinuated before the extremity, remote from the tip of the wing ; recurrent nervure rejected; 1st cubital areolet imperfectly separated from the 1 st discoidal by reason of the dividing nervure being colourless; anal nervure effaced. Legs testaceous, with fuscous coxe. Abdomen not longer than the thorax, spathulate, somewhat convax, pointed at the extremity; 1 st segment twice as broad at the extremity as at the base, hardly pubescent, very finely aciculate, the tubercles scarcely visible; the following segments smooth. Terebra concealed. 才 similar ; antenuæ 22-jointed; abdomen depressed ; not so wide behind; 1st segment sublinear. Length, $\frac{3}{8}$ line ; exp., $1 \frac{3}{4}$ lines.

Common in Cornwail ; obtained by sweeping hedges.

$$
\begin{gathered}
\text { 14. Dacnusa albipes, Hal. } \\
\text { D. albipes, Hal., Hym. Brit., ii., p. } 10 \text {; Marsh., lib.cit., }
\end{gathered}
$$ p. 477, $\widehat{0}$.

Radial areolet shorter than the prebrachial. Abdomen entirely black. of black, shining, hardly pubescent. Mandibles ferruginous; labrum and palpi yellow. Antennæ as long as the body, black, with joints 1-5 yellow, 21-25-jointed. Thorax subglobular; a minute fovea before the scutellum ; furrow of the mesopleure rugose. Wings hyaline ; squamule yellow ; nerrures pale ; stigma ochreous, linear, emitting the radial nervure from the base ; recurrent nervure rejected ; radial areolet shorter than the prebrachial, atteunated and simuated before the extremity. Legs pale yellow, with only the last tarsal joint obssure. Abdomen depressed, spathulate; 1st segnent sublinear, punctate-rugulose. q unknown. Length, 1 line.

Ireland, in woods, verv rare. Dr. Schmiedeknecht states that he lias found it in Germany.

## 15. Dacnusa lateralis, Hal.

D. literalis, Hal., Hym. Brit., ii., p. 9 ; Marsh., lib. cit., p. 480, ô 우.

Antennæ very long, one-half longer than the body; radial nervure distinctly sinuated; 1st abdominal segment three times as long as its breadth. Body black, shining, very finely pubescent ;
abdomen usually black (see varieties). if antennæ slender, testaceous, blackish towards the extremity, about 40 -jointed. Mesothoracic furrows inchoate; an oblong, linear fovea before the scutellum; metathorax rugose, very short, almost vertical from the base, carinated in the middle, beset with whitish pubescence. Wings slightly infumated; squamulæ testaceous ; nervures and stigma pale brown ; the latter linear, elongate, varrow, emitting the radial nervure from near the base ; radial areolet large, lanceolate, sinuated before the extremity : recurrent nervure interstitial. Legs testaceous ; hind coxæ blackish, their tibir infuscated at the apex, and the femora often streaked with blackish towards the extremity; tarsi obscure, the 4 anterior only at the tips. Abdomen depressed, suborbicular, almost broader than the thorax ; 1 st segment linear, punctate-rugulose, with medial tubercles. Terebra hardly exserted. § similar ; abdomen sublinear. Length $1 \frac{1}{3}$ lines ; exp., 3 lines.

Var. 1. Second abdominal segment dull testaceous at the base; base of antennæ, and legs, of a duller tint.

Var. 2. of of Abdomen testaceous, infuscated at the sides; 1st segment black. This variety is perhaps peculiar to Ireland, since Haliday has described it as the ordinary form of the species ; but in all the numerous specimens which I have seen the abdomeu is black, having at most a slight reddish tint at the base of the 2nd segment.

This species may be known by the remarkable length of the antennæ. In other respects it much resembles D.talaris (sp.3), and especially those specimens which have the 2nd segment free from rugosity ; these, however, have both the antennæ and the 1 st segment shorter. Common in England and Ireland ; taken also by Walker in Fiumark.

## 16. Dacnusa cincta, Hal.

D. cincta, Hal., Hym. Brit., ii., p. 9 ; Marsh., lil. cit., p. 481, ㅇ.

Antennæ a little longer than the body ; radial nervure hardly sinuated; 1st abdominal segment twice as long as its width. of black, shining, with very fine pubescence ; 2nd and following segments testaceous, cinctured with a darker colour, after the 3rd; mandibles testaceous. Antennæ slender, 42 -jointed, more or less testaceous at the base. Metathorax short, obtuse, punctaterugulose. Wings hyaline with an obscure tinge; squamulre
yellowish; nervures and stigma dull ferruginous, the latter linear, emitting the radial nervure from near the base ; radial areolet very little narrowed and sinuated before the extremity. Legs testaceous with the last tarsal joint obscure. Abdomen rather longer than the head and thorax, and as wide as the latter ; 1st segment sublinear, contracted at the extreme base, black, punctate-rugulose. Terebra subexserted. đ unknown. Length, $1 \frac{1}{3}$ lines.

I have not met with this species. The habitat is not mentioned; probably Ireland.

## 17. Dacnusa lepida, Marsh.

D. lepida, Marsh., lib. cit., p. 482, ô .

Legs whitish-yellow, elongate; squamulæ of the same colour ; wings very ample, obtuse and truncated at the extremity ; face whitish. of black, shining, thinly beset with whitish hairs ; abdomen piceous brown. Head transverse, wider than the thorax, face and oral parts whitish-yellow. Autennæ much longer than the body, slender, dull testaceous, with the scape and the base of the flagelluin of a brighter hue, 33 -jointed. Mesothoracic furrows subobsolete; a linear fovea before the scutellum ; metathorax almost smooth, rather shining, without a basal earina. Wings hyaline ; nervures and stigma brown, the latter moderately long, lanceolate, obtuse at the base, acuminate at the extremity, emitting the radial nervure before onc-fourth of its length ; radial areolet distinctly attenuated and sinuated towards the extremity, longer than the præbrachial areolet ; recurrent nervure interstitial. Legs very pale, including the coxæ; 4 posterior tarsi, and tips of the hind tibixe slightly infuscated; a small black spot at the base of the hind coxæ, above. First abdominal, segment short, barely twice as long as its width, not much narrowed at the base, canaliculate in the middle throughout its length, margined, somewhat shining, without rugosity, its tubercles salient; the following segments form a claviform oval, shorter than the thorax. of unknown. Length, nearly 1 line ; exp., $2 \frac{1}{2}$ lines.

The only specimen was taken at Bishop's Teignton, Devon.

## 18. Dacnusa ovalis, Marsh.

D. ovalis, Marsh., lil. cit., p. 483, ô 우.

Legs dull testaceous, shorter than in species 17 ; squamulæ of the same colour; wings less ample, regularly rounded at the extremity ; face black. Body black, shining; metathorax and 1st
segment covered with fine down; 2nd segment somewhat reddish at the base. Head transverse, wider than the thorax; mandibles rufous, tridenticulate; palpi dusky. $I$ Antennæ longer than the body, blackish, with two or three of the basal joints more or less testaceous, 31 -jointed (in 4 examples). 'Thorax short, gibbous; mesothoracic furrows almost obsolete ; a rather large oval fovea before the scutellum ; metathorax short, not shining, finely rugose, vertically truncate behind, the descending portion bounded by a transverse carina. Wings subhyaline; nervures and stigma fuscous, the latter elougate, linear-lanceolate, obtuse at the base, acuminate at the extremity, emitting the radial nervure from near the base ; radial areolet large, much dilated in the middle, sinuated and gradually attenuated towards the extremity, longer than the prebrachial; recurrent nervure interstitial. Last joint of the tarsi infuscated. First abdominal segment short, twice as long as its apical width, hardly narrowed at the base, not shining, finely aciculate, with medial tubercles, not salient; the following segments form a pointed oval, as wide and as long as the thorax, black, more or less reddish at the base. Terebra hardly exserted. ${ }^{*}$ similar ; antennæ 31-jointed; legs of a more dingy hue; abdomen obtuse at the extremity, narrower than the thorax. Length, hardly 1 line ; exp., $2 \frac{1}{2}$ lines.

Var. \& Abdomen, after the 1st segment, dull, testaceous, infuscated at the sides.

Found at Nunton, Wilts, 3 ㅇ, $1 \hat{\delta}$; the var. in Cornwall.

## 19. Dacnusa leptogaster, Hal.

## D. leptogaster, Hal., Hym. Brit., ii., p. 10 ; Marsh., lib. cit., p. 484, § 우.

Squamulæ black. Body black, pubescent ; abdomen linear, not so wide as the thorax; '2nd segment reddish at the base. Resembles 1). petiolata (sp. 8), but is much smaller, and the head and abdomen are relatively narrower. if Anteunæ as long as the body, 26-30jointed. Thorax oblong-oval; a punctiform fovea before the scutellum ; metathorax short, pubescent, slightly excavated behind. Wings hyaline, with a faint dusky tinge; nervures and stigma fuscous, the latter linear, rather stout, emitting the radial nervure before one-quarter of its length; radial areolet short, hardly sinuated and narrowed before the extremity. Legs testaceous; the 4 anterior femora marked above with a blackish streak; hind tibie blackish at the aper. Abdomen somewhat compressed,
truncate at the extremity ; 1st segment slender, linear, almost as long as the following segments united, rugose, reticulated; tubercles situated before the middle, subobsolete : the rest of the abdomen sometimes wholly reddish. Terebra subexserted. क Antennæ rather longer than the body, 33 -jointed, and upwards; abdomen linear, not compressed. Length, $1 \frac{1}{3}$ lines.

England and Ireland ; somewhat rare.

## 20. Dacnusa posíica, Hal.

D. postica, Hal., Hym. Brit., ii., p. 11 ; Marsh., lib. cit., p. 485 , ${ }^{\text {on }}$

Squamulæ reddish. Abdomen testaceous with the 1st segment black. Similar to $D$. senilis (sp. 12), but the 1st segment is more sleuder, and its pubescence not so dense. § Black, pubescent ; head large, wider than the thorax ; mandibles red, palpi paler. Antennæ testaceous at the base. Thorax oblong; metathorax pubescent, slightly excavated behind. Wings hyaline, with an obscure tinge ; nervures and stigma fuscous, the former (according to Haliday) arranged as in D. senilis. Legs testaceous. Abdomen narrower than the thorax ; 1st seament slender, linear, punctaterugulose, subcarinate ; tubercles obtuse, situated somewhat before the middle. $\uparrow$ unknown; but compare D. gracilis (sp. 22). Length, $1 \frac{3}{4}$ lines.

The single example, taken long ago by Walker, is too succinctly described by Haliday. He differentiates it from D. cincta (sp. 16) as being of a more elongate form, with a larger head, the 1st segment more slender, and the radial areolet smaller.

Taken once in England.

## 21. Dacnusa diremta, Hal.

D. divemta, Hal., Hym. Brit., ii., p. 12 ; Marsh., lib. cit., p. 485, के 우.

Head subcubic, its length and breadth being about equal, not dilated behind the eyes ; nervures and stigma pale yellow. Black, shining, with scattered pubescence. The form of the head, peculiar to this species, is ensy to recognise; the head also is as wide as the thorax, and less flattened than usual ; mandibles and
palpi ferruginous. I Antennæ longer than the body, slender, blackish, with the base ferruginous, 52 -jointed, and upwards. Thorax subcylindric ; mesothoracic furrows united, not far from the fore margin, in a chanuel which terminates in a deep round fovea before the scutellum ; metathorax downy, punctate-rugulose, obtuse behind, canaliculate in the middle. Wings hyaline; squamule pale yellow ; stigma linear, acuminate at the extremity, emitting the radial nervure from near the base; radial areolet lanceolate, hardly sinuated, longer than the prebrachial ; recurrent nervure interstitial. Legs entirely ferruginous. Abdomen narrower than the thorax, somewhat compressed posteriorly; 2nd segment ferruginous, the rest blackish. Terebra subexserted. ot Antennæ twice as long as the body, about 32 -jointed; 1st abdominal segment twice as long as its apical width, hardly contracted at the base, canaliculate in the middle, very finely aciculate, with medial tubercles not salient ; abdomen narrowly oblong, not compressed; 2nd and 3rd segments testaceous. Length, $\frac{1}{2}$ line ; exp., $1 \frac{1}{2}$ lines.

Var. Second abdominal segment piceous.
Found in marshy places; England and Ireland; Germany; Russia, according to Kawall. I possess one $\hat{\delta}$, not in good condition.

## 22. Dacnusa gracilis, Nees.

Alysia gracilis, Nees, Mon., p. 257, $\hat{\text { o }}$ ㅇ. D. gracilis, Marsh., lib. cit., p. 487, of $\ddagger$.

Head transverse, dilated behind the eyes; nervures and stigma fuscous. Black, shining ; middle of the abdomen ferruginous. © Head large ; oral parts rufous. Antennæ somewhat longer than the body, testaceous as far as the middle, thence gradually darkened to the apex, 31 -jointed. Mesothoracic furrows continued to the oblong fovea before the scutellum; metathorax carinate in the middle, pubescent posteriorly, hardly rugulose, truncate behind. Wings hyaline with an obscure tinge ; nervures and stigma pale brown, the latter linear-lanceolate, emitting the radial nervure at one-third of its length ; radial nervure hardly sinuated ; recurrent nervure rejected. Legs rufous, the coxæ included ; last joint of the tarsi infuscated. Abdomen longer than the head and thorar, narrow, strongly compressed towards the apex ; 1st segment almost linear, striolate, carinate in the middle, with subobsolete tubercles ; 2nd and part of the 3rd, testaceous or rufous; the rest blackish,
trans. ent. soc. lond. 1897.-part i. (april.) 2
except the last and the hypopygium, which are rufous. Terebra exserted, curved upwards. © similar, according to Nees, but not described. Length, $1 \frac{1}{2}$ lines ; exp., $3 \frac{1}{4}$ lines.

I have taken two females of this species, one in England, the other in France, at Nantua; they agree in all respects except size, the English example being much the smaller. For a long time I supposed them to be D. postica, Hal. (sp. 20), the $f$ of which is undiscovered; but the identification is too uncertain to be adopted. Taken by Manger in the Sudetsche Gebirge.

## 23. Dacnusa aphanta, Marsh. D. aphanta, Marsh., lib. cit., p. 488, 아.

First cubital areolet more or less confounded with the 1st discoidal. Black ; abdomen piceous; body not very pubescent. Head wider than the thorax; oral parts pale. I Antennæ twice as long as the body, blackish, with the scape partly testaceous, 25 -jointed. Mesothoracic furrows obsolcte; a linear fovea before the scutellum ; metathorax sloping from the base, not shining, bisected by a transverse carina. Wings hyaline; squamulæ pale yellow ; nervures and stigma pale brownish ; the latter clougate, stout, abruptly acuminate at the extremity, emitting the radial nervure before one-fourth of its length ; radial areolet large, much longer than the prebrachial, dilated and sinuated before the extremity ; the nervure dividing the 1 st cubital from the 1 st discoidal areolet widely interrupted, subobsolete: recurrent nervure interstitial. Legs very pale testaceous, the coxæ included ; tips of the hind tibiæ and last joint of all the tarsi, infuscated. Abdomen claviform, as long as the thorax, somewhat compressed towards the apex, which is vertically truncate; 1st segment linear, black, $2 \frac{1}{2}$ times as long as its width, hardly aciculate, not shining ; the tubercles not salient ; the following segments piceous. Terebra briefly exserted. of doubtful on account of the antennæ, which have only 24 joints, and are somewhat shorter than those of the $q$. Otherwise it agrees well with the description ; the 1st cubital is completely confused with the 1st discoidal; this character may be of little value, but I could not find any other by which to fix the place of a species so little distinguished. Length, 3 lines ; exp., 2 lines.

Taken in S. Wales and near Plymouth. Förster has made a genus Aphanta, possibly intended for this insect.

## 24. Dacnusa stramineipes, Hal.

D. stramineipes, Hal., Iym. Brit., ii., p. 16 ; Marsh., lib. cit., p. 498, 大 우.
Second discoidal areolet not closed on the outer side; antennæ much longer than the body, 23-31-jointed; terebra as long as onefourth, or even three-fourths, of the abdomen. Blackish-brewn, or piceous, pubescent ; the apex of the abdomen pale. Head not wider than the thorax; cheeks pale piceous; mandibles rufous; palpi pale. of of Anteunæ very slender, blackish, more or less testaceous at the base. Mesonotum flattened posteriorly, having in front of the scutellum a linear fovea of variable length, sometimes short and oval ; the ordinary furrows effaced; furrow of the mesopleuræ wanting; metathorax pilose, short, not shining, punctulate, without a medial carina., Wings ample, very long, hyaline; squamulæ testaceous; nervures and stigma testaceous in the $\circ$, black in the $o f$; stigma linear, very elongate, acuminate at the apex; radial areolet very long, louger than the præbrachial, and approaching nearer to the tip of the wiug than in the next species, somewhat dilated and sinuated in the middle, not much attenuated towards the apex, almost cultriform; radial nervure originating near the base of the stigma; recurrent nervure rejected. Legs straw-coloured; last joint of the tarsi obscure. Abdomen subsessile, oboval, somewhat depressed; 1st segment not longer than its apical width, somewhat narrowed at the base, aciculate, downy, not shining ; the tubercles not apparent. Length, $1 \frac{1}{2}$ lines ; exp., $3 \frac{3}{4}$ lines.

This species constitutes the genus Tanystropha, Förster. It is confounded by transitional links with D. areolaris (sp. 25) ; it is found with that species, but less abundantly; as it differs in no important particulars except superior development, it may be reasonably suspected of being only a well nourished variety. England and Ireland; common.
25. Dacnusa areolaris, Nees. (Pl. I., fig. 3.)

Bracon areolaris, Nees, Mag. Ges. Berl., 1811, p. 20, pl. i., fig. 5.
Alysia areolaris, Nees, Mon., i., 262, $\hat{\text { of }}$ f.
D. areolaris, Hal., Hym. Brit., ii., p. 15, of ; Marsh., lib. cit., p. 491.
Alysia pubescens, Curt. Brit. Ent., 141.
Stigma elongate, emitting the radial nervure not far from its base, which is somewhat attenuated; abdomen entirely black or
piceous; terebra only slightly exserted. Body black, with pale pubescence; palpi dusky; mandibles rufous. © ㅇ Antennæ a little longer than the body, about $2 \overline{0}$-jointed. Mesonotum somewhat flattened, impressed with a medial faint longitudinal channel not reaching the fore border ; furrow of the mesopleure wanting ; metathorax densely pubescent, short, rugulose. Wings hyaline ; squamulæ brownish ; nervures and stigma pale in the $\mathcal{q}$, black in the ${ }^{\text {o }}$; stigma much attenuated, extending ever two-thirds of the radial areolet; this latter is longer than the prebrachial areolet, and a trifle more remote from the tip of the wing than in sp. 24 ; radial nervure rather stout, curved and sinuated before the extremity ; recurrent nervure interstitial. Legs rufous; coxæ, base of the trochanters, upper edge of the 4 posterior femora, tips of the hind tibiæ, and the hind tarsi, often infuscated. Abdomen like that of sp. 24 , but not pale at the apex. Terebra concealed or slightly exserted. Length, $\frac{3}{4}-1$ line ; exp., $2 \frac{1}{4}-3$ lines.

Variable, not only as to size, but also in the colour of the palpi, mandibles, and legs, which are more or less dark in the smaller examples, more clearly rufous in the larger. Many seem to be intermediate between this species and the preceding, so that it is hard to say, among the great number 1 possess, to which they ought to be referred. It may be also remarked that the radial areolet varies in length, and the stigma exhibits different degrees of attenuation, but the general resemblance of all these equally abundant forms is too intimate to admit a doubt of their specific identity. They are probably widely dispersed in cold and temperate regions, where they show themselves in the earliest days of spring. Förster has made of them another genus, Rhizarcha.

## 26. Dacnusa clandestina, Hal.

> D. clanclestina, Hal., Hym. Brit., ii., p. 14 ; Marsh., lib. cit., p. 492, ㅇ.

Stigma somewhat shorter, emitting the radial nervure before one-fourth of its length, and dilated at the anastomosis ; abdomen blackish, the segments cinctured with pale yellowish; terebra half as long as the abdomen. o Black, pubescent; head large, wider than the thorax, piceous with paler cheeks ; mandiblesferruginous, dark at the points ; palpi elongate, pale testaceous. Thorax oval ; mesonotum impressed with a longitudinal smooth channel not reaching thz fore border; mesopleuræ without a furrow ; meta-
thorax short, obtuse. Wings hyaline ; squamule and stigma pale ochreous ; radial areolet slightly dilated and sinuated in the middle, somewhat acuminate at the extremity, shorter than spp. 24,25 ; resurrent nervure almost interstitial. Legs pale testaceous, the tips of the tibiæ and of the tarsi infuscated. Abdomen subsessile, oval, convex; 1st segment obconic, densely pubescent like the metathorax, and finely rugulose ; segments $2-5$ cinctured with pale yellowish before the posterior margin ; 6-7 ochreous. Described by Haliday from a single speciman. of unknown. Longth, 112 lines.

## Taken in Treland.

## 27. Dacnusa aquilegix, Marsh.

$$
\text { D. aquilegiæ, Marsh., lib. cit., p. 493, } 7 .
$$

Stigma as long as the prebrachial areolet ; radial nervure bent in the middle, forming almost a blunted angle, indicating thus a 3rd abscissa, which proceeds alinost in a straight line to the metacarp, and terminates in an acute angle at a considerable distance from the tip of the wing. This conformation is found also in certain species of Opius, as O. ochrogaster, Wesm., and O. nitidulutor, Nees (see Tr. Ent. Soc. Lond., 1891, pp. 32, 38). \& Black, scarcely pubescent ; abdomen piceous, with the 1st segment testaceous. Head much wider than long ; mandibles rufous; palpi paler. Antenne slender, longer than the body, 28 -jointed, black, with the two first joints reddish. An impressed line on the masonotum before the scatellum ; metathorax short, not shining, pubescent, with a smooth space at the middle of the base. Wings hyaline; squamulæ testaceous; nervures and stigma fuscous, the latter stout, extending to twothirds of the short radial areolet, emitting the radial nervare from near its base; the dividing nervure between the 1st cubital and 1st discoidal areolets colourless, but still traceable; recurrent nervure directed towards the inner lower angle of the 2nd cubital areolet. Legs rufotestaceous, the coxæ included; last joint of the tarsi infuscated. Abdomen as long as the head and thorax, subsessile; 1st segment twice as long as its apical width, not much narrowed at the base, finely striolate and margined, with salient tubercles; the following segments smooth, forming a claviform mass as wide as tha thorax. Terebra concealed. of unknown. Length, 1 line ; exp., $2 \frac{1}{2}$ lines.

The only example was bred from an unknown dipterous pupa found on the columbine, Aluilegia vulgaris, by Mr. Billups.
28. Dacnusa abdita, Hal. (Pl. I., fig. 4.)

> D. abdita, Hal., Hym. Brit., ii., p. 13 ; Marsh., lib. cit., p. 494, र \&.

Mesopleuræ without a distinct furrow. of Black, shining, with scattered pubescence; abdomen in general entirely black, sometimes the segments cinctured with testaceous along the hind margin. Head short, transverse, wider than the thorax ; clypeus brown; mandibles rufous ; palpi whitish. Antennæ longer than the body, black, with the scape testaceous, 31-3̄-jointed. Thorax short, gibbous, oval ; on the mesonotum before the scutellum is an oval fovea more or less distinct, which is prolonged into a channel on the disk; metathorax short, rugose, truncate posteriorly. Wings ample, hyaline, minutely hairy; squamule testaceous; nervures and stigma fuscous, the latter stout, elongate, linear-lanceolate, sometimes attenuated at the base, close to which it emits the radial nervure ; radial areolet large, much longer than the prebrachial, strongly dilated and sinuated before the extremity; recurrent nervure directed towards the inner lower angle of the 2nd cubital areolet. Legs testaceous; hind tarsi and tips of the hind tibie infuscated, tarsi shorter than the tibir. Abjomen convex, suborbicular; 1st segment sublinear, somewhat contracted before the tubercles, which are conspicuous and situated in the middle; the following segments very smooth, ciliated on the margins; belly testaceous. Terebra hardly exserted. ot similar, but more slender ; antenuæ (in 3 examples) 32 -jointed; abdomen depressed, oblong, with parallel sides ; posterior segments obscurely bordered with testaceous. Length, $1 \frac{1}{4}$ lines; exp., 3 lines.
-This species may be known by the unusual direction of the recurrent nervure, and the exceptional shortness of the hind tarsi; otherwise it is very like D. talaris (sp. 3) and D. lateralis (sp. 15); in D. talaris the hind tarsi are as long as their tibie; in D. lateralis the hind tarsi are short, but the antenne very much longer. Found in England and Jreland; a supposed parasite of some Phytomyza, whose larva lives in the parenchyma of leaves.

## 29. Dacnusa gilvipes, Hal.

D. gilcipes, Hal., Hym. Brit., ii., p. 12 ; Marsh., lib. cit., p. 495, $\widehat{o}$ 우.
Mesopleure with a crenulate furrow. Antennæ 25-29-jointed.
\& Black, shining, finely pubcseent ; mandibles, clypeus, and palpi
yellow. Antenne as long as the body, blackish, with the first 4 or 5 joints yellow, the 3rd somewhat elongate. Thorax oval, convex; mesothoracic furrows scarcely inchoate, punctulate; a punctiform fovea before the scutellum ; metathorax very short, obtuse, punctate-rugulose. Wings hyaline; squamule yellow; nervures and stigma testaceous, the latter very narrow, emitting the radial nervure from its attenuated base; the nervulation according to Haliday) resembles that of 1 . areoluris (sp. 25), but the recurrent nervure is interstitial, and the 1st abscissa longer. Legs slender, yellow. Abdomen subpetiolate, spathulate, somewhat less wide than the thorax, slightly compressed at the apex ; 1st segment linear, punctate-rugulose, very little contracted at the base, with medial tubercles. Terebra as long as one-fourth of the abdomen, its valves slender. of similar, but with stouter legs. Length, 1-1 $\frac{1}{3}$ lines.

Var. 1. of Abdominal segments, after the 1st, fuscous; an obscure testaceous patch at the base of the 2 nd.

Vas. 2. of Hind tarsi and tips of their tibio infuscated.
I have not seen this species, which, according to Haliday, resembles 1 . albipes (sp. 14), differing only in having the thorax nearly glabrous, the radial areolet and the stigma shorter, and the recurrent nervure interstitial. Förster has made for it the genus Mesora. Found in England and Ireland, but very rare.

## V. GYROCAMPA, Förster.

## Förster, Verh. Pr. Rheinl., 1862, p. $2 \overline{7} 6$.

Palpi elongate, the maxillary 6-, the labial 3- or 4 -jointed. Head transverse ; cheeis somewhat dilated ; eyes rather small, glabrous. Thorax smooth; mesonotum canaliculate in the middle, the channel developing into a fovea before the scutellum ; mesothoracic furrows incomplete, directed at first across the disk, but soon forming almost a right angle, marked by a punctiform impression, and then suddenly effaced ; furrow of the mesopleure smooth; metathorax pubescent. Wings narrower than in Ducmusa ; 2nd abscissa forming a regular parabolic curve, not at all sinuated; recurrent nervure rejected ; stigma linear, elongate, sometimes very much attenuated and indeterminate, emitting the radial nervure at one-fourth or one-third of its length; radial areolet remote from the tip of the wing ; 2nd discoidal completely closed ; radial nervure of the hind wings colourless or effaced. Abdomen spathulate, pointed at the apex in the $q ;$ 2nd and following sutures very indistinct ; 1st
segment oblong, a little narrowed at the base, striolate, pubescent, with more or less visible tubercles. Terebra briefly exserted, with broad, flattened valves.

These insects are distinguished from Dacnusa by a certain facies, which is due to the form of the head and abdomen, as well as to the neuration. Förster has made of them two genera, Gyrocampa and Ametria, the latter of which is distinguished bv a longer radial areolet, and the number of joints of the labial palpi. The same author evidently intended to separate Giyrocampa from Dacnusa by the radial nervure, which is regularly curved in the former ; but the typographical errors in his synopsis, p. 276 (where No. 20 needs correction), are misleading to the reader. It may also be remarked that some species of Dacnusa, as D. semirugosa (sp. 4), present a radial nervure not more sinuated than in Gyrocampa.

The parasitism of the species of ifyrocampa is unknown, but they are always found in marshy places, especially on plants of the family Lemnacer. The dense pubescence or down, covering the region of the principal spiracles, viz., the metathorax and the 1st abdominal segment, is probably for the protection of the breathing-orifices from water, and indicates, as in many other insects, the habit of living in wet places.

## Table of Species.

(4) 1. Labial palpi 4-jointed; stigma attenuated, but not quite obsolete, emitting the radial nervure at one-fourth of its length.
(3) 2. Second segment striolate at the base, length nearly 2 lines
(2) 3 . Second segment entirely smooth; length 1 line or very little more

1. affinis, Nees.
(1) 4. Labial palpi 3 -jointed; stigma obsolete, or nearly so, not thicker than the costa, emitting the radial nervure at one-third of its length 3. uliginosa, Hal.

## 1. Gyrocampa afinis, Nees.

Bracon lonticornis, varr. $\alpha, \beta$, Nees, Mag. Ges. Berl., 1811, p. 20.
Bassus affinis, Nees, lib. cit., 1814, p. 209.
Alysia aftinis, Nees, Mon., i., p. 261, of 오.
Dacnusa affinis, Hal., Hym. Brit., ii., p. 16, $\widehat{\text { o }}$.
G. affinis, Marsh., Species des Hym. d'Eur. et d'Alg. Bracon., vol. ii., p. 503, t 아.

Labial palpi 4-jointed; stigma elongate, attenuated, emitting the radial nervure at one-fourth of its length, which fourth is about equal in length to the 1st abscissa. Second segment of the abdomen entirely smooth. $\ddagger$ Black, shining, pubescent; mandibles and palpi rufous. Antennæ somewhat longer than the body, $2 t$-jointed, the first 3 or 4 joints rufous. Prothorax transversely wrinkled; mesonotum traversed by an impressed line issuing in a rounded fovea before the scutellum; metathorax not shining, beset with whitish hairs, truncate posteriorly. Wings hya!ine; squamulæ brown ; nervures and stigma reddish-brown, sometimes very pale. Legs rufotestaceous; last joint of the tarsi elongate, incrassated, with minute claws. Abdomen spathulate, as long as the thorax; 1st segment finely striolate, pubescent, carinate in the middle, twice as wide at the extremity as at the base, with inconspicuons tubercles. Terebra hardly exserted. of similar ; antenne longer, 28-33-jointed; 1st segment almost linear ; 2nd and following narrower than in the $\circ$, forming together an elongate oval. Length, $1-1 \frac{1}{3}$ lines ; exp., $2 \frac{1}{4}-3$ lines.

Var. of of Form more slender; head not so much flattened; antennæ longer, 36-joisted; stigma more attenuated, almost obsolete. Haliday.

Common in Europe, upon duck-weed and other aquatic plants.

## 2. G!yrocampa foveola, Hal.

Dacnusa foveola, Hal., Hym. Brit., ii., p. 16, ㅇ. G. foveola, Marsh., lib. cit., p. 504, î + .

Labial palpi, and stigma, as in the preceding. Second segment of the abdomen striolate at the extreme base. 'The largest species. o Black shining. Antennæ 30-35-jointed, the two basal joints more or less testaceous. Medial furrow of the mesonotum broad and deeply sunk; metathorax densely pubescent. Wings slightly infumated; nervures and stigma fuscous. First abdominal segment with salient tubercles, striolate, with a small medial space triangular and smooth ; apex of the abdomen more acuminate than in G. affinis ; terebra longer, its ralves incrassated and flattened. The other characters are the same as those of G.affinis. ot similar ; 2nd abdominal segment reddish towards the base ; one $\begin{gathered}\text { o }\end{gathered}$ in my collection has 30 -jointed antennæ, like the $\circ$. Length, $1 \frac{3}{4}$ lines; exp, $3 \frac{3}{4}$ lines.

Found in England and Ireland, but much more rarely than the other species
3. Gyrocampa uliginosa, Hal. (Pl. I., fig. 5.)

Dacmusa uliginosa, Hal., Hym. Brit., ii., p. 17, ô $q$. G. uliginosa, Marsh., lib. cit., p. 502 , ठ 우.

Labial palpi 3-jointed; stigma more elongate and attenuated, almost indistinguishable from the costa, emitting the radial nervure at one-third of its length, which third is longer than the 1st abscissa. If Black, shining; head and thorax pubescent, and of equal width ; palpi aud mandibles rufous. Antennæ somewhat longer than the body, 24 -jointed, the 2nd joint testaceous. An impressed line on the mesonotum, terminating in a rounded forea before the scutellum ; furrow of the mesopleure fine and smooth; metathorax beset with whitish hairs. Wings hyaline; squamulæ brown; nerrures and stigma ferruginous brown; the portion of the stigma preceding the 1st abscissa being longer than this latter, it results that the parastigma is thrown back towards the base of the wing, and the 1st cubital areolet is angularly prolonged in the same direction ; radial areolet longer and narrower than in the other species; hind wings narrow. Legs rufous ; tarsi, and tips of the femora, infuscated. Abdomen conver, spathulate, as wide as the thorax and a little longer, glabrous, very shining ; 1st segment $t$ wice as wide at the extremity as at the base, striolate, finely margined. with scarcely visible tubercles: : ud sometimes faintly striolate at the extreme base. Terebra hardly exserted. © similar ; antennæ 28-jointed ; abdomeu elongate-oval. depressed: -nd segment rufcpiceous towards the base, Length, 1 line; exp., $2 \frac{1}{4}$ lines.

Found all orer the British Islands, and in Holland; common amongst aquatic plants. It constitutes the genus Ametria, Fürster.

## VI. CHOREBUS, IIal.

Hal., Hym. Brit., ii., p. 1i (1839).

Maxillary palpi 6 -jointed, the 4 th joint longer than the $\overline{5}$ th, the bith shorter, suboral ; labial palpi 3 -jointed, the last joint enlarged, oral. Head transrerse: eyes pilose; mandibles subcompressed, prismatic, 3 -denticulate, the middle tooth the longest. Thorax finely and densely punctulate. often not shining. rugose at the sides and beneath ; mesosternum smooth ; furrow of the mesopleure rugose; mesothoracic furrows incomplete, directed at first across the disk, but soon turning off at a right angle marked by a punctiform
impression, and then suddenly effaced; metathorax rugose, reticulate. Stigma either linear, elongate, attenuated, emitting the radial nervure before one-third of its length, or else forming an elongate triangle, and emitting the radial nerrure just before the middle ; radial nervure describing a regular curve, without siuuation ; radial areolet narrow, elongate, remote from the tip of the wing; recurrent nervure more or less rejected, when it is much thrown back, the first cubital areolet becomes a hexagon; 2nd discoidal areolet complete. Abdomen subsessile; 1st segment striolate, the rest smooth, minutely ciliate along the hind border. Terebra very short.

Maliday was acquainted with three species, to which I am now enabled to add a fourth, distinguished by its neuration. They are closely allied to the preceding and the following genus, and are found in similar situations, such as the banks of rivers and ponds, or among the rejectamenta of the sea-beach. 'Their earlier states are not known.

## Table of Siectes.

(- 1 ) 1. Recurrent nervure rejected as far as the middle, or one-third, of the 1st cubital areolet, thus forming a the side of that areolet.
(3) 2. Stigma attenuated, sublinear, not so thick as the length of the 1-t abscissa; emitting the radial nervure betore one-fourth of its length; legs blackish

1. nereïdum, Hal.
(2) 3. Stigma forming an elongate scalene triangle ; emitting the rarial nervure from near the middl-, where it is thicker than the length of the 1st abscissa; legs in great part testaceous
2. limoniadum, Marsh.
(1) 4. Recurrent nervure not so far rejected.
(i) 5 Antennæ of the $\$$ one-half longer than the head and thorax; abdomen not compressed ( © unknown)
3. lymphatus, Hal.
(5) 6. Autenne of the $f$ as long as the head and thorax; abdomen, after the 3rd segment, strongly compressed ... ... 4. naïadum, Hal.

## 1. Cherelus nereïdum, Hal.

C. nereïdum, Hal., Hym. Brit., ii., p. 18; Marsh., lib. cit., p. 507, 大 + .
\& Black ; head transverse, somewhat less wide than the thorax, shining, densely pubescent ; vertex faintly canaliculate; mandibles piceous ; palpi pale, infuscated at both ends. Antennæ 18 -jointed, hardly as long as the head and thorax. Thorax densely pubescent; mesothoracic furrows humeral, effaced posteriorly, between them on the fore margin is a short smooth stria; metathorax short,
subtruncate. Wings hyaline ; squamulæ black; nervures and stigma fuscous; radial areolet lanceolate, very narrow ; 1st cubital areolet hexagonal; probrachial areolet of the hind wings rather short. Legs robust, blackish, with the extremities of the trochanters rufous. Abdomen as broad as the thorax, and somewhat longer, lanceolate, depressed; 1st segment obconic, rather longer than its apical midth, without visible tubercles, obsoletely rugulose, margined, often marked with a medial impression ; 2nd and 3rd, taken together, subrectangular, one-half longer than the 1st; the rest, taken together, scarcely half as long as the 2nd and 3rd. Terebra hardly exserted. ot similar ; antennæ almost one-half longer than the head and thorax, 2 -jointed; abdomen scarcely narrower than the thorax ; segments 2-3 as long as all the following united. Length, $1 \frac{1}{4}$ lines; exp., $2 \frac{1}{4}$ lines.

It has been taken in England, Ireland, and Holland, but rarely ; it crawls slowly amongst seaweed at the mouths of rivers, and on the coast. Mr. Billups has captured it at Oxshott.

## 2. Chorebus limoniadum, Marsh.

 C. limoniadum, Marsh., lib. cit., p. 507, \&.of Black; head transverse, as wide as the thorax, shining pubescent ; vertex faintly canaliculate; mandibles and palpi testaceous. Antennæ mutilated, but 16 joints remain. Mesothorax as in the last species; metathorax punctate-rugose, traversed by several raised lines, irregular, longitudinal, of which the two medial enclose an oval space. Wings hyaline ; squamulæ, nervures, and stigma, rufopiceous ; radial areolet lanceolate, broader than in C'. nereïdum; recurrent nervure rejected to one-third of the length of the inner lower side of the 1st cubital areolet, which is thus made hexagonal; prebrachial areolet of the hind wings shorter than in C. nereïdum. Legs testaceous, pubescent ; 4 anterior coxæ, all the femora, tibiæ, and tarsi infuscated at the apex; hind coxæ black. Abdomeu elongate-oval, depressed, subpetiolate ; 1st segment striolate, nearly linear, much narrower than the metathorax, margined from the base to the tubercles, which are acute and very salient; the rest of the segments smooth. Terebra hardly exserted. of unknown. Length, $1 \frac{1}{4}$ lines ; exp., $2 \frac{1}{2}$ lines.

The shape of the stigma will at once distinguish this species, without regard to smaller differences. I captured the only specimen known on the banks of a rivulet in Devonshire, at some distance from the sea.

## 3. Chorebus lymphatus, Hal.

C. lymphatus, Hal., Hym. Brit., ii., p. 19; Marsh., lib. cit., p. 508, ㅇ.
\& More slender than C. nereïdum and C. naïadum. Black ; head transverse, subcubic, wider than the thorax, shining; eyes beset with scattered hairs; mandibles and palpi ferruginous. Anteunæ 22 -jointed, the 2nd joint rufescent. Thorax finely punctulate, pubescent; mesonotum having an impressed line iu front, and a fovea before the scutellum ; metathorax obtuse. Wings hyaline; squamulæ yellowish; nervures and stigma dull ferruginous, the latter still more attenuated than in C. nereïdum ; radial areolet more elongate. Legs ferruginous, the tips of the tarsi infuscated. Abdomen as in C.nereïlum, but less narrowed posteriorly ; 1st segment almost twice as long as wide, its tubercles situated before the middle. Terebra subexserted. Length, $1 \frac{1}{2}$ lines.

Once captured by Haliday in North Ireland, in a grassy ditch.

## 4. Chorelus naïadum, Hal.

C. naïadum, Hal., Hym. Brit., ii., p. 18 ; Marsh., lib. cit., p. 509, $\begin{gathered}\text { 우. }\end{gathered}$
of Black; head transverse, a little narrower than the thorax, shining, densely pubescent; vertex faintly canaliculate ; mandibles dusky ; palpi pale. Antennæ 16 -jointed, more slender than in C. nereïdum. Thorax densely pubescent ; mesonotum canaliculate in the middle, sometimes studded with large punctures ; metathorax very short, gibbous at the sides, truncate posteriorly. Wings hyaline ; squamulæ black ; stigma and nervures dull ferruginous; the former linear-lanceolate, emitting the radial nervure before one-third of its length ; recurrent nervure moderately rejected. Legs dull ferruginous. Abdomen longer than the head and thorax ; 1st segment about one-half longer than its apical width ; faintly rugulose; 2nd and 3rd forming together an attenuated cone, searcely as long as the following segments united; these latter are strongly compressed like the blade of an oar, vertically. Terebra exserted, with slender valves. of Antennæ longer and more slender than those of the $q, 20-21$-jointed; stigma and nervures fuscous; legs dull rufopiceous, much longer and more slender. Length, $1 \frac{3}{4}$ lines; f $1 \frac{1}{2}$ lines.

Taken by Haliday in North Ireland, on the banks of rivers and lakes, but not commonly.

> VII. CHENUSA, IIal. Hal., Hym. Brit., ii., p. 19 (1839).

Maxillary palpi 6-jointed, the last joint suboval; labial 4-jointed, the two last joints short, consolidated so as to form a club somewhat longer than the 2nd joint. Head somewhat transverse, subcubic, widened behind the eyes, smooth, shining, finely pubescent; eyes beset with scattered hairs ; mandibles subcompressed in the form of a prism, as in Chorebus, tridenticulate. Thorax densely punctulate, pubescent; prothorax large, transversely wrinkled; mesothoracic furrows as in Chorebus, but smoother, the medial line almost effaced; a linear fovea before the scutellum; mesopleure smooth, the usual furrow crenulate; metathorax short, rounded, rugose. Stigma oval-lanceolate, shorter than in Chorebus, and broader than the length of the 1st abscissa, emitting the radial nervure from very near the middle; radial areolet small, shorter than the prebrachial, remote from the tip of the wing ; recurrent nervure very slightly rejected; 2nd discoidal areolet completely closed. Abdomen as long as the head and thorax, depressed, spathulate in the $q$, elongate-oval in the $\delta$; 1st segment twice as long as its apical width, very little narrowed at the base, finely striolate and margined, its tubercles almost effaced; before them there is generally a transverse impression resembling a false suture; the following segments smooth, ciliate on the hind margin. Terebra very short.

The single species of this genus has the general appearance of a Chorelus, differing only in the neuration and the labial palpi: this latter character probably induced Haliday to establish a new subgenus, though at the present day it would hardly be regarded as of primary importance. Nees von Esenbeck strangely placed the insect in his genus Perilitus, notwithstanding the mandibles, which are those of the Erodontts, and not considering his own closely allied species Gyrocampu affinis, which he more correctly referred to the genus Alysia.

## 1. Chænusa conjungens, Nees. (Pl. I., fig. 6.)

Bracon conjungens, Nees, Mag. Ges. Berl., 1811, p. 27, pl. ii., fig. 7.

Perilitus conjungens, Nees, Mon., i., p. 33, ̂̂ 여. C. conjungens, Hal., Hym. Brit., ii., p. 19 ; Marsh., lib. cit., p. 511, of f.

Black; $\ddagger$ mandibles testaceous; labrum and palpi ferruginous. Antennæ longer than the body, 24-25-jointed. Wings hyaline ; squamulæ brownish ; stigma fuscous in the of, ferruginous in the ․ Legs ferruginous; trochanters and base of the tibir paler; knees and tips of the tarsi infuscated. Terebra scarcely as long as the last segment. Length, $1-1 \frac{1}{2}$ lines; exp., $2 \frac{1}{4}-3$ lines.

Found in England and Ireland; originally by Nees in Franconia. I have taken three, in Devonshire and Cornwall; the species is not uncommon in swampy places.

## Explanation of Plate I.

DACNUSIDE.
Fig. 1. Dacnusa ampliator, Nees, ㅇ. 1 $\downarrow$ Antenua.
2. Dacmusa petiolata, Nees, of.
3. Dacnusa areolaris, Nees, $ํ$
4. Wing of Dacnusa abdita, Hal.
5. Gyrocampa uliginosa, Hal., $f$.
6. Chcenusa conjungens, Nees, 3 .

# II. Western Equatorial African Micro-lepidoptera. By The Right Honble. Lord Walsingiayr, M.A., LL.D., F.R.S. 

[Read Dec. 2nd, 1896.]
Plates II. and III.
I am indebted to the Rev. Dr. W. J. Holland for the opportunity of making known some interesting additions to the African Micro-lepidoptera from a locality hitherto unvisited by any collector of these small but instructive forms. Kangwé, on the Ogowé River (where the Rev. A. C. Good collected the specimens communicated by Dr. Holland), is situated only two miles south of the equator, and the collection, as might be expected, affords several examples of the more brilliant colouring and abnormal structure which distinguishes the equatorial fauna in other regions. The specimens, unfortunately, for the most part are in only moderate condition, but are sufficient to indicate that an experienced collector could find a rich harvest of novelties if he should possess also the qualifications of a sportsman and be indifferent to the aggressive curiosity of the very numerous lions which, I am informed, make night collecting absolutely impossible, and in this instance confined it exclusively to lamp-light on the upper floor.

This small collection still further emphasises the alliances undoubtedly prevalent between the Microlepidoptera of the two regions lying on opposite sides of the great dividing barrier of the Atlantic Ocean, especially about those degrees of latitude tending southward from the equator. But, while emphasising this fact, the collection possesses a still greater interest from the evidence which it affords that the African continent forms a strong connecting link with the eastern as well as with the western fauna. Some of the genera included in this paper, such as Idiothauma and Mictopsichia, have repretrans. ent. soc. lond. 1897.—part i. (april.) 3
sentative forms in both. The species placed in the genera Chorentis, Simaethis, and Glyphipteryse have near allies among the Amazonian types, but could be matched almost as closely by specimens from Assam and the Malay Archipelago, while Tiquadra, another Brazilian genus (to which a species is here added), is represented in the late Mr. Pryer's collection from Japan. Nematois parvella, in the Adelina, carries us at once to Borneo and Sumatra for a careful comparison to enable us to distinguish it from more than one species equally resplendent; and this is the more remarkable, inasmuch as the Adelina are but poorly represented in all coliections that have hitherto reached us from the African region, and are apparently unrepresented in South America; while the alliance of Ptilothyris is with Adelomorpha, hitherto only known from a single species occurring in Celebes. Alucita similalis, Wkr., affords a parallel instance, strengthened by the absolute similarity of specinens from both localities. These affinities will probably be more strongly recognised when the mass of material in my hands, illustrating this study from the islauds of the Malay Archipelago and the adjacent peninsula, as well as from India and the extreme worth of Australia, can be thoroughly worked out and described.

My assistant, Mr. Durrant, has drawn and coloured the figures for the plates which illustrate this paper under circumstances of unusual difficulty, owing to the condition of the specimens and the absence of any lengthened series; the extreme interest which attaches to many of these unique forms being the chief incentive in undertaking a task which he has achieved with remarkable success. To make correct drawings of the neural characters from ill-set and frequently contorted specimens, requires not only much labour and patience, but an intimate knowledge of structure which few possess, yet this portion of the work is of the utmost importance in instituting any comparison between what may be regarded as grades of structural variation, chiefly interesting for the light they may throw upon geographical origin and distribution; I must here express my acknowledgment for the pains that he has taken to ensure accurate delineation, as well as for the skill with which he has reproduced the natural colouring.

## PTEROPHORID.E.

Crocydoscelus, gen. n.
(крокйs = a piece of wool, бкє́入os = a leg.)

Type. Crocydoscelus ferrugineum, Wlsm.
Auternce half the length of the forewings, scarcely pubescent in the of, somewhat flattened laterally. Labial palpi slender, projecting about the length of the head beyond it ; apical joint nearly as loug as the second, which is slightly recurved. Haustellum well developed. Head clothed above with bifid scales. Thorax stout, smooth. Forewings narrow, bilobed, the fissure commencing at about three-fourths from the base; the anterior lobe as wide as the second, slightly uncate at the apex; second lobe square-ended. Neuration, 12 veins; 8 and 9 stalked, 8 to apex ; 3 and 4 stalked. Ilinderings trilobed, the anterior fissure extending to one-half, the lower fissure not reaching to the base ; third lobe filiform, with a spatule of black scales in the cilia at its apex. Neuration, 8 veins; 7 to apex of upper lobe ; 5 and 6 short, to fissure ; 3 and 4 approximate towards origin, 4 to apex and 3 to angle of second lobe; 1 to apex of third lobe. Abdomen widened in the middle, tapering to the anal segments. Legs, anterior pair with a wide tuft at the end of the tibiæ; middle pair with a similar tuft ; posterior pair with three outspreading fan-like tufts, the first small, near the base of the tibiæ, the other two much larger, arising above the base of the spurs, the iuner spurs much longer than the outer, slightly clothed, outer spurs densely clothed.

## Ciocydoscelus ferrugineum, sp. n. (Pl. II., fig. 1.)

Antemue greyish fuscous, with a reduplicated white line and white spots above. Palpi, head, and thorax ferruginous. Forewings ferruginous, banded across the outer half of the lobes with tawny fuscous and reddish cupreous, with a faint indication of a white transverse streak on each lobe; the apical margin of the anterior lobe is slightly uncate, the cilia blackish along their base, their outer half tawny-grey; on the second lobe the cilia are similarly coloured, but the tawny grey does not extend to the tornus, where they are purplish, and behind it they become pale ferruginous on the dorsum. Exp. al., 15 mm .

Hinduings bright shining ferruginous at the base, shading outwardly to cupreous; cilia purplish fuscous at the apex, shading to tawny grey and pale ferruginous towards the base; hind lobe very slender, with a cupreous black spatule at its apex. Abdomen dark ferruginous, shading to tawny fuscous at the siles. Legs, the anterior and middle pairs pale ferruginous with a rich ferruginous fan-shaped tuft towards the end of the tibiæ ; posterior pair thickly clothed to the tarsal joints with dark ferruginous scales, the tibial tufts banded at their base with reddish ferruginous, on their outer half bright ochreous.

Type. §. Mus. Wlsm.
Hab. Yoruba-Idanre (Sir G. Carter, 1894) ; French Congo-Kangwé, Ogowé River (Rev. A. C. Good).

Alucita, L.
Type. Phalæna (Alucita) pentadactyla, L. (Poda, 1761).
alucita, L. (nec Meyr.) = aciptilia, Hb. = aciptilus, Z. $=$ *Pterophorus (Geofir.) Meyr. $^{\text {P }}$

## Alucita similalis, Wkr.

n. syn. = malacensis, Z.

Aciptilus similalis, Wkr., Cat. Lep. Ins. B.M., XXX., 949 (1864) ; Aciptilia malacensis, Z. Hor. Soc. Ent. Ross., XIII., 485.6 (1877)².

Hab. Africa-Sierra Leone, 10, I. (Dr. Clements); French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; Asia-Malacca ${ }^{2}$; Borneo-Sarawak ${ }^{1}$; CelebesMacassar, 500 ft . (W. M. Doherty).

This species has not hitherto been recorded from Africa.

## Alucita candidalis, Wkr.

Aciptilus candidalis, Wkr., Car. Lep. Ins. B.M., XXX., 948 (1864) ${ }^{1}$; Wlsm., 'Tr. Ent. Suc. Lond. 1881, $282^{2}$.

Hab. Sierra Leone ${ }^{1,2}$; French Congo-Kangwé, Ogowé River (Rev. A. U. Good) ; Natal-Spring Vale, 111. ${ }^{2}$

# GELECHIADA. 

$$
\begin{aligned}
& \text { Ptilothyris, gen. n. }
\end{aligned}
$$

## Type. Plilothyris purpurea, Wlsm.

Anternce shorter than the forewings, somewhat thickened beyond the base : ot bipectinate $2 \frac{1}{2}$, each pectination strongly biciliate; $ㅇ$ slightly biserrate: basal joint smooth in both sexes. Maxillary palpi slender, drooping. Labial palpi very long, recurved, smooth; second and third joints of about equal length, the former somewhat flattened and sabre-shaped, the latter very slender and sharply pointed. Haustellum long. Head smooth, with side-tufts behind eyes. Thorax smooth. Forewings elongate, of approximately even width throughout, costa slightly depressed at the base and apex, termen slightly oblique, not sinuate, tornus rounded. Neuration, 11 veins ( 9 absent, coincident with 8 ); 7 and 8 stalked, 7 to costa above apex; 2,3 and 4 from a recurved common stem; 5 from lower angle of cell, remote from 6. Hinduings broader than the forewings, scarcely sinuate beneath apex ; $\delta$ with a semi-transparent patch. Neuration, 8 veins; 6 and 7, as also 3 and 4, from a short stalk; 5 straight. Abdomen slightly flattened behind middle; ô with genital segments densely hairy ; uncus strongly developed. Legs smooth, hind tibie with elongate slender tarsi and rather long spurs.

Allied to Adelomorpha [founded by Snellen (Tijd. v. Ent., XXVIII., 31-2, Pl. III., 1-3, 1885) on the characters of a single species from Celebes] but differing chiefly in the shorter and distinctly bipectinate antenne, which in Adelomorpha are biciliate. The occurrence of this genus in tropical Africa is interesting, especially in connexion with other forms from which probably it may have been derived. Idiopteryx, Wlsm., possesses vein 9 in the forewings from the same stem as $7+8$, while the loss of this vein is characteristic of Adelomorpha and Ptilothyris. A tendency in the same direction is shown in the hindwings, where 3 and 4 , which are separate in Idiopteryx, arise from a short stalk in both these genera. It would be interesting to discover a form in which all these stalked veins have become coincident.

## Ptilothyris purpurea, sp. n. (Pl. II., fig. 2.)

Antenne purple on the basal two-thirds, with an ochreous patch behind the basal joint, the outer third white. Palpi bright ochreous, the apical joint shaded with purplish fuscous externally. Head dark purplisb, the face paler ; the fringes above the cyes bright ochreous. Thorux dark purplish. Forewings shining, dark purplish, with a triangular patch of somewhat roughened scales extending nearly across the wing at one-third from the base (this is bright purplish grey in certain lights, but appears brownish fuscous if held in an opposite direction) ; beyond this at the upper angle of the cell is a smaller similar patch; a slender subochreous line runs along the base of the dark purplish cilia. Erp. al. 24 mm . Hinduings, 才, deep purplish fuscous (varying somewhat according to the angle at which the light strikes them); costal margin from the base to two-thirds shining whitish ochreous; a pale, iridescent transparent elongate patch, lying beneath the costal margin beyond the middle, extends nearly across the width of the cell ; a tuft of greyish hair-scales at the base of vein 1; cilia purplish tipped with whitish ochreous towards the abdominal angle and somewhat beyond it: $q$ cupreous brown, without the pale patch ; cilia purplish grey. Abdomen purplish grey, anal tuft pale ochreous; underside shining whitish ochreous. Legs bright ochreous ; hind tibix shaded externally with purplish at the base and between the spurs, the outer spurs and the basal joint of the tarsi also purplish externally.

## Type. $\begin{gathered}\text { o } . ~ M u s . ~ W l s m . ~ ; ~ ㄱ . ~ M u s . ~ H o l l a n d . ~\end{gathered}$

IIab. Lagos ( 介 ô, Sir G. Carter) ; French CongoKangwé, Ogowé River ( + Rev. A. C. Good) ; three specimens.

Epicharma, gen. n. ( $\pi^{\prime} \pi^{\prime} \alpha \rho \mu \alpha=$ an object of malignant joy.)

Type. Epicharma nothriforme, Wlsm.
Antennce ( $\ddagger$ ) filiform. Labial palpi strongly recurved, second joint amply clothed above and below, the scales beneath scarcely longer than those above ; apical joint as long as the second, slender, smooth. Maxillary palpi short, dependent. Haustellum long. Ocelli obsolete. Heud and thorax smooth. Forevings, costa slightly arched at the base, straight beyond, apex depressed, termen scarcely oblique. Neuration, 11 veins ( 7 and 8 coincident
throughout); 2 and 3 from a recurved common stem, others separate. Hindwings slightly broader than the forewings, trapezoidal, costal third of the wing thickly scaled throughout beneath. Neuration, 8 veins; 3 and 4 from a point, 6 and 7 closely approximated at base. Legs, hind tibie thickly clothed, spurs very long.

Allied to Nothris and Ypsolophus, but differing in the coincidence of veins 7 and 8 of the forewings.

## Epicharma nothriforme, sp.n. (Pl. II., fig. 3.)

Antenne stone ochreous, faintly annulate. Palpi, rich brown extercally on the second joint ; apical joint and a narrow fringe at the end of the second joint stone-ochreous. Hearl and thorax stone-ochreous. Forewings pale stone-ochreous with three black spots, one on the middle of the fold, one on the middle of the disc above and beyond it, the third at the end of the cell slightly below the line of the previous one; a very faint shade of greyish brown on the apical portion of the wing is interrupted by a pale waved fasciaform mark which extends from the commencement of the costal cilia, bulging outwards and reverting to the dorsum before the tornus ; a few ill-defined greyish brown spots around the apex and termen; cilia pale stone-ochreous. Exp. al., 23 mm . Hinclwings grey ; cilia stone-ochreous with a greyish shade near their base. Aldomen greyish. Legs stone-ochreous.

## Type. +

Hal. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

This species has much the appearance of Nothris verbascella, Hb., but the neuration is different.

> Pappophorus, gen. n. $(\pi \dot{\alpha} \pi \pi o s=$ thistle down, $\phi \hat{\rho} \rho \in i \nu=$ to bear. $)$

## Type. Pappophorus eurynotus, Wlsm.

Antennce ( $\frac{3}{4}$ ), unidentate, basal joint witLout pecten. Labial palpi, second joint porrect, clothed at the end and above and beneath so as to make the joint appear triangular ; apical joint slender, recurved, twice the length of the second joint. Laxillary palpi short, distinct. Haustellum well-developed. Head and thorai smooth. Forewings with the costa conspicuously bulged before
the middle, comparatively straight beyond, but slightly depressed before the apex, termen somewhat oblique, tornus rounded, dorsum straight. Neuration, 12 veins; 7 and 8 stalked, 7 to apex; 2 and 3 from a recurved stalk, the others separate. Hindwings trapezoidal, broader than the forewings, slightly sin:ate beneath apex, and concave between abdominal angle and tornus, cilia $\frac{2}{3}$; $\frac{1}{}$ with a long narrow naked fold on the upper side between vein $1 b$ and $1 c$ containing a pencil of long fine expansible hairs. Neuration, 6 veins; 2 absent, 3 and 4 coincident, 5 nearer to 6 than to $3+4$, 6 and 7 closely approximated, $1 b$ with a long and distinct fork. Abdomen slender, somewhat flattened. Leys, hind tibix smooth.

Allied to Ypsolophus, F., but differing conspicuously in the hindwings in the absence of vein 2, in the coincidence of veins 3 and 4 , in the approximation of 5 to 6 , and in the fold containing a long hair-pencil between 16 and $1 c$.

## Pappophorus eurynotus, sp. n. (Pl. II., fig. 4.)

Antenne pale fawn, faintly anuulate with brown. Palpi pale fawn on their inner sides, with a well-marked triangular brown shade externally on the second joint, leaving a pale margin along the upper edge of the projecting tuft ; apical joint dark fuscous. Heal and thorax pale fawn. Forewings whitish fawn, shaded with umber-brown along the dorsal half and on the costa beyond the middle; a small black spot at the extreme base of the costa, another, wedge-shaped, at the end of the discal cell, scarcely above the middle of the wing; a larger blackish patch (variable in size and shape) half-way between this and the base (its lower portion sometimes forming a black line in the middle of the fold); along the outer side of the bulged portion of the costa commences an umberbrown shade, which continues to the apex (shading downwards to chestnut-brown along its middle in some specimens) but interrupted by three slender whitish streaks, the first of which is very oblique, passing across the discal nervules and angulated downwards at a point before the termen, but above the middle of the wing, hence it reverts to the dorsum at the commencement of the dorsal cilia ; the other two small and inconspicuous whitish streaks precede the apex, and the termen and apex are margined by a line of the same colour, containing a series of three or four blackish spots; cilia chestnut-brown ou their basal half, fawn-brown externally. Exp. al , 16 mm . Hinduings dark umber-brown; cilia scarcely paler but chestnut-brown at the apex ; ot with an expansible white hair-
pencil between veins $1 b$ and $1 c$. Abdomen shining, cinereous, anal tuft slightly paler. Legs brown, tarsi annulated with pale fawn.

## Type. đ. Mus. Wlsm.

Hab. Sierra Leone, 2.5, IV. (Dr. Clements); French Congo-Kangwé, Ggowé River (Rev. A. C. Good) ; two specimens.

## Ypsolophes, F .

## Ypsoloplus basistriatus, sp. n. (Pl. III., fig. 13.)

Antenne pale cinereous, annulated with fawn grey. Palpi, second joint with a conspicuously projecting triangular tuft below, apical joint very long, slender; second joint with a triangular chocolate-brown shade externally, apical joint sprinkled with chocolate-brown scales on the under side. Head and thorax fawn-grey, face slightly paler. Forewings with veins 2 and 3 closely approximate throughout, but especially at their base; pale cinereous sprinkled with fawn-grey throughout, a series of small blackish spots around the apex and termen at the base of the cilia, and a conspicuous outwardly-oblique black balf-fascia arising from the dorsum near the base, crossing the fold and terminating at the upper end of the cell at about two-thirds the width of the wing ; cilia pale cinereous. Exp. al., 16 mm . Hindwings greyish; cilia scarcely paler, with a faint subochreous parting line along their base. Abdomen grayish. Legs. anterior and middle pairs black, tarsi annulated with white, posterior pair pale cinereous.

Type. ${ }^{\text {o }}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good); three specimens.

This species differs from the typical forms of Ypsolophus in the approximation of veins 2 and 3 of the forewings.

## ECOPHORID压.

Orygocera, gen. n.
(ŏ ${ }^{\text {óv }} \boldsymbol{\xi}=$ an antelope, $\kappa$ ќpas $=\mathrm{a}$ horn.)
Type. , 今. Orygocera carnicolor, Wlsm.
Antennce, ơ simple. Labial palpi very long, evenly recurved, tapering to an acute point, overarching the thorax, apical joint as long
as the second. Maxillary palpi short, stout, dependent. Haustellum present. Head slightly rough above, face smooth. Thorar smooth. Forewings of approximately even width throughout, apex depressed, somewhat acute, termen slightly concave, oblique, tornus rounded. Neuration, 11 veins (vein 11 absent); 2 and :3 from a short stalk (not recurved), 4,5 , and 6 straight; 7 and 8 from a long stalk enclosing the apex, 12 ruuning to the commencement of the costal cilia. Hinduings as broad as the forewings, slightly lanceolate at the apex, termen not indented. Neuration, 8 veins; 3 and 4 from a point, 5 bent over to near their base; the outer end of the cell forming a deep angle between 5 and $6 ; 6$ and 7 -widely separate, almost parallel, 7 nearly coalescing with 8 beyond the upper angle of cell. Abdomen not flattened. Legs, hind tibir clothed with projecting scales above; spurs stout, tarsal joints somewhat coarsely clothed.

Orygocera carnicolor, sp. n. (Pl. II., fig. 5.)
Antenne yellowish grey. Palpi white, sprinkled with greyish scales on the second joint. Head white. Thorax yellowish grey spotted with flesh-red. Forewings sericeous, yellowish grey, dappled with flesh-red, with a small triangular mouse-grey spot a little before the middle, of which the apex is slightly turned outwards, the whole bordered with flesh-red; a suffusion of scattered fleshred scales extends over the greater portion of the wing-surface, especially along the fold and in a line beueath it; there is a red spot on the middle of the disc, and a second a little beyond it below the costa; a series of three similar spots running obliquely, parallel with the termen, the first immediately below the costa, the second at the upper angle of the cell, and the third, somewhat lunate, at the lower angle of the cell; another smaller one lies near the tornus, and the termen is mottled throughout with flesh-red; the extreme base of the costa is shaded with fuscous; cilia yellowish grey. Exp. al., 19 mm . Hindwings greyish, somewhat transparent, with a bluish iridescence between the veins, especially near the abdominal margin; cilia yellowish grey. Abdomen greyish. IIindlegs whitish cinereous.

Type. 8.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

Theatrocopia, gen. n. ( $\theta \in \alpha т$ рокоті $\alpha=$ a courting of applause.)
Type. Theatrocopia roseoviritis, Wlsm.
Autennce $\frac{2}{3}$ ( $\$$ simple). Palpi very long, strongly recurved to above the middle of the thorax, smooth, apical joint shorter than the second and somewhat more slender. Maxillary pall $p_{i}$ short. Haustellum present. Head somewhat rougheued above. Thorax smooth. Forewings elongate, narrow, scarcely widened outwardly, apex depressed, obtuse but not rounded, costa arched, termen oblique, tornus rounded. Neuration, 12 veins, 7 and 8 from a common stem ènclosing the apex, 2 and 3 from a recurved common stem, the others separate. Hindwings as broad as the forewings, apex slightly depressed, obtuse, termen scarcely sinuate. Neuration, 8 veins, 6 and 7 separate, parallel, 3 and 4 from a short stalk. Legs, hind tibiæ clothed with hairs.

Allied to Cryptolechia, Z., but differing in the longer palpi, and in the stalking of 2 and 3 of the forewings.

## Theatrocopia roseoviridis, sp. n. (Pl. II., fig. 6.)

Antenuce roseate, faintly annulate. Pulpi pale olive-grey, tinged with rosy externally, especially on the apical joint. Ifead and thorax pale olive-grey, the latter with a strong roseate tinge. Forewings elongate, narrow, scarcely widened outwardly, apex depressed, obtuse, but not rounded, costa arched, termen oblique, tornus rounded : rosy pink with a strong olive-green band covering the whole base of the wing (except the extreme basal margin) and extending to beyond the end of the cell, where it is deflected to the tornus, its upper edge being impressed before the middle by the rosy ground-colour which continues between it and the costa, occupying the whole apical portion of the wing, and continued very narrowly to the base; beneath the band is a large semicircular olive-green patch on the middle of the dorsum, bordered by a narrow line of purplish scales ; between this and the band the rosy ground-colour, commencing in a narrow line at the base, becomes widened towards the middle of the wing, and still more so towards the tornus, its upper edge, adjacent to the angulated green band, being enriched with bright rosy scales ; cilia rosy pink. Exp. al., 19 mm . Hindwings olive-grey, cilia the same, slightly tinged with rosy about the apex, and with a narrow paler parting line on the outer half of the margin. Abdomen grey. Legs pals grey, tarsi slightly rosy.

## Type. $\quad$. (Paratype, Mus. Br.)

Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good), one specimen; Calabar-Old Calabar, one specimen (British Museum).

## Theatrocopia elegans, sp. n. (Pl. III., fig. 14.)

Antennce pale reddish grey. Palpi slender, recurved, second joint very long, apical joint somewhat shorter than the second; pale reddish grey. Head and thora.x pale reddish grey. Forewings grass-green, with a dorsal patch before the middle connected with an oblique fascia beyond the middle. which is again connected along the costa and around the tornus, with a patch covering the apical portion-these markings are all reddish grey, with a distinct lilac tinge, and are delicately margined with darker scales; the connexion of the dorsal patch with the ceutral fascia leaves a semicircular patch of the green ground-colour on the middle of the dorsum; cilia reddish grey. Exp.al., 16 mm . Hindwings and cilia brownish grey. Abdomen brownish grey. Legs slightly paler than the abdomen.

Type. $\widehat{\delta}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

## Pseudoprotasis, gen. n. (Protasis, nom. gen.)

Type. Pseudoprotasis canariella, Wlsm.
Antenne, $\mathrm{o}^{\text {b }}$ biserrate, slender. Labial palpi (as in Protasis, H.-S.), very long, projecting more than three times the length of the head beyond it, clothed with appressed scales throughout; apical joint very short, scarcely visible; second joint straight and laterally compressed. Muxillary palpi short. Haustellum present. Head and thorax smooth. Forewings somewhat narrowed at the base, whence the costa is slightly arched, of approximately even width beyond the bend, apex depressed, rounded, termen slightly convex, oblique. Neuration, 11 veins ( 10 missing) ; 2 and 3 stalked; 7 and 8 stalked, 7 to apex. Hindivings as broad as the forewings, apex obtuse, termen evenly rounded. Neuration, 8 veins; 3 and 4 stalked, 5 bent over towards their origin; 6 and 7 separate and parallel. Abdomen rather slender. Hindlegs slender, scarcely clothed.

This genus differs from Protasis, H.-S., in its neuration and in the less acute forewings, but greatly resembles it in the form of the palpi, and in general appearance.

Pseuloprotasis canariella, sp. n. (Pl. II., fig. 7.)
Antennce ochreous. Palpi canary-yellow, tinged with ferruginous internally and externally on the upper edge of the second joint ; apical joint fuscous. Head and thorax canary-yellow. Forewings straw-yellow, with a slight ferruginous tinge at the extreme base and along the outer half of the costa, also at the apex ; cilia pale straw-yellow, slightly tinged with ferruginous. Exp. ul., 14 mm . Hindwings pale greyish ochreous ; cilia the same, but tinged with ferruginous at the apex and along the costa. Abdomen ochreous. Legs pale greyish ochreous, with some fuscous shading on the hind tibie and tarsi.

Type. ${ }^{\hat{3}}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Gcod) ; unique.

> Ethmia, Hb., (n. syn. $=$ pSECAdia, Hb.)

Ethmia rhomboidella, sp. n. (Pl. III., fig. 15.)
Antenne stone-grey. Palpi ochreous, apical joint shaded with grey. Head and face ochreous. Thorax mouse-grey, with five black spots (two in front, one in the middle, and two smaller ones behind it). Forewings slaty grey, cilia the same; with six black spots (two small ones beneath the costa on the basal fourth, two larger ones on the disc, and two on the fold) ; of the discal spots one lies at the end of the cell, the other at the middle of the wing; the first of those on the fold is somewhat further removed from the base than the second subcostal spot, the other lies beyond and below the first discal spot, but nearer to it than to the second; thus these six spots form a series of three pairs, in parallel lines whether counted as pairs or in series of three. Exp. al., 28 mm . Hindwings stone-grey, having a slight ochreous tinge on the abdominal margin, cilia also inclining to ochreous, except towards apex. [Abdomen missing.] Legs greyish ochreous.

> Type. ㅇ. Mus. Wlsm.

Hab. Natal-Malvern (Col. Bowker), one specimen ; French Congo-Kangwé, Ogowé River (Rev. A. C. Good), two specimens.

The specimens from the Ogowé River have the series of spots in precisely the same places, but they are decidedly of larger size; in all other respects they are similar to the type, and without further evidence cannot be regarded as belonging to a distinct species; these specimens, which are figured, have the abdomen oshreous. Exp. al., 26-27 mm.

## HYPONOMEUTIDA.

## HYPONOMEUTINA.

Jobula, Wkr.

> Jobula? radiata, sp. n. (Pl. III., fig. 16.)

Antennce of shortly uniciliate, basal joint amply clothed ; olivegrey above, ochreous beneath. Palpi, ot long, projecting four times the length of the head beyond it, second joint slightly recurved, closely clothed throughout ; apical joint short, recurved, slender, also clothed ; orange-ochreous on their upper half, olivegrey externally along their middle, cinereous within and beneath : of shorter than in the $\delta$, and much more recurved; whitish cinereous throughout. Head strongly tufted with long projecting hairs in front, face concave; olive-grey above, mixed with pale cinereous, face pale cinereous. Thorax smooth, olive-grey with three longitudinal orange-ochreous lines; whitish cinereous beneath. Forewings, of dark olive-grey, with orange-ochreous lines marking the interspaces between the veins, the extreme base of the costa narrowly orange-ochreous ; a distinct orange-ochreous line, commencing near the base beneath the costa, follows the upper edge of the cell to the middle of the wing-length; this is followed by some spots of the same colour about the upper angle of the cel!, diverging obliquely downwards and nearly joining the outer end of a mediau streak of the same colour, which terminates in the direction of the base at half the length of the cell ; there is also a line of the same colour along the fold and some suffusion of orange-ochrenus scales beneath it; beyond the end of the cell a series of 9 or 10 separate orange-ochreous lines diverge fan-like between the veins, and are margined, at their outer ends, by a distinct semicircle of the olive-grey ground-colour, which is
followed by an orange-ochreous space, also semicircular, but not attaining the margins, the apical space being dark olive. grey; cilia olive-grey, with an ochreous line along their base : of with the orange-ochreous much less distinct than in the $\delta$, although the same pattern can be traced. Exp. al., $17-18 \mathrm{~mm}$. ILindwings brown, cilia greyish. Ablomen brown. Legs pale cinereous.

Type. $\begin{gathered}\text {. Mus. Wlsm. ; ́. Mas. Holland. }\end{gathered}$
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; two specimens.

This African form differs from any of the Asiatic or Malayan group, so far as known to me, in that vein 8, forming the upper branch of 7 and 8 stalked, terminates at the apex instead of below it. In the palpi of the $\hat{\delta}$ it approaches Jolula semilinea, Wkr., more nearly than the ordinary forms known under the name of Tortricomorpha, but the palpi of the + differ scarcely at all from those of both sexes of the latter genus.

## Eremothyris, gen. n.

$$
(\bar{\varepsilon} \rho \hat{\eta} \mu o s=\text { destitute of, } \forall u p i s=a \text { window. })
$$

Type. ô of. Eremothyris hollandi, Wlsm.
Antennce, two-thirds length of forewings, basal joint enlarged, flaitened, in o biciliate (1). Labial pulpi short, somewhat recurved, moderately slender, smooth, apical joint not longer than second. Muxillary palpi and ocelli absent. Huustellum naked. Head moderately clothed, not roughened above. Thorax smooth. Forewings ovate, somewhat widened outwards. Neuration, 12 veins : 2 and 3 from a short slightly recurved common stem at lower angle of cell, the others separate; 4 from near origin of $2+3 ; 5$ further removed at the base from 4 than from $6 ; 6$ and 7 approximated, 7 to below apex ; 8 and 9 approximated, but parallel, 8 to costa; 9 and 10 from upper angles of a small supplementary cell, formed by an internal vein runuing from between 7 and 8 to about midway between 10 and 11 ; two internal veins, the upper from between 6 and 7 , and the lower from immediately above 5 , unite at about half the length of the cell, and form a common stem, which is continued nearly to the base, where it runs into the radius. Hind"rings slightly broader than the forewings, subovate, the margin evenly rounded, the part occupied by the branches of vein 1
clothed above with long hair-scales, no transparent spot at the base. Neuration, 8 veins : 3 and 4 from a point (or short stalk); 6 and 7 from a short stalk; the cell receding upwards and angulated inwards between 5 and $6+7$, with an internal vein from the angle to the base; vein $1 b$ basally furcate. Legs smooth, outer spurs longer than the inner ones.

## Eremothyris hollandi, sp. n. (Pl. II., fig. 8.)

Antennce whitish at the base, tinged with grey beyond. Palpi whitish unspotted. Head, of whitish: ¢ stone-grey. Thorax stoncgrey; tegulæ whitish in the of, stone-grey in the q. Forevings. stone-grey, the costa narrowly whitish except at the extreme base ; cilia whitish. Underside greyish, cilia whitish. Exp. al., $22-25 \mathrm{~mm}$. Hindwings pale stone-grey (scarcely paler than the forewings); cilia whitish, somewhat tinged with grey. Underside slightly paler than in the forewings. Ablomen stone-grey. Legs whitish, somewhat tinged with grey.

Type. $\widehat{\text { o }}$. Mus. Wlsm.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; five specimens.

## GLYPHIPTERYGINA.

Glyphipteryx, Hb.
Glyphipteryx gemmatella, Wkr. (Pl. III., fig. 17.)
Gelechia gemmatella, Wkr., Cat. Lep. Ins. B.M., XXX., 1022 (1864) ${ }^{1}$. Glyphipteryx (Gelechia) gemmatella, Wlsm., Tr. Ent. Soc. Lond. 1891, 116-7².

Antennce brownish fuscous, faintly aunulated. Palpi porrect, slightly recurved, apical joint very acute, shorter than the second; second joint with a divided friuge beneath, consisting of three or four black tufts separated from each other by white lines. Head leaden grey. Thorax greyish fuscous, with a white spot posteriorly; white on the underside. Forewings bronzy brown mixed with fuscous shading, especially towards the base, a large triangular straw-white dorsal patch near the base, its apex ending in a small straight whitish costal streak at one-fifth from the base, its outer edge slightly convex; this is followed by two straight chalybeous metallic streaks, the first at one-third from the base, the second scarcely beyond the middle; a third slightly oblique towards the apex is preceded by a small white costal dot half-way between it
and the preceding streak, and followed by a larger white costal spot immediately before the apex, a few white scales at the costal extremity of the third chalybeous streak; from the dorsum arises a rather broad straight chalybeous streak immediately before the middle, which terminates on the dise between the lower extremities of the first and second costal streaks; this is followed by a conspicuous black patch at the tornus, margined by a shorter chalybeous streak at its commencement, and containing two conspicuous shining metallic spots, with some golden metallic scales along the margin; above this patch is a series of five radiating golden ochreous lines following the nervules, but not extending to the termen; termen indented below the apex, the apex itself being somewhat depressed; cilia shining metallic about the tornus (but too much worn above it to admit of description). Exp. al., 12 mm . Hindwings purplish fuscous, with cilia the same colour but inclining to greyish about the abdominal angle. Underside with the cilia distinctly spotted with white along the outer margin. Abdomen leaden grey. Underside white, anal segments fuscous. Legs greyish fuscous, ammulated with white on the tarsal joints, spurs inclining to ochreous.

Hab. Sierra Leonel,2. French Congo-Kangwé, Ogowé River (Rev. A. C. Good).

Allied to Glyphiptery, grapholithoides, WIsm., from Natal. These species belong to the group to which Walker gave the generic name Ussara, when describing decoratella from the Amazons. I am unable to discover any structural character by which it can be separated from Glyphipteryx. [When the above description was written I had not recognised the species, but as it supplements Walker's in several particulars I am nüt willing to suppress it.]

## Idiothauna, gen. n.

$$
\text { (ǐıos }=\text { distinct, } \theta \alpha \hat{\imath} \mu \alpha=\mathrm{a} \text { wonder.) }
$$

## Type. Idiothauma africanum, Wlsm.

Antennce, of bifasciculate (at least 2), without pecten. Labial palpi recurved, appressed to face; apical joint blunt, shorter than second. Muxillary palpi absent. Haustellum short. Ocelli present. Head and thorax smooth. Forewings somewhat triangular, narrow at the base, widened outwardly, costa straight or slightly depressed towards apex, dorsum straight, termen oblique,
trans. entr. soc. lond. 1897.-part I. (april.) 4
indented abore vein 5. Neuration, 12 veins, all separate; 2 from commencement of outer third of cell, 3 and 4 somewhat straight, 8 to termen. Hinderings broader than the forewings (or at least equal to the extreme width outwardly), evenly rounded. Neuration, 8 veins; 3 and 4 from a point or short stalk, 6 and 7 from a short stalk, 8 free, 5 straight; outer edge of cell somewhat receding upwards. Legs, hind tibiæ slightly hairy.

Allied to Hilarograpla, Z., but differing in vein 8 of the forewings running to the termen instead of to the costa, in the much straighter costa and in the conspicuous indentation between veins 5 and 6 .

## Idiothauma africanum, sp. n. (Pl. II., fig. 9.)

Antenuce ochreous with greyish cilia. Palpi pale straw-colour. Head brownish fuscous, with some pale straw-coloured scales. Thorat. brownish fuscoas, streaked at the sides with pale strawcolour. Forewings reddish orange, streaked with brownish fuscous, dark fuscous, pale straw-colour and metallic lilac ; the groundcolour of the basal third is brownish fuscous, in which are two conspicuous pale straw-coloured marks, the one from the middle of the base depressed along the fold, thence tending upwards and attenuated to a sharp point below the costa at about one-third the wing length ; the second at one-third of the dorsum, cuneiform, oblique, and ending in a point at about the middle of the discal cell immediately beyond the apex of the basal streak already described; separated from the outer edge of this mark, by a narrow line of brownish fuscous, is a rather narrow band of shining cupreous scales illuminating the orange ground-colour of this portion of the wing, this is entirely narrowly margined with brownish fuscous, its upper extremity being above the middle of the wing, but not reaching to the upper edge of the discal cell, and therefore terminating before the apex of the pale straw-coloured wedge; a dark fuscous shade leaves the dorsum at two-thirds from the base, tending outwards to the end of the cell above its middle, its upper portion contains a short orange streak and its extremity is contiguous with a shade of a similar colour which approaches the lower half of the termen extending to the tornus; between these two shades a short cuneiform spot of brilliant cupreous scales leaves the dorsum immediately before the tornus, occupying the central portion of the orange patch of which they form the boundaries ; along the costa are seven pale straw-coloured streaks,
the first two within the basal third very oblique, the third and fourth within the middle third also oblique, the fifth straight at the commencement of the apical third, and the sixth and seventh (also straight and more than twice the length of the others) immediately before the apex-all these streaks are uarrowly margined on both sides with dark fuscous and with a few lilac-metallic scales at the lower extremities of the third and fifth streaks; in the orange space between the fifth and sixth costal streaks is an isolated, oblique, bright metallic lilac patch similarly margined; cilia purplish fuscous, interrupted at the upper third of the outer margin by a small wedge-shaped pale straw-coloured spot. Underside dirty ochreous all the pale straw-coloured streaks being distinctly white. Exp. al., of 14 mm .; of $15-20 \mathrm{~mm}$. Hindwings bronzy ochreons, shaded with brownish fuscous around their margins ; cilia slightly paler, with an ill-defined darker parting line along their base. Abdomen bronzy ochreous, whitish cinereous beneath. Leys cinereous with bronzy brown spots and shading on the hind tibie and tarsal joints.

## Type. $\hat{6}$ ㅇ.

Hab. French Congo--Kangwé, Ogowé River (Rev. A. C. Good) ; three specimens.
[Hilarographa was proposed by Zeller, Hor. Soc. Ent. Ross., XIII., 186-7 (1877) as a subdivision of his existing genus Setiostoma, and having as its types swederianc, Stoll, and ribbei, Z.

Meyrick, Trans. Ent. Soc. Lond., 1886, p. 286, raised Hilarographa to generic rank, giving a careful structural description, and adding a new species, zapyra from New Guinea, the type of which is in my collection, and it was from this specimen, differing in neuration from swerleriana, Stoll, that his generic description was probably taken, as it conforms in every particular, and no reference was made to either of Zeller's original types.

I have not been able to examine the neuration of ribbei, Z. (the type of which is in Staudinger's cabinet), to see whether it agrees in structure with swedericunc, Stoll ; but of this I have specimens, and I select it as the type of Hilarographa, Z., with the following generic characters:-

## Hilarograpia, Z.

setiostoma (hilarographa), Z., Hor. Soc. Ent. Ross., XIII., 186-7 (1877).

Trpe. Phalæna Tortrix swederiana, Stoll, (Wlsm.).
Anteme hardly half the length of the forewings, stout, simple, without pecten. Lalial pulpi recurved, appressed to face, closely scaled; apical joint blunt, shorter than second. Maxillary palpi absent. Haustellum short. Ocelli distinct. Head with loosely appressed hairs. Thorax smooth. Forevings uarrow at the base, widened outwardly ; costa slightly arched, termen scarcely oblique, slightly sinuate below the apex and convex beneath. Neuration, 12 veins, all separate ; 2 from commencement of outer third of cell, 8 to costa. Hindwings broader than the forewings, costa arched, termen evenly convex, not sinuate, cilia short. Neuration, 8 veins; 3 and 4 connate (or from a short stalk), 6 and 7 from a short stalk, 8 free. Abdomen slender, tapering, in $\circ$ terminating in a bifid extruded chitinous process (having much the appearance of the anal claspers of the $む$ ), this is armed with short scattered bristles, and is either the ovipositor itself or the sheath of the same, a point I am unable to determine from the sperimen before me. Legs smooth, the first pair of spurs on the hind tibixe longer than tle second.

> Thacmatographa, n. n. $(\partial u \hat{\nu} \mu a=\mathrm{a}$ wonder, $\gamma \rho \dot{\alpha} \phi \omega=\mathrm{I}$ write $)$.
$=$ hilarographa, Mejr., Tr. Ent. Soc. Lond., 1886, 286 (nec Z.).
Type. Hilarographa zapyra, Meyr.
I propose the above name for Meyrick's genus Hilaroyrapha, which differs from Zeller's in having veins 7 and 8 of the forewings stalked.]

## Choreutis, Hb .

Choreutis octogemmifera, sp. n. (Pl. III., fig. 18.)
Antenne whitish beneath, barred with fuscous above. Pulpe white tipped with fuscous, the second joint with three diverging points of hair-like scales beneath, mixed white and fuscous. Head greyish fuscous, with a slender white liny along each side. Thorax
greyis'l fuscous, with two slender white lines on each side of the anterior half. Forewings greyish fuscous, mottled and banded with white, with a row of eight bright metallic spots around the apex and termen, each set in an elongate dark fuscous shade ; the white markings on the forewings are thus distributed :-a narrow fascia near the base, running obliquely outwards from the dorsum across the fold, angulated a little below the costa and reverting to it; a second a little beyond, rather straighter, reaches only halfway across the wing from the costa; beyond the middle of the wing is a large patch spreading from the outer end of the cell to the costa and dorsum, much interruptel an l sufusel by greyish fuscous scales, but becoming distinct on the margins at the commencement of the costal cilia and before the commencement of the dorsal cilia ; cilia greyish fuscous, with a white spot below the apex and another below the tornus, a slight parting line along their base. Exp. al., 12 mm . Hinduings brownish fuscous, with a white patch on the outer half of the cell, and an oblique white streak reverting from beyond this to the middle of the termen; above and beyond the upper extremity of the second streak is a brilliant metallic lilac streak tapering to its lower extremity, where it almost reaches the margin; a third obscurely whitish streak, from near the abdominal augle, tends outwards and upwards, terminating above the lower extremity of the more conspicuous white streak beyoud it ; ciliz greyish fuscous with three conspicuous white interruptions, the first at the apex, the other two corresponding with the extremities of the lilac streak and the largest white streak respectively. Abdomen brownish fuscous. Legs white, annulated with brownish fuscous.

Tlipe. ${ }^{\wedge}$.
Hab. Yoruba-Idanre (Sir G. Carter) ; French Congo —Kangwé, Ogowé River (Kev. A. C. Good) ; three specimens.

All the white and metallic markings of both fore and hindwings are reproduced ou the underside, where they are even more strongly apparent than above.

## Simaethis, Leach.

## Simaethis equatoris, sp. n. (Pl. III., fig. 19.)

Antenuce slightly ciliate ; greyish fuscous, annulated with whitish. Palpi very short, not projectiug beyond the head ; cinereous, with three narrow greyish fuscous b.uds beneath. Heal ochreous, mixed
with greyish fuscous. Thorax brownish fuscous. Forerings narrow at the base, much widened outwardly, apex rounded, termen somewhat oblique ; brownish fuscous to beyond the middle, thence orange-ochreous; the outer edge of the brownish fuscous portion broken into projecting points, one tending upwards towards the apex from the upper end of the cell, another shorter one tending outwards from the lower angle of the cell, a narrow band of brownish fuscous runs around the apex and termen to the tornus with a slight inward projection below the apex (but in some specimens this is reduced to a slight shade) preceding a more or less distinct brownish line along the base of the pale greyish cilia; a pale greyish speckled transverse fascia crosses the darker portion of the wing at one-third from the base, and is somewhat wider on its lower than on its upper half; a few whitish scales are visible at three points on the costa, the first at the upper extremity of the transverse fascia, the second at the outer edge of the brown portion of the wing, the third immediately before the apex, and these are slightly reproduced on the brownish fuscous underside. E.r.p. al., 14 mm . Hinduings brown, with pale greyish cilia, a narrow brown parting line running through them near their base ; a slight pale marking occurs near the abdominal angle, within the margin, extending outwards parallel with it nearly to one-half. Aldomen, brownish fuscous. Leys brownish, with several conspicuous whitish bands on the hind tibiæ and tarsi, spurs whitish.

Type. $\begin{gathered}\text { ot. }\end{gathered}$
Hab. French Congo—Kangwé, Ogowé River (Rev. A. C $:$ Good) ; three specimens.

## Simaethis flarimaculata, Wlsm.

Simaethis flavimaculate, Wlsm., Tr. Ent. Soc. Lond., 1891, 77. Pl. H1., $16^{1}$.
Hab. French Congo-()gowé River; one specimen. Zanziber ${ }^{1}$.

This specimen exlibits some slight variation from the type, in that the first orange spot reaches to the costal margin, the two outer spots narrowly touching each other at their outer edge.

## Mictorisichia, Hb.

Mictopsichia argus, sp. n. (PI. III., fig. 20.)
Antennce dull ferruginous. Pulpi short, recurved, scarcely projecting beyond the head, apical joint shorter and more slender than
the second; pale ferruginous. Head dull ferruginous. Thora: greyish, with three inconspicuous ferruginous longitudinal streaks and a reddish orange patch posteriorly. Forering: dull ferruginous, paler on the dorsal than on the costal half, much speckled and shaded with greyish fuscous scales and streaked with metallic purplish grey, a triocellated dorsal patch before the tornus; the dorsal half of the wing from near the base to the tornus is minutely reticulated with black wavy lines, and these are concentrated into a somewhat circular patch almost touching the dorsum before the tornus, in which are spots of the ferruginous (almost ochreous) ground-colour, and three or four larger spots of metallic bluish grey, all dark-margined, the more conspicuous of these bluish grey spots lying along its outer edge ; from the base, immediately below the costa, runs a bluish grey streak which is deflected at one-third the wing-length, terminating ou the cell ; beneath it from the base arises a shorter streak of the same colour, almost coterminous with a similar streak arising from near the base of the dorsum, the space between them being brownish; on the outer half of the wing are two conspicuous blue-grey streaks, the first arising below the costa near its middle and tending outwards and downwards towards the tornus, but ending between the ocellated patch and the termen at one-third the wing-breadth, the second commencing on the costa at four-fifths, less oblique than the first, and ending opposite to the middle of the termen ahove and beyond the apex of the first streak; between them lies a small spot of the same colour below the costa, and beyond the outer one immediately before the apex is a similar spot almost touching the costa; several small brownish fuscous spots are visible along the basal two-thirds of the costa, and a brownish shade precedes each of the blue-grey streaks and extends along the termen to the apex (which is less falcate than in the South American representatives of this genus) ; cilia brownish grey with a ferruginous parting line near their base. Exp al., 19 mm . Hinduings reddish orange, speckled around the margins and apex with greyish fuscous, and having a conspicuous ocelloid black patch within the middle of the termen, divided by streaks of the ground-colour, and illuminated along its lower edge by metallic steel-grey spots; cilia greyish ochreous, spotted with blackish, with a reddish orange parting line along their base. Abdomen orange-ochreous. Lags pale orange-ochreous, hind tarsal joints spotted with black and whitish.

Type. $\widehat{\text { of }}$.
Hab. French Congo-Kangwé, Ogowé River ; three specimens.

It may be necessary ultimately to distinguish this species, and its allies, from Mictopsichia, on the ground of the somewhat longer and more recurved palpi, and the less falcate apex of the forewings, but the same form occurs in Mexico and the Malay Archipelago.

TORTRICIDE.

## OLETHREUTINA.

$=$ OLETHREUTA, Hb., $=$ GRAPHOLITHINLE, Fern.
$=$ EPIBLEMIDAE, Meyr.

Eccorsis, Z.

## Eccopsis procedens, sp. n. (Pl. III., fig. 21.)

Anternce stout and densely but shortly pubescent in © ; ochreous. Palpi projecting the length of the head beyond it, moderately clothed ; cinereous. Heal cinereous, mixed with dark umber. Thorax cinereous. Forewings, costa arched near the base, depressed in the middle, thence again convex and depressed towards the apex, termen oblique, slightly convex ; pale cinereous, mottled and blotched with dark umber tending to blackish along the costa, and with a series of spots and blotches; five costal spots on the hasal third are followed by a median triangular shade interrupted a little beyond its middle, this is followed by another narrow costal spot, which is succeeded by a shade extending to the apex; beneath this apical shade is an oblique band angulated at its upper extremity and reaching the termen below the middle, the space between it and the apex shining chalybeous; a few shining chalybeous scales scattered over the surface of the wing, especially on its outer half, the greater part of the wing-surface is also streaked and dotted with dark umber scales somewhat evenly distributed; cilia cinereous, slightly shining on their outer half. Underside brownish. Exp. al., 22 mm . Lindwings with the abdominal angle strongly lobed, the abdominal margin deeply indented and with a small hanging appendage near its base (somewhat more strongly developed than in Eccopsis crahlbergiana Z.) ; coppery-brown, cilia greyish with a slight parting shade along their middle. Underside brownish ochreous. Abdomen cinereous, much shaded with dark umber, anal tuft coppery-brown. Leg. worn, apparently cinereous, tarsal joints broadly banded with dark umber.
Type. đ̂.

Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; two specimens.

In comparing this species with the better-known Eccopsis wahlbergiana, Z., it may be distinguished by the somewhat longer palpi, by the stronger costal marks on the basal half of the forewings, by the less conspicuous dorsal shading and by the hindwings being of a much lighter and more cupreous colour, as well as by its somewhat larger size.

> Ancylis, Hb. $(=$ phoxopteris, Tr.)

Ancylis argenticiliana, sp. n. (Pl. IIT., fig. 22.)
Antenuc ( ${ }^{+}$) rather stout, simple; stone-grey. Palpi very closely appressed to the face, the short apical joint scarcely projectivg beyoud it ; stone-grey. Heal stone-grey. Thorax pale olive-grey. Forevings, costa evenly arched, apical margin strongly indented on vein 6 ; pale olive-grey, with a few inconspicuous darker mottlings indicating a pale basal patch at one-third, its irregular outer edge slightly oblique, nearer to the base on the costa than on the dorsum; from the middle of the costa a slender umber-brown line (slightly convex outwardly below the middle of the wing) extends obliquely to the dorsum within the tornus; this is followed by a paler space extending to the termen, showing a silvery sheen with a few slender lines of black scales following the nervules across it in the direction of the apex, this space is narrowed towards its costal extremity by an oblique brown line extending from the indentation on the termen inwards and upwards to the costa and along the base of the cilia both upwards and downwards; above it the costa before the apex is chestnut-brown, with three or four slender oblique silvery-white streaks, a faint indication of smaller streaks can be traced along the whole of the outer two-thirds of the costa ; cilia pure silvery-white, tending to greyish about the tornus, and tipped along their upper half with chestuat-brown. Exp,al., 17 mm . Hindwings stone-greyish, with scarcely paler cilia, a very faint line along their base. Abdomen stone-greyish. Legs pale stone-grey, inclining to ochreous.

Type. $\widehat{0}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

> Laspeyresia, Hb.

Laspeyresia hemisplıriana, sp. n. (Pl. III., fig. 23.)
Antenne black. Palpi scarcely roughened beneath, apical joint short, porrect ; snow-white, second joint blackened above towards the base. Heall black, white above posteriorly. Thorax greyish, with a conspicuous white band across in front. Forewing slatygrey, shaded with fuscous along the outer half of the costa; with a large semicircular brownish patch on the middle of the dorsum, narrowly outlined with white ; several narrow very oblique whitish costal streaks and two very conspicuous clear white ones before the apex, the first very oblique, the second straight and parallel with the termen; a few whitish scales along the extreme base of the costa ; cilia whitish, a dark fuscous parting line along their base. Exp. al., 14 mm . Hinduings brownish fuscous; cilia pale whitish grey, a darker parting line along their base. Abdomen brownish fuscous. Legs greyish fuscous.
Type. đ.

Hah. Sierra Leone-21, IV. (Dr. Clements) ; French Congo-Kangwé, Ogowé River (Rev. A. C. Good); two specimens.

> Cydia, Hb.
(= carpocapsa, Tr.)

## Cydia? prretextana, sp. n. (Pl. III., fig. 24.)

Antenne ochrenus. [Palpi missing.] Head and thorax canaryyellow, the latter white with a greyish tinge beneath. Forewings canary-yellow blending to rich orange along the costa, and reddish ferruginous along the termen, with some reddish ferruginous blotehes in a wide fasciated band across the middle and along the dorsum ; a series of about nine small black dots along the extreme costa, and numerous raised spots of bright steel-grey scales scattered about the darkened portions of the wing; a series of these starting at one-fourth from the base continues nearly parallel with the costa, these are chiefly circular or oblong, those nearest to the costa being smaller than those below them; at one-fifth from the apex is a longer steel-grey spot placed obliquely and pointing to a similar elongate spot within the lower half of the termen; a long narrow spot of the same colour lies parallel with the termen below the apex and a shorter one immediately within the tornus; from the last spot tending towards the base is a series of three large similar metallic circular spots, and another lies upon the fasciated band
which crosses the wing ; an orange spot preceded by some fuscous scales lies at the extreme base of the dorsum ; cilia shining dark steel-grey. Underside orange, broadly black-margined throughout. E.sp. al., 18 mm . Hindwings rich orange, with a rather broad black border ; cilia on the abdominal half of the margin orange, on the outer half greyish, with a black parting line at their base. Underside orange, narrowly black-margined throughout. Abdomen orange, canary-yellow at the extreme base, the posterior segments narrowly indicated with black, anal tuft black. Underside whitish. Legs (anterior) yellowish, with blackish spots [po=terior legs missing].

## Type. $\hat{0}$.

Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

The neuration of the hindwings differs from Cyilia in having 6 and 7 converging, but distinctly separated. As the palpi are missing, I prefer to place the specics in Cydia provisionally rather than to create a new genus for its reception.

## TORTLICINL.

## Tortrix, L.

Turtrix viridis, Wlsm.
Argyrotnaca viriaias, Wlsm., Trans. Ent. Soc. Lond., 1891, 68-9. Pl. HII., $4^{\text {1 }}$.

Hab. Gold Coast-Accra ${ }^{1}$; French Congo-Kangwé, Ogowé River (Rev. A. C. Good).

## CARPOSIVA, subfam. n.

Median vein of hindwings pectinate at base; vein 2 of forewings rising from posterior fourth of cell.

$$
\begin{gathered}
\text { Autogriphus, gen. n. } \\
\text { (aìtós }=\text { of itself, rpo.申os }=\text { a puzzle.) } \\
\text { Type. Autogriphus luteus, Wlsm. }
\end{gathered}
$$

Antennce ( $\ddagger$ ) simple, basal joint slightly enlarged and somewhat roughly clothed. Lubial palpi long, porrect, reaching three times
the length of the head beyond it, second joint triangular with a brush of scales above tapering to its apex, apical joint short porrect. Maxillary palpi absent. Huustellum present. Head and thorax smooth. Forewings narrow, elongate, costa evenly but moderately arched throughout, apex depressed, slightly produced, termen oblique, scarcely sinuate, with slight tufts of raised scales. Neuration, 12 veins; 8 and 9 from a common stem, 7 to slightly below apex, 2 from very near angle of cell, 3 and 4 from a very short common stem, 5 from near origin of $3+4,11$ bent over at lase to very near origin of 10 , an internal vein running towards the base from between 5 and 6 ; vein 1 furcate at base. Hindwings broader than the forewings, apex slightly produced, obtuse, termen evenly rounded, median vein pectinated at base. Neuration, 7 veins ( 6 and 7 coincident) ; 3 and 4 from a short stalk, 5 straight, not bent over, and continued through the cell as an internal vein. Abdomen smooth. Legs, hind tibiæ slightly hairy above, spurs rather long and slender.

## Autogriplus luteus, sp. n. (Pl. II., fig. 10.)

Antenne greyish. Palpi pale cinereous, shaded with fuscous beneath. Head and thorax pale cinereous, the latter mottled with brown and brownish fuscous. Forexings pale cinereous, much suffused and mottled with brown; with six elongate fuscous spots along the outer two-thirds of the costa, a conspicuous dark fuscous spot of slightly raised scales at the end of the discal cell between veins 5 and 6 , and a smaller one, also raised, about the lower angle of the cell before and beneath it; a few raised greyish scales a little beyond the middle of the fold on its upper edge, and some also beneath the fold nearer to the base; along the termen is a slight shade or suffusion of brownish fuscous scales, its inner margin sinuate, angulated inwards at its middle, and recurved at both extremities, the upper extremity not reaching to the costa, the lower terminating about the tornus; cilia greyish, a slightly paler line along their base. Exp. al., 21 mm . Hinduings grey, the spaces between the veins, especially about the abdominal margin, semitransparent with a bluish iridesceuce ; cilia pale grey. Abdomen [greasy]. Legs pale greyish, hind tarsal joints faintly annulate.

Type. $\quad$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

# TINEID $\not ⿰$. 

## TINEINE.

Eccompsoctena, gen. n.
(Compsoctena, nom. gen.)

## Type. Eecompsoctena secundella, Wlsm.

Antennce, of strongly bipectinate (3) ${ }^{\left.\frac{1}{2}\right) \text {, the pectinations biciliate. }}$ Labial palpi short, slender, but roughly clothed, scarcely projecting beyond the rough scales of the face. Maxillary palpi and haustellum rudimentary. Head and face rough. Thorax rather roughly clothed. Forewings scarcely narrower towards the base than beyond it, costa slightly convex, apex rounded, termen oblique, slightly convex. Neuration, 12 veins; 7 and 8 from a long common stem, 7 to apex, 8 to above apex from a small supplementary cell, from which 9 and 10 also arise, these latter meeting at their extremity on the costal margin. Hindwings as broad as the forewings. Neuration, 8 veins, all separate; 6 and 7 separate and parallel. Hind legs thickly clothed, not hirsute.

Eccompsoctena secundella, sp. n. (Pl. II., fig. 11.)
Antemes and palpi brown. Head and face ochreous. Thorax umber-brown. Forewings pale ochreous, thickly mottled, speckled, and suffused with umber-brown scales, the two colours alternating along the costa in unequal spaces throughout; a rather strong patch of umber-brown scales lies at the end of the disc, which appears to be the only point at which this colour is more concentrated than on the remainder of the wing-surface, although it somewhat prevails also towards the apex and tornus; cilia pale ochrenus, with au umber-brown parting line along their middle, and another at iheir extremities. E.pp.al., 22 mm . Hindurings purplish fuscous; cilia cinereous, with a dark parting line near their base. Abdomen purplish fuscous, anal tuft iuclining to ochreous. Leys dull ochreous.

Type. $\widehat{\delta}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

This has so much the appearance of Compsoctena primella, Z., that it might easily be mistaken for that species, but the neuration differs in the forking of veins 7 and 8 , and the meeting of veins 9 and 10 towards the costa of the forewings, and the palpi are very much shorter.

> Mesorolia, gen. n. $\left(\mu \epsilon \sigma 0 \pi \sigma_{0} \lambda o s=\right.$ grizzled. $)$

## Type. $\hat{\text { o Mesopolix inconspicua, Wlsm. }}$

Antemnce, $\begin{gathered}\text { a strongly bipectiuate (3-4), the pectinations biciliate, }\end{gathered}$ basal joint tufted in front. Labial palpi slender, short, porrect, not reaching beyond the head. Maxillary palpi and haustellum obsolete. Head thickly scaled, but moderately smooth. Thorax smooth. Forewings elongate ovate, costa eveuly arched, apex rounded, termen oblique, tornus rounded. Neuration, 12 veins; 7 and 8 stalked, 8 to below the apex, 5 somewhat bent over and approximate to 4 at its base; an internal vein forms a supplementary cell by arising from slightly below $7+8$ and running to between 10 and 11, and a stalked internal vein from between 11 and the base emits branches to either side of 5 . Hindwings as broad as the forewings, ovate, costa slightly convex. Neuration, 8 reins all separate; 6 and 7 closely approximate at base, 5 approximated to 4 , a stalked internal vein emits its branches to either side of 5 . [Legs and cudlomen missing.]

This genus appears to be allied to Nrarycia, Stph. (Xysmatodoma, Z.), but differs in the form of the antenue and in neuration. It has very much the appearance of Psilothrice dardoiniella, Mill., but is somewhat larger and there are no veins missing as in that species. Nothing is known at present of its habits, but the larva is probably a case-bearer.

Mesopolia inconspicua, sp. n. (Pl. II., fig, 12.)
Antennce ashy-grey. Palpi dark fuscous. Head and thorax ashy-grey, the latter shaded with fuscous anteriorly. Forewings ashy-grey with numerous short transverse striæ and spot-like groups of brownish fuscous scales-these form a rather conspicuous spot below the costa near the base, another beyond and below it extending on both sides of the fold, and a third about the middle of the wing, there is also a slight shade about the upper angle of the cell ; the other spots are more or less distributed over the wing surface; cilia ashy-grey with a slight parting shade along their middle. Exp. al., 23 mm . Hinduings pale brownish, cilia slightly paler. [Abdomen and hindlegs missing.]

Type. $\widehat{\delta}$.
Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

## Comiscotena, Z.

Compsoctena media, sp. n. (Pl. III., fig. 25.)
Antennce dentate, shortly biciliate ; pale cinereous. Palpi projecting less than the length of the head beyond it, brush-like ; dull ochreous with a few brownish seales. Heall very roughly clothed ; dull ochreous. Thora. whitish cinereous, transersely banded with brown. Forevings whitish cinereous mottled and reticulated with brown, a series of brownish patches along the costa; three small ones before the middle, of which the first two form the upper edge of an ill-defined basal patch, a broad one on the middle of the costa, forming the upper end of a somewhat broken transverse fascia inclining slightly inwards to the dorsum, and two beyond the middle, the first small, the second larger, before the apex, also blending with a shade of brownish scales beneath it ; the interspaces between these spots on the outer balf of the costia are ochreous, the costal cilia immediately above the apex being also ochreous, and a slight ochreous shade runs through the base of the cilia along the termen, in which are three more or less distinct lines of brown scales, the onter extremities of the cilia being greyish. E.cp. al., 16 mm . Hinduings purplish grey, cilia pale cinereous with a faint ochreous parting line along their base. Abdomen greyish, anal tuft ochreous. Legs brown, hind tarsal joints annulated with pale einereous.

Type. ${ }^{\text {a }}$.
Hal. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

This species appears to differ somewhat from Compsoctena primella, Z., in the formation of the antenne and in the shorter palpi, but the neuration is the same, and its divergence from the type can be scarcely cousidered of generic valuc.

Monopis, IIb.
(= blabophanes, Z.)

Monopis monachella, Hb.

$$
=\text { longella, Wkr. }{ }^{33}\left[?=\text { mediella, F. }{ }^{9}\right]
$$

[Alucita mediella, F., Ent. Syst. III. (2), 337, No. 26 $(1798)^{1}$ : Tinea mediella, F., Sppl. Ent. Syst., 494, No. 73 (1798) ? ; Tinea monachella, Hb, Samml. Eur. Schm., V1II., Pl. XXI., 143 (c. 1800)3; [? T'inca mediella, Turtın, Syst. Nat., III.,', 381
(1806) ${ }^{4}$ ]; Scythropia monachella, Hb. Verz. bek. Schm., 414, No. $4001(1826)^{5}$; Litr monachella, 'Tr. Schm. Eur., IX. (2), 100-1 (1833) ${ }^{6}$; Tinea monachella, Z , Is., 1839, $184^{7}$; Stn. Zool., VII., $2630(1849)^{8}$ : Sppl. Cat. Br. Tin. and Pter., 2, No. 39, $1851^{9}$; Hdnrch., Lp. Eur. Cat. Meth., 79 (1851) ${ }^{\text {10 }}$; Tinea (Blabophanes) monachella, Z, Linn. Ent., VI., 111-2 (1852) "' Tinea monachella, Stn. List. Br. An. B. M., XVI., Lp. 9, No. $4(1854)^{12}$ : Ins. Br. Lp. Tin., $27(1854)^{13}$; Blabophanes monachella, H.-S. Schm. Eur., V., 79, Index, p. 29 (1856) ${ }^{14}$; Tinea monachella, Koch. Schm. S. W. Deutschl., $376(1856)^{15}$; Stn. Mn., II., $290(1859)^{16}$; Stgr. and Wkr., Cat. Lp. Eur., 106, No. 1210 $(1861)^{17}$; Wkr., Cat. Lp. Ins. B. M., XXVIII., $465(1863)^{18}$; Tinea longella, Wkr., Cat. Lp. Ins. 13. M., XXV1II., $479(1863)^{19}$; Tinea monachella, de Graaf, 'lijd. v. Ent., IX., $44(1866)^{20}$; Rssl., Nass. Nat. JB., XIX.-XX., 315 ( = Verz. Schm. Nassau., 215), No. 1290 (1866) ${ }^{21}$; Blabophanes monachella, Hein. Schm. Deutsch. 'Tin. (I.) 39 (1870) ${ }^{22}$; Stgr. and Wk., Cat. Lp. Eur. 269, No. 1369 (1871) ${ }^{23}$; Blabophanes longella, Btl., Anu. and Mag. N. H. (̌ s.), VII., 396-7 (1881) ${ }^{24}$; WIsm., Tr. Ent. Soc. Lond., 1881, 243-4 ${ }^{25}$; Blabophanes monachella, Snell., Vlind. Ned. Micr. 457-8 (1882) ${ }^{26}$; Meyr., Ent. Mo. Mag., XX., 36 $(1883)^{27}$; Sorh. Kleinschm., Mark Brndbg., 143-4 $(1886)^{23}$; Blabophanes longella, Moore, Lp. Ceyl., III., 503, Pl. 209, 1 (1887) ${ }^{29}$; Swinh. and Cotes, Cat. Moths Ind., 702, No. 4790 (1889) ${ }^{30}$; Wlsm., 'I'r. Ent. Soc. Lond., 1891, $87^{31}$; Blabophanes monachella,Wlsm., Tr. Ent. Soc. Lond., 1891, $87^{32}$; Meyr., 'Tr. Ent. Soc. Lond., 1894, $27^{33}$; Monopis monachella, Meyr., HB., Br. Lp., 785 (1895) ${ }^{34}$.

Larra-among rubbish, ${ }^{11,28}$; in birds' nests (Büttner $)^{25}$; in skins ${ }^{25}$.

Hab. Europe-V., 7, 8, 11, 13, 15-6, 21-2; VI., 15, 20, 22, 26, 28 ; VII., ${ }^{11,26}$; VIII., $7,11,13,15-6,22,26,28$; IX., ${ }^{26,28}$; Germany,
 England, 8, 9, 11-16, 23-4. India-N. India, 19, 24, 25 ; Nilghiris, ${ }^{30}$; Buryail-Koni, ${ }^{33}$; Ceylon, ${ }^{29,30}$. Africa-Gambia
(Bathurst) ${ }^{31-2}$. XI.-XII., ${ }^{32}$; French Congo (Kangwé, Ogowé River-Rev. A.C. Good); Natal (Spring Vale) ${ }^{24,}{ }^{25}$; II., ${ }^{25}$; Zululand, ${ }^{31}$. Hawainan Is. (Honolulu) ${ }^{24}$, 27, 33-4.

When recording monachella as new to the African fauna (l. c., No. 32), I expressed the opinion that longella was probably only a variety, and Meyrick (l. c, No. 33) sunk longella as a synonym. The acquisition of further specimens confirms the opinion that these two forms cannot be rightly separated. I am not aware that the variety longella occurs in Earope, but the ordinary form is certainly met with in other localities, from which I have received it (e.g., India, Africa, and Ceylon), but is apparently not found in the Hawaiian Island, whence I have only received longella. It seems extremely probable that the first description of this species is that of Fabricius, under the name of Alucita mediella (l. c., No. 1). Stainton drew attention to this with a "?" (l.c., Nos. 9, 12, 13), and Herrich-Schäffer endorsed his opinion (Schm. Eur. V., Index, p. 29), while Werneburg, Beitr. Schm. I., 489, 591 (1864), regarded it as a variety, or as a worn specimen of Gracilaria alchimiella, Sc., to which it seems to me impossible that the description could apply. I hesitate to adopt the name mediella, F. (nec Hb.); although if this insect were intended it must undoubtedly have priority, and for the present I prefer to retain it as a probable synonym with a "?", but not without hope that some further evidence may be obtainable to throw light upon the sulbject. I think however that the description could fairly apply to a worn specimen of that form in which the head assumes a decidedly yellowish colour.

## Scalidomia, Wlsm.

## Scalidomia hirsutella, Wlsm.

Psoricoptera (?) hirsutella, Wlsm., Tr. Ent. Soc. Lond., 1881, 261, Pl. XII., $29^{1}$.

Hab. Gambia-Bathurst, VIII. (Sir G. Carter) ; French Congo-Kangwé, Ogowé River (Rev. A. C'. Good) ; Natal ${ }^{1}$.

TRANS. ENT. SOC. LOND. 1897.-PART I. (APRIL.)

## Tiquadra, Wkr.

## 'Tiquadra lichenea, sp. n. (Pl. III., fig. 26.)

Antenua fawn-brown. Palpi, second joint with a loose projecting tuft beneath, apical joint of about equal length, erect, also thickly clothed; fawn-brown. Head and thorax fawn-brown, the latter pale greenish posteriorly. Forewings very hirsute, with patches of upstanding scales, all the margins with rough cilia, except on the basal third; pale bluish green with spots and illdefined cross-streaks of raised coarse hair-like fawn-brown scales, giving a somewhat reticulated appearance; of these some at the end of the disc, and others above and about the outer third of the fold, are more conspicuously raised ; the outer half of the costa, which is very roughly fringed, is distinctly chestnut-brown, and this colour extends narrowly towards the base, the termen also has some chestnut-brown scales, but the majority of the cilia are dirty whitish. Underside fawn-ochreous. Exp. al., 24 mm . Hindwings and cilia fawn-ochreous. Underside the same. Abdomen fawnochreous. Legs slightly paler than the abdomen.

## Type. $\widehat{\delta}$

Hab. French Congo-Kangwé, Ogowé River (Rev. A. C. Good) ; unique.

An interesting species allied to goochii, Wlsm.

## ADELINA.

Nematois, Hb.

Nematois parvella, Wkr. (Pl. III., fig. 27.)
Nematois parrella, Wkr., Cat. Lep. Ins. B.M., XXVIII., 504 (1863)'.

Antennae three times as long as the forewings; cinereous. Palpi almost obsolete. Head cinereous, with some metallic scales. Thorax purplish, with metallic scales. Forewings narrow at the base, widened outwardly, costa depressed to the apex ; purplish cinereous, richly studded with brassy metallic scales, strongly iridescent in different lights, with three yellowish ochreous patches : the first on the dorsal half at the base; the second triangular, narrowly margined with black scales, extending inwards from the costal margin about the middle to the fold ; the third lying beyond the end of the cell, occupying the middle of the apical portion of the wing, and prodnced narrowly inwards and upwards to the com-
mencement of the costal cilia, a few blackish scales lying around its margins ; a line of blackish scales crosses the wing obliquely inwards from the costal to the dorsal margin near the base ; cilia iridescent, brassy, with some greenish scales below the apex. Exp. al., 16 mm . Hindwings cupreous, with shining brassy cilia. Abdomen cupreous. Legs cinereous, with rather long hair-scales on the tibir.

Hab. Sierra Leonel 11.V.-VI. (Dr. Clements); French Congo-Kangwé, Ogowé River (Rev. A. C. Good).

I described this species as new before identifying it as parvella, Wkr., and it may be well to publish my description, as Walker's is hardly precise enough to distinguish it from allied forms occurring in the Malay Archipelago.
III. On Lepidoptera from the Malay Archipelago. By Edward Meyrice, B.A., F..Z.S.
[Read Nor. 3rd, 1896.]
In the Society's Transactions for 1894, pp. 455-480, I recorded some notes on a collection of Pyralidina from Sambawa, Celebes, and Borneo. In the present paper are included the species of the Geometroid families of Notodontina which belonged to the same collection; as well as those of both groups from the islands of Sangir and Talaut. These, like the former, were collected by Mr. W. Doherty, and the types are in the possession of Mr . H. J. Elwes.

## HYDRIOMENIDE.

Sauris abortivata, Guen. S.E. Borneo.
S. hirudinata, Guen. Sambawa.
S. proboscidaria, Walk. (\%). Sangir.

Chloroclystis recensitaria, Walk. Sambawa.

## Carbia, Walk.

Face with cone of scales. Palpi moderate, porrected, smoothscaled, terminal joint rather long. Antennæ in of filiform, simple. Abdomen with series of small dorsal crests. Posterior tibie with all spurs present. Forewings with areole simple. Hindwings with 6 and 7 separate at origin.
C. calescens, Walk. S.E. Borneo. The + differs from the $\hat{\delta}$ in being considerably smaller ( $\hat{\delta} 22 \mathrm{~mm}$., \& 16 mm .), with the forewings duller, the white subterminal line straight on upper half, not waved as in $\hat{\delta}$, the hindwings grey (in $\widehat{\delta}$ ochreous-yellow).

Pomasia euryopis, sp. n.
of 21 mm . Forewings unusually broad, with the whole dise thinly scaled and irregularly contorted or crumpled in shallow grooves, complicated by a transverse impression below middle ; cell much deformed, longest at lower angle, where it reaches $\frac{4}{5}$ from base, lower margin rather strongly curved upwards, thickened to trans. ent. soc. lond. 1897.-part i. (april.)
form a stout ridge beneath from base to ${ }_{5}^{4}$ of cell, where it gives off a bent additional vein, which appears to be 1c.; pale whitish-ochreous, suffused with orange-ochreous towards costa and termen ; six fasciæ of irregular bisinuate partly confluent brown striæ, first four of about three striæ each, fifth of two (three on costa), sixth of one : cilia pale orange. Hindwings with colour and markings as in forewings, but not orange towards costa ; first and secoud fasciæ absent, an irregular clear discal space between third and fourth.

## Pulo Laut; one specimen.

P. gelastis, sp. n.
to 16 mm . Anal claspers large. Forewings whitish-ochreous, orange-tinged, suffused with bright orange towards costa and termen; six fasciæ of irregular bisinuate partly confluent dark brown striæ, black-dotted on costa, first four of about three striæ each, fifth of two, sixth of one : cilia orange, with blackish bars at apex, in middle, and above tornus. Hindwings as forewings, but not orange towards costa ; first and second fasciæ absent, an irregular clear discal space between third and fourth containing a dark fuscous discal dot.

Pulo Laut; one specimen.
P. vernacularia, Guen. Pulo Laut.

Physetobasis heliocoma, sp. n.
¢ 31 mm . Head orange-ochreous, face dark fuscous except on margins. Forewings grey with slight greenish and purplish reflections, whitish-suffused towards disc posteriorly; subbasal, antemedian, and postmedian curved transverse series of irregular blackish-grey spots; a black transverse-oval discal spot; subterminal line faint, cloudy, grey-whitish : cilia grey. Hindwings whitish ; a grey discal mark ; a postmedian series of three blackishgrey spots on dorsal half, and a grey subcostal spot; a suffused gíey terminal fascia.

Sambawa; one specimen.
Eucymatoge ghosha, Walk. Talaut. Anthyria pictaria, Moore. Sambawa.
A. lunulosa, Moore. Pulo Laut.
A. grataria, Walk. Sangir.
A. metriopis, sp. n.

太 23 mm . Head ochreous-brown, fillet white. Autenuæ white, ringed with dark grey, pectinations dark grey. Forewings light fuscous, slightly purplish-tinged; costa posteriorly yellowish-
tinged; about twelve evenly distributed darker striæ; a dark fuscous discal dot; a pale yellow transverse mark towards termen above middle : cilia whitish-yellowish, with a fuscous subbasal line. Hindwings as forewings, but without yellow mark.

Pulo Laut ; one specimen.

## STERRHIDA.

Eois procrossa, sp. n.
才 12 mm . Head pale ochreous, fillet whitish, face dark fuscous. Antennæ serrate, cilia $1 \frac{1}{2}$. Posterior tarsi 1, tibial tuft large. Forewings pale whitish-ochreous, thinly sprinkled with dark fuscous ; costal edge fuscous on basal third; first, median, and second lines faint, slender, fuscous, first and second forming small dark fuscous spots on costa; a dark fuscous discal dot before median line; a terminal series of minute blackish dots: cilia pale whitish-ochreous. Hindwings as forewinge, but lines not traceable, except that second line forms small dark fuscous costal and dorsal spots.

Sambawa; one specimen.
Leptomeris aspilataria, Walk. Sambawa.
L. remotata, Guen. Sambawa.
I. crossophragma, Meyr. Sambawa.
L. opicata, Fabr. 'J'alaut.

Chrysocraspeda permutans, Hamps. S.E. Borneo.
C. orgalea, sp. n.

才 15 mm . Structure as in typical section. Head crimsonfuscous, fillet white. Forewings dull purple; a small irregular yellow spot in disc at $\frac{3}{4}$; an irregular deep yellow streak along termen and posterior part of dorsum, forming a projection inwards in middle of termen, and terminating in a quadrate spot in middle of dorsum; a terminal series of purple dots: cilia yellow, tips paler. Hindwings with termen rounded-angulated in middle; dull purple; a yellow discal dot at $\frac{1}{3}$; an irregular yellow terminal streak, dilated at apex ; terminal dots and cilia as in forewings.

Pulo Laut ; one specimen.

## Heteroctenis, gen. n.

Face smooth. Palpi short, porrected, with appressed scales. Antennæ in $\uparrow$ (probably, therefore, in ot also) thickened with
scales near base，unipectinated，apical third simple．Posterior tibiæ in $\$$ with all spurs present．Forewings with 10 out of 9,11 anastomosing strongly with 9 ，forming small simple areole．Hind－ wings with 3 and 4 connate， 6 and 7 connate or short－stalked．

Allied to Chrysocraspeda．Type，H．dracontias．

## H．dracontias，sp．n．

ㅇ 24 mm ．Antenual pectinations 5，slender．Forewings deep yellow，with a few ferruginous scales ；a large dorsal patch，bounded ly an outwards－curved line from near base of costa to tornus，and a large circular subapical blotch purplish－ashy，edged first with deeper purple and then with ferruginous，and connected in disc by a short ferruginous bar ；a terminal series of ferruginous dots ：cilia pale yellow．Hindwings purplish－ashy ；two dark fuscous dots trans－ versely placed in dise，and a dot of black scales between these；a rather narrow deep yellow terminal fascia，edged anteriorly first with ferruginous and then with deep purple ；terminal dots and cilia as in forewings．

S．E．Borneo ；one specimen．

## H．tigrina，sp．n．

o 23 mm ．Head orange，face and fillet yellow－whitish． Antennal pestinations 2，very thick．Forewings with termen bowed；yellow，suffusedly strigulated with ferruginous－orange ； anterior portion of dise nearly clear ；a very broad purple post－ median fascia，not reaching costa，posterior edge forming a broad rounded projection below middle ：cilia pale yellow．Hindwings with termen subdentate；yellow，suffusedly strigulated with ferruginous－orange；base suffused with purple；a very broad fascia of purple suffusion，occupying from $\frac{2}{⿳ 亠 丷 厂 彡}$ projecting in middle and below costa；two dots transversely placed in disc，upper blackish，lower dark purplish ：cilia pale yellow．

S．E．Borneo ；one specimen．
Perixera syntona，Meyr．（intermictaria，Swinh．）．Pulo Lant．
P．suspicaria，Snell．Sangir．
P．homostola，sp，n．
of 34 mm ．Head light reddish－fuscous，fillet whitish．Posterior tibiæ moderate，slender，without tuft．Forewings ochreous，slightly
reddish-tinged, obscurely strigulated with light reddish-fuscous; first, second, and subterminal lines faintly indicated, median rather thick, faint, pale fuscous; a fuscous discal mark ; a terminal series of fuscous dots : cilia ochreous, tips paler. Hindwings as forewings, but first and mediau lines absent, a small dark fuscous whitecentred discal spot.

Talaut ; one specimen.
Calothysanis aventiaria, Guen. Sambawa, Sangir. Alex palparia, Walk. Pulo Laut, Sambawa, Celebes.

## GEOMETRIDÆ.

Comostola inductaria, Guen. Sambawa. C. rubrolimbaria, Guen. S.E. Borneo.

## Probolosceles, gen. n.

Face smooth. Palpi moderate, porrected, second joint roughscaled. Antenne in ot strongly bipectinated, apical third simple. Posterior tibiæ with all spurs present, in ot with very long stout projection from apex above tarsus. Forewings with 10 out of 9 , 11 free. Hindwings with frenulum ; 3 and 4 stalked, 6 and 7 stalked, 8 appressed to cell to middle.
P. quadrinotata, Butl., Ill. Het., vii., p. 105, pl. 136, fig. 7.
'Talaut; one specimen. The dark patches are small.
Uliocnemis partita, Walk. Sambawa.

## Thalassodes phrixopa, sp. n.

o 21 mm . Head green, fillet and margius of face white. Abdomen with a white raised dorsal spot near base. Forewings green, with numerous obscure hyaline strigulæ; costal edge dark fuscous; white subcostal and subdorsal antemedian dots; a blackish-grey discal dot ; subterminal and terminal series of white dots : cilia green, tips whitish, costal cilia dark fuscous, becoming white near before apex. Hindwings with colour, discal dot, terminal dots, and terminal cilia as in forewings.

Sambawa; one specimen.

Epipristis nelearia, Guen. Celebes.

## ORTHOSTIXIDÆ.

Ozola macariata, Walk. Sambawa.
O. dissimilis, Warr. Talaut.
O. extersasia, Walk. Talaut.
O. spilotis, sp. n.
f 29 mm . Abdomen whitish-ochreous, with two rows of blackish spots. Forewings with termen not sinuate; whitish; a rather broad grey stripe along costa throughout, lower edge very irregular, extending at base to dorsum; first and second lines represented by dorsal and subdorsal grey spots; subterminal aud terminal series of grey spots, former interrupted below middle, towards apex connected by a light grey suffusion. Hindwings whitish ; a grey blackish-centred discal spot; second line represented by small grey spots or dots towards costa and dorsum ; subterminal and terminal series of grey spots.

Sambawa; one specimen.
Rambara ochreicostalis, Hamps. Pulo Laut, Saugir. R. saponaria, Guen. Sambawa.
R. satelliata, Walk. Talaut.

Noreia perdensata, Walk. Pulo Laut.

## MONOCTENIADE.

Eumelea rosalia, Cram. Sangir,

## Canonistis, g. n.

Face with short cone of scales. Antennæ in ot unipectinated, apex simple. Forewings with 10 and 11 stalked, 12 anastomosirg with stalk of 10 and 11. Hindwings with 6 and 7 approximated at base.
C. rectilineata, Guen., x., p. 18. Pulo Laut.

## SELIDOSEMIDÆ.

Opisthograptis emersaria, Walk. Sambawa.
O. isospila, Meyr. Sambawa. Possibly an extreme variety of $O$. emersaria.

Corymica arnearia, Walk. Pulo Laut.
Plutodes pardaria, Guen. Sangir.
P. hilarrpa, sp. n.

む 22 mm . Forewings yellow ; several purplish-ashy ferruginousedged spots towards base; a purplish-ashy ferruginous-margined irregular-edged antemedian fascia, much attenuated on dorsum, posteriorly confluent above middle with an 8 -shaped ferruginous discal mark; second line formed of ferruginous spots, irregular, interrupted above middle; beyoud this an S-shaped purplishashy ferruginous-edged band from costa to middle ; subterminal ferruginous spots on dorsal half; a double alternating terminal series of ferruginous spots: cilia yellow, indistinctly barred with ferruginous. Hindwings yellow ; a ferruginous mark near base ; a purplish-ashy ferruginous-edged antemedian fascia on dorsal half, dilated dorsally ; second and subterminal lines formed by series of ferruginous spots, latter interrupted by a larger purplishashy ferruginous-edged spot above middle ; terminal spots and cilia as in forewiugs.

Pulo Laut; one specimen.

> Diastictis separata, Walk. Sambawa. D. schistacea, Walk. S.E. Borneo.
> D. subexpressa, Walk. Pulo Laut.
> D. microdoxa, sp. n.

of 18 mm . Head whitish, fillet and a median bar on face black. Forewings white, irregularly strewn with fine fuscous strigula; first and median lines indistinct, but forming small dark fuscous spots on costa; second line fuscous, sinuate outwards above and below middle ; a dark fuscous discal dot on median line ; subterminal line indicated by fuscous marks, only distinct towards costa : cilia whitish, irrorated with pale fuscous. Hindwings with termen waved ; white, irregularly strewn with fine fuscous strigulæ towards costa and termen ; a dark fuscous transverse antemedian suffusion in disc ; a transverse dark fusoous discal mark ; second and subterminal lines and cilia as in forewings.

## Pulo Laut; one specimen.

> D. sublavaria, Guen. Sambawa. Ectropis biundularia, Esp. Sambawa. E. petras, sp. n.

of 23 mm . Head light greyish-ochreous, fillet and a median band of face mixed with brown. Antennæ with fascicles of long
cilia rising from minute paired projections. Forewings pale greyish-ochreous, thinly spriukled with white, brown, and dark fuscous ; first and second lines parallel, curved, bisinuate, dark brown, marked with dark fuscous dots on veins and costa, first preceded and second followed by a brown shade ; median brown, rather irregular, indistinct on dorsal half, traversing an indistinct dark fuscous discal dot, and marked with another on costa ; a suffused darker spot on middle of shade following second line, followed by au indistinct pale suffusion ; subterminal line pale, waved, margined with brown and anteriorly on upper half with dark fuscous, interrupted in middle ; a terminal series of dark fuscous dots: cilia ochreous-whitish, basal half obscurely spotted with fuscous. Hindwings with termen waved; colour and markings as in forewings, but first line absent, median indistinct, second less marked, not followed by darker median spot.

## Pulo Laut ; one specimen.

## Luxiaria ditrota, sp. n.

¢ 36 mm . Forewings with apex subacute, termen slightly sinuate; whitish-ochreous, with thinly scattered dark fuscous scales; a faint brownish tinge towards base; lines very faint, brownish, first nearly straight, with indistinct darker dots on veins, median hardly traceable, second angulated above middle, darkerdotted on lower half, between angle and dorsum, followed by a suffused brownish shade; subterminal line fatintly indicated, its anterior margin marked by two large dark fuscous dots opposite angle of second line; a terminal series of dark fuscous dots. Hindwings with termen waved, slightly angulated in middle; colour and markings as in forewings, but first line absent, a fine short dark fuscous linear discal mark before median, second not angulated, hardly curved, the following shade nearly reaching costa, subterminal line without the two dark fuscous dots.

Sambawa; one specimen. I possess this species also from Halmahera.

## L. exclusa, Walk. S.E. Borneo.

Selidosema acaciaria, Boisd. Sambawa.
S. propulsaria, Walk. Sambawa.

Tigridoptera monochrias, sp. n.
才 53 mm . Head and thorax blue-grey. Abdomen ochreousyellow, basal segment blue-grey. Forewings blue-grey ; a deep yellow-ochreous basal blotch, not quite reaching costa, followed on upper half by two black spots ; first and second lines thick, black,
bent above middle, median similiar but indistinct and partially obsolete, traversing a roundish black discal spot; two posterior series of roundish black spots, second indicating anterior margin of subterminal line. Hindwings blue-grey ; first and second lines thick, black, rather sinuate, second interrupted in dise ; discal spot and two posterior series as in forewings.

Sangir ; one specimen.

## T. ptochopis, sp. n.

ot 50 mm . Head and thorax whitish-grey. Abdomen dull ochreous-yellowish, suffused with whitish-grey towards base. Forewings whitish-grey, subdorsal fold obscurely tinged with dull ochreous suffusiou; black subcostal and subdorsal spots at base ; a small black subcostal spot at $\frac{1}{\gamma}$, and another bencath it ; first and second lines formed by series of cmall black spots, bent above middle ; median slender, blackish-grey, avgulated beneath costa, interrupted on fold; a small transverse-oval black discal spot before median ; a faint grey line beyond second ; anterior margin of subterminal line represented by a series of small black spots. Hindwings as forewings, but without basal or subbasal spots, or median line; no subdorsal ochreous suffusion, but a similar one occupying median fold.

Sangir ; one specimen.

> Synegia botydaria, Guen. Pulo Lant.
> S. imitaria, Walk. Pulo Laut.

> Hyposidra janiaria, Guen. Sambawa.
> H. talaca, Walk. Sangir.
> H. affictaria, Walk. 'Talaut. Abraxas sylvata, Scop. Sambawa.
> A. labraria, Guen. Sambawa.

> Buzura nephelistis, sp. n.

of 63 mm . Head and thorax yellow-ochreous, face mixed with fuscous. Antennal pectinations 3, apical $\frac{2}{5}$ simple. Forewings with termen almost straight, rather strongly oblique ; light ochre-ous-yellowish, clouded with deeper ; basal and median areas almost wholly occupied by broad bandlike suffusions of dark grey irroration ; posterior edge of second line indicated by an incomplete fascia of dark grey irroration following it, abruptly sinuate outwards above middle, and more gently inwards below it; subterminal line faintly paler, waved, posteriorly margined above
middle by a terminal patch of dark-grey suffusion. Hindwings with colour as in forewings; an ill-defined broad median fascia of dark grey irroration, becoming obsolete dorsally.

Talaut ; one specimen.
Ephoria ranthocolona, sp. n.
f 24 mm . Head brownish-orange, fillet pale yellow. Antennæ white, hardly subdentate, shortly ciliated. Fowewings dull ashypurple, becoming crimson on margins of yellow markings; a rather broad bright yellow costal band from base almost to apex, narrowed towards base, lower edge irregular, forming a triangular projection before middle, and twice sinuate beyond it; a bright yellow terminal streak from apex to above middle, not quite reaching costal band at apex : cilia purple, opposite terminal streak yellow. Hindwings dull ashy-purple; costal area broadly light ochreousyellowish : cilia dull purple.
S.E. Borneo; one specimen. This species, nearly allied to the Japanese E.formosa, differs from it and the rest of the genus in the absence of antennal pectinations, which are however short and tending towards disappearance in them also; in other details of structure it coincides exactly, and does not call for generic separation.

> Lomographa cogenaria, Snell. Pulo Laut.
> Deilinia chlorochroa, sp. n.

© $20-23 \mathrm{~mm}$. Head and thorax pale greenish-ochreous. Forewings with vein 10 out of 9 , connected with 12 , and anastomosing with 9,11 out of 10 between connexions; dull light green, with fine seattered dark fuscous strigulæ; first and second lines curved, somewhat waved, dark fuscous ; a dark fuscous discal dot. Hindwings as forewings, but first line absent.

Pulo Laut; one specimen. This is in poor condition; the above description has therefore been made from a better example, which I possess, from Burma. The neuration of the forewings, as given above, shows some details of acquired complexity differing from the normal type; but as all the typical points of structure are present (the fovea of the hindwings is small and inconspicuous, but distinct), there is no occasion to separate the species generically.

Eulepidotis fimbriata, Cram. Pulo Laut. E. hortensiata, Guen. Pulo Laut.
E. guttaria, Boisd. Pulo Laut.

Euchlæna pyrotoca, sp.n.
t 22 mm . Head and thorax dark fuscous. Forewings with termen bowed and slightly prominent in middle; dark fuscous; first and second lines darker, bent near costa ; a darker discal spot. Hiudwings bright orange ; a wedge-shaped dark fuscous subdorsal streak, broadest at tornus, attenuated to base, occupying about $\frac{1}{4}$ of wing.

Talant ; one specimen.
E. pallida, Moore. Sambawa.
E. pachiaria, Walk. Sambawa.
E. imbutaria, Walk. Celebes.
E. maculifera, Feld. Sangir, Talaut.
E. vestigiata, Snell. Celebes, Talaut.

## GALLERIADA.

## Harpagoneura, Butì.

I have not been able to verify the structural characters of Butler's type, but have little doubt that the following species is truly congeneric with it ; to prevent misapprehension, however, I add the leading structural characters of my species (applicablo to $\hat{\delta}$ only), viz. :

Forewings with apex contorted; on upper surface with a short subcostal groove before apex, enclosing a short dense expansible tuft of hairs covered over with broad scales ; cell very large, reaching ${ }^{5}$. of wing, transverse vein angulated outwards in middle, 5 from the angulation, widely remote from 4, 7 and 8 out of 9 . Hindwings with long pencil of hairs ou upper surface from base of costa, lying beueath forewings ; 5 absent, transverse vein absent, 7 anastomosing shortly with 8 .
H. acrocausta, sp. n.
of 28 mm . Head aud thorax ochreous-whitish. Forewings elongate, apex obtuse, termen vertical, rounded ; whitish-ochreous, faintly pinkish-tinged, with some scattered dark fuscous scales; traces of antemedian and postmedian discal spots; a rather narrow dark coppery-fascous terminal streak, anterior edge straight : cilia
pale ochreous-brown, with a black interrupted suobasal line. Hindwings ochreous-yellow, thiniy scaled: cilia pale yellowish, tips whitish.

> Sangir ; one specimen.
> Heteromicta rufivena, Walk. Sangir.
> Picrogama anticosma, sp. n. Sangir.*

Antiptilotis, gen. n.
Palpi in ot short, curved, ascending. Antennæ in of simple, basal joint with broad projecting anterior flap of scales. Thorax with posterior crest. Forewings in of beneath with subcostal groove towards base, enclosing dense expansible pencil of hairs, concealed by long loose hairs from adjoining surface; 4 and 5 connate, 6 approximeted to 7 at base, $8,9,10$ out of 7 . Hindwings in d above with subdorsal groove towards base, enclosing pencil of dense hairs ; 5 rather remote from 4,7 out of 6 near origin, shortly approximated to 8 .
A. rubicunda, sp. n.

才 25 mm . Head and thorax whitish. Forewings elongateoblong, termen rather oblique, rounded; rosy-whitish, with scattered dull rosy scales, towards costa and on dorsum somewhat mixed with pale yellow-ochreous; first and second lines and two dots longitudinally placed in dise yellow-ochreous, very indistinct; an indistinct suffusion of reddish-brown scales towards termen below middle: cilia rosy-whitish suffused with yellow-ochreous and sprinkled with dull rosy. Hindwings light dull rosy ; subdorsal hair-pencil blackish-grey : cilia light ochreous.

Sangir ; one specimen.

> CRAMBIDE.
> Autarotis euryala, Meyr. Sangir.
> Thalamarchis, gen. n.

Face rounded ; ocelli present; tongue developed. Labial palpi long, porrected, triangularly scaled. Maxillary palpi moderate, triangularly dilated. Antennæ in ot subdentate, shortly ciliated. Abdomen in of with dorsal tuft of flocculent hairs near base, concealed by flat scales. Forewings with 4 and 5 closely approximated at base, 9 absent, 11 absent. Hindwings in $\begin{gathered}\text { t } \\ \text { above }\end{gathered}$ with long pencil of hairs from base of costa, concealed beneath forewings, a loose subdorsal pencil of long hairs, and an expansible

[^1]tuft of short hairs at tornus ; 4 and 5 short-stalked, 7 out of 6 near origin, connected with 8 at a point before middle.

## T. chalchorma, sp. n.

of 16 mm . Head white. Palpi orange, tips white. Thorax grey-whitish. Forewings moderate, subtriangular, termen vertical, rather sinuate inwards on upper half, and with an indentation above middle ; pale silky-grey, with indistinct spots of whitish-ochreous suffusion towards dorsum before and beyond middle ; an orange outwardly-oblique wedge-shaped mark on middle of costa; a triangular orange apical patch, extending on costa from ${ }_{5}^{3}$, and on termen to indentation, cut by two white lines from costa, first angulated inwards, second curved inwards; a fine paler line near before termen on lower half, anteriorly finely edged with dark grey ; a coppery-metallic streak along lower half of termen, preceded by five black dots separated by ochreous-yellowish interspaces : cilia on upper half of termen orange, base shining white, on lower half coppery-metallic, at tornus pale orange. Hindwings whitish-ochreous, greyish-tinged; hair-pencils light yellow-ochreous; a dark fuscous terminal line round apex : cilia whitish-ochreous, round apex whitish.

## Sangir ; one specimen.

## PYRAUSTIDÆ.

## Mixophyla xanthocasis, sp. n.

\& $10-12 \mathrm{~mm}$. Head and thorax white. Palpi white, second joint fuscous above, terminal joint dorsally flattened, obtuse loosely scaled at sides. Forewings with distinct indentation above middle of termen; white; median line light fuscous, angulated, thickened on dorsum; terminal area broadly suffused with ochreousyellow, most widely on costa, where it encloses two oblique whitish spots, below middle enclosing a transverse-oval white spot, marked anteriorly with two short dark fuscous lines (first indistinct) representing margins of second line, and posteriorly with three dark fuscous subterminal dots, uppermost smallest : cilia shining greyishochreous, white at tornus and on basal half round apex, with a blackish subbasal line except on indentation and at tornus. Hindwings whitish-grey : cilia white.

Sangir ; two specimens. I take the opportunity of describing also the following additional species of this genus from examples in my own collection.
M. chrysias, sp. n.
of of $14-15 \mathrm{~mm}$. Head and thorax white. Antenuæ in ot very shortly ciliated. Palpi white, second joint blackish above, terminal joint tolerably cylindrical, pointed. Abdomen in of with anal tuft of mixed black and whitish hairs. Forewings with termen rounded, very slightly prominent on 5 ; white ; median line light ochreousyellow, strongly curved, becoming orange and dilated towards costa; two oblique wedge-shaped orange marks from costa towards apex, reaching $\frac{1}{3}$ across wing ; a pale ochreous-yellowish suffusion extending from beyond median line above middle to middle of termen, enclosing on its lower edge before termen a small rectangular dark fuscous spot which includes a whitish mark cutting its lower side ; a strong blackish terminal line on upper $\frac{2}{5}$ of termen: cilia shining grey, cut by white bars in and above middle, on tornus white, basal half white on upper $\frac{z}{\zeta}$ of termen, a dark grey basal line on lower third. Hindwings and cilia white.

## Amboina; two specimens.

## Oligostigma polydora, sp. n.

© 24 mm . Head and thorax yellow-ochreous. Middle tibire clothed with long fine hairs above, and with a pensil of similar hairs from base beneath. Forewings elongate-triangular, termen bowed, oblique, costa folded over above from base to middle, margin of fold dilated except towards extremities by a broad flap of long dense projecting scales, covering a deep circular fovea at end of cell, dorsum strongly bowed and fringed with very long fine cilia; 7 and 10 out of 9 ; ochreous-orange; a shining whitish streak from end of cell to near before tornus, where it meets a shining white posteriorly black-edged curved subterminal streak from costa ; a nearly straight shining white streak from beneath costa at $\frac{4}{5}$ to near angle of junction of these, narrowed beneath ; an obscure semitransparent whitish streak along dorsum ; an interrupted blackish terminal line: cilia pale grey. Hindwings abruptly sinuate beneath apex; shining white ; beneath costa an elongate-oval grey patch reaching from near base to near middle, edged above with rough grey hairs, and beneath this a linear longitudinal streak of deep black scales reaching middle, these entirely covered by the expanded dorsal area of forewings; an ochreousorange postmedian fascia and another along termen, confluent at extremities, terminal fascia black-edged from above middle to near tornus ; two subquadrate black terminal dots beneath sinuation, margined anteriorly by white black-edged lunules : cilia whitishgrey, with a grey subbasal line.

Sangir ; one specimen.

## O. metriodora, sp. n.

§ 21 mm . Head and thorax ochreous-yellow. Middle tibiæ with fine slender pencils of long hairs from base above and beneath. -orewings elongate-triangular, termen rounded, oblique ; on upper surface a fovea at end of cell, and a slight subcostal groove above it; 10 out of 9 ; shining white, suffused with fuscous in disc towards base ; an orange costal streak from base to $\frac{3}{4}$, suffusedly confluent with postmedian fascia; a broad orange partially fuscousirrorated dorsal streak to $\frac{4}{5}$; a triangular orange fuscous-irrorated median patch from costa, apex touching extremity of dorsal streak: a nearly straight fuscous-orange fascia at $\frac{4}{5}$, parallel to termen, ending beneath in dorsal streak; an orange anteriorly fuscousedged terminal fascia; a black interrupted terminal line: cilia whitish-fuscous, with an interrupted dark fuscous subbasal line. Hindwings suddenly sinuate below apex; whitish-grey, darkersprinkled; an orange subbasal fascia, extended along dorsum to meet posterior band; a broad terminal orange band, leaving a three-lobed apical spot of ground colour, fuscous-sprinkled towards termen on lower half, enclosing on lower half a narrow whitish subterminal streak edged with black posteriorly on its upper half ; a black terminal line opposite this portion, and two semi-oval black dots beneath sinuation : cilia whitish-fuscous, with a dark fuscous subbasal line, lighter round apex.

## Talaut ; one specimen.

## O. mormodes, sp. n.

of $\frac{q}{4}-45 \mathrm{~mm}$. Head ochreous-yellow. Palpi in of with terminal joint considerably elongate, porrected, terminating in a small hooked scaletuft. Antennæ in of dentate. Thorax ochreous-yellowish, with three dark fuscous anterior spots. Posterior femora in $\delta$ with small hairtuft beneath towards apex. Forewings very elongate-triangular, termen oblique, rounded, dorsum in of slightly sinuate; in of upper margin of cell roughened above with erect scales, and a ridge-like tuft of hairs on $1 b$ towards base; 10 and 11 out of 9 ; shining grey-whitish; a rather broad fuscous costal streak from base to $\frac{2}{3}$, sending a thick suffused branch beneath. from $\frac{1}{4}$ to middle of disc ; a long semioval blotch extending along dorsum from near base to near tornus, anterior half dark ochreousfuscous, posterior half pale ochreous-yellow ; a rather broad dark ochreous-fuscous inwards-angulated fascia from $\frac{2}{3}$ of costa, confluent with costal streak, and a similar nearly straight fascia from $\frac{5}{6}$, meeting at $\frac{2}{3}$ above tornus and not continued further; a pale ochreous-yellow anteriorly black-margined terminal fascia; an
interrupted black terminal line : cilia fuscous-whitish. Hindwings with short sudden sinuation below apex ; shining white; a dark fuscous subbasal fascia, marked with an ochreous spot towards dorsum; a broad pale ochreous-yellow terminal band, edged anteriorly on upper $\frac{2}{3}$ by a sinuate dark fuscous line, enclosing an indistinct whitish anteapical spot posteriorly edged with dark fuscous, and an ill-defined shining whitish subterminal fascia on lower half, posteriorly shortly edged with dark fuscous below middle of wing; four small black terminal dots below sinuation, each preceded by a silvery-metallic lunule set in black, and separated by orange interspaces : cilia whitish, with dark grey basal spots opposite terminal dots, and four black basal dots alternating with these.

Sangir; two specimens.
O. hemicryptis, sp. n.
of o $15-16 \mathrm{~mm}$. Head and thorax dark fuscous. Forewings elongate-triangular, termen oblique, rounded; 10 out of 9 ; orange ; in ${ }^{t}$ costal half dark fuscous from base to $\frac{2}{3}$, forming an elongatetriangular blotch, rest up to subterminal streak unevenly irrorated with dark fuscous, in $\&$ wholly dark fuscous from base to subterminal streak except a small costal præsubterminal spot; a shining white posteriorly black-edged subterminal streak, hardly reaching margins; an interrupted black terminal line, forming a larger black dot at apex: cilia whitish-fuscous, basal half darkermixed. Hindwings with slight subapical sinuation, prominent beneath it ; shining white ; a basal fascia, in ot orange, in $\uparrow$ dark fuscous ; a broad ochreous-orange terminal fascia, anteriorly strongly edged with dark fuscous except towards extremities; a minute black terminal dot in subapical sinuation, preceded by a larger white dot, and two quadrate black terminal dots beneath this, preceded by white black-edged lunules, alternating with bright orange interspaces ; beneath these a pale line, black-edged on both sides, extending along termen from middle to $\frac{3}{4}$ : cilia as in forewings, with a blackish basal dot on prominence.

Sangir ; two specimens.
O. gephyrotis, sp. n.

ㅇ 20 mm . Forewings very elongate-triangular, termen oblique, rounded; shining white; a fuscous costal streak from base to terminal fascia, lower edge somewhat prominent in middle ; a light ochreous-orange terminal fascia, anteriorly fuscous-edged in disc, continued from tornus to near base of dorsum, but leaving a white anteriorly fuscous-edged dorsal streak from before middle to
near tornus, and enclosing a white fuscous-sprinkled subterminal streak; a terminal series of black marks: cilia whitish. Hindwings with short sinuation below apex; white; a broad suffused pale orange terminal fascia, becoming deeper on termen, anteriorly edged with blackish for about $\frac{1}{3}$ in dise; a silvery-whitish subterminal streak round apex ; five black roundish terminal dots below sinuation, preceded by silvery-whitish lunules edged with a few black scales, two lowest remote from the dots : cilia whitish, with grey basal line.

Talaut; one specimen. Nearly allied to O. argyropis.
Anydraula bombayensis, Swinh. Sangir.
Nymphula leucoplaca, sp. n.
§ 16 mm . Labial palpi long, smooth scaled, acute. Forewings very elongate-triangular, termen sinuate beneath apex, bowed, waved, rather oblique ; orange, irregularly and suffusedly irrorated with dark fuscous; a white suffusion towards base; first and second lines forming shining white fasciæ, strongly edged with dark fuscous, first widely interrupted in diss, second curved inwards and interrupted below middle, upper portion forming three adjacent spots; a shining white dark-edged submarginal fascia, interrupted below middle, upper portion forming three adjacent spots, two uppermost small. Hindwings with termen irregularly dentate-waved, apex forming a very prominent tooth; colour and markings as in forewings, but second line forming a straight fascia, interrupted in middle only, three upper submarginal spots rather small, subequal.

Sangir ; one specimen. The furm of the hindwings is peculiar and distinctive.
N. villidalis, Walk. Sangir; a specimen not showing
the dark median line of hindwings, yet apparently
identical.

Hydrocampa conspurcatalis, Warren. Sangir.
Strepsinoma, gen. n.
Face oblique ; ocelli present ; tongue very long. Antennæ $\frac{2}{6}$, in đ ciliated. Labial palpi moderate, curved, subascending, second joint rough-scaled beneath, terminal joint rather short, pointed or obtuse. Maxillary palpi moderate, filiform. Posterior tibix with outer spurs half inner, tarsi very long. Forewings with semitransparent bladdery impression in cell, larger in $\delta^{\text {d }}$, sur-
mounted by slight ridge ; 3 and 4 stalked, 10 and 11 out of 9 . Hindwings $1 ; 3,4,5$ approximated at base, 7 out of 6 near origin, anastomosing with 8 to middle.

Type. S. amaura. Besides the two following speries, Cataclysta crosalis (-susalis), Walk., XVII., 449 , also belongs to the genus; it occurs in India, Borneo, and Halmahera.
S. amaura, sp. n.
of of $13-15 \mathrm{~mm}$. Forewings elongate-triangular, termen oblique ; dark fuscous; a white sometimes indistinct dot on costa beyond middle ; a fine white subterminal line, sometimes partially obsolete : cilia shining grey, base darker. Hindwings rather dark fuscous; faint traces of a pale subterminal line.

Sambawa, S.E. Borneo ; two specimens.
S'. sphenactis, sp. n.
o \& $13-15 \mathrm{~mm}$. Forewings elongate-triangular, termen oblique; greyish-fuscous, somewhat darker towards costa ; impression in cell obscurely whitish, more distinctly in $\delta$; a fascialike narrow-triangular white spot on costa beyond middle, reaching more than half across wing, narrower in $\delta$; a curved white subterminal line: cilia pale fuscous, with darker subbasal line. Hindwings greyish-fuscous, with very indistinct darker median and postmedian lines, latter followed in $\delta$ by an obscure whitish line.

Sangir; two specimens.
Nausinö̈ trogalis, Walk. Sangir. Nerrina procopia, Cram. Sangir. Pleonectusa adhæsalis, Walk. Talaut.
P. extenuatalis, Walk. (leptomeralis, Walk.). Talaut. Pagyda salvalis, Walk. Sangir.
Marasmia ruralis, Walk. Sangir.
Syngamia trimaculalis, Snell. Sangir.
Molybdantha tricoloralis, Zell. Sangir.
Eurrhyparodes bracteolalis, Zell. Sangir.
Diathrausta profundalis, Led. Sangir.
Hydrivis ornatalis, Dup. Sangir.
Dodanga truncatalis, Walk. Sangir.
Diplotyla tellesalis, Walk. Sangir.

Tabidia aculealis, Walk. Talaut.<br>Margaronia suralis, Led. Sangir; unusually large.<br>M. vertumnalis, Guen. Talaut.<br>M. nitidicostalis, Guen. Sangir.<br>M. celsalis, Walk. Talaut.<br>M. (?) spissalis, Guen. Sangir.<br>M. crassicornis, Walk. Talaut.<br>M. scapulalis, Led. Sangir.<br>M. ityalis, Walk. Sangir.<br>M. invertalis, Snell. Talaut.<br>Omiodes bianoralis, Walk. Talaut.<br>O. vulgalis, Guen. Sangir.

Coptobasis crotonalis, Walk. (?). Walker's type is a $\&$, but appears to agree; it is, however, a very obscure species, which might belong to another genus. The $\hat{\delta}$ here recorded is a true Coptobasis. Sangir.
C. mimica, Swinh. Sangir.

Pycnarmon jaguaralis, Guen. Talaut, Sangir.
Aripana abdicalis, Walk. Sangir.
A. macrotis, sp. n.
o 26 mm . Abdomen with a black lateral dot on anteapical segment, anal segment elongate. Forewings elongate-triangular (more elongate than in allied species), termen slightly bowed, oblique; white, ochreous-tinged towards base and on a costal streak from base to $\frac{2}{\mathrm{y}}$; small black basal and subbasal dots on costa ; a small black discal dot at $\frac{1}{4}$; a small transverse-oval black discal spot in middle; a small black costal dot at $\frac{2}{3}$; second line fuscous, indistinct, blackish on costa, broken and interrupted in disc, followed by a pale yellowish shade ; a large black dot towards termen below middle ; a small blackish apical dot: cilia whitish, basal half yellowish. Hindwings white; a dark fuscous discal dot; second line as in forewings, but marked with a darl fuscous dot on dorsum ; subterminal dot and cilia as in forewings.

Talaut; one specimen.
Cunostola originalis, Walk. Sangir.

## Osphrantis, gen. n.

Face rounded ; ocelli present ; tongue developed. Antennæ $\frac{3}{4}$, in $\delta$ ciliated with long fascicles (4). Labial palpi moderate,
curved, ascending, second joint beneath with dense rough projecting scales, forming a short tuft in front, terminal joint rather short, thickened with rough projecting scales beneath, obtuse. Maxillary palpi short, slender, filiform. Posterior tibiæ with outer spurs about half inner. Forewings with $3,4,5$ approximated, 10 out of 9 . Hindwings, $1 ; 3,4,5$ approximated, 7 out of 6 near origin, anastomosing with 8 to middle.

## O. paraphæa, sp. n.

© 13 mm . Forewings rather elongate-triangular, termen sinuate, bowed, oblique ; deep yellow, towards costa and termen suffused with a ferruginous tinge ; a dark fuscous costal streak from base to $\frac{3}{8}$; first and second lines dark ferruginous, second irregular, running from a dark fuscous spot on costa at $\frac{3}{4}$ to near tornus, then widely interrupted and recommencing in middle of disc, running to $\frac{3}{5}$ of dorsum ; small rounded dark fuscous spots in dise at $\frac{1}{3}$ and $\frac{1}{2}$, latter touching inferior section of second line ; an interrupted dark fuscous terminal line: cilia whitish, base yellowish, a subbasal dark yellow-brown line. Hindwings yellow, towards termen ferruginous-tinged ; second line as in forewings, but superior section reaching tornus.

Talaut; one specimen.

## Conogethes mimastis, sp. n.

đ $25-27 \mathrm{~mm}$. Head ochreous-yellow. Palpi ochreous-yellow, second joint with dark grey apical band. Thorax ochreous-yellow, with blackish-grey anterior spot. Forewings rather elongatetriangular, termen slightly bowed, oblique ; light orange, markings blackish; a small basal costal spot; a narrow curved subbasal fascia; first line thick, dilated costally, bent inwards beneath costa ; a narrow transverse discal mark, touching a subcostal streak connecting first and second lines; second line thick, nearly straight, connected along costa with a rather broad terminal band, of which the anterior edge is strongly concave: cilia dark grey. Hindwings orange; second line thick, nearly straight, blackish; a blackish terminal streak : cilia dark grey.

## Sangir; two specimens.

C. iopasalis, Walk. Talant. C. punctiferalis, Guen. Sangir.

> C. xiphialis, Walk. Sangir.

> Notarcha butyrina, Meyr. Sangir.
> Dichocrocis tyranthes, sp. n.

t 33 mm . Head, palpi, and thorax whitish-ochreous. Forewings rather elongate-triangular, termen obliquely rounded; whitish-ochreous, yellowish-tinged; a blackish terminal line: cilia whitish, towards base ochreous-tinged, with a grey subbasal line. Hindwings with colour, terminal line, and cilia as in forewings.

Sangir ; one specimen.
Daulia afralis, Walk. Sangir.
Isocentris illectalis, Walk. Sangir; a very small specimen, hardly 13 mm .

## Placosaris, gen. n.

Face rounded; ocelli present; tongue developed. Antennæ $\frac{3}{4}$, in ot minutely ciliated. Labial palpi moderately long, porrected, triangularly scaled, terminal joint concealed. Maxillary palpi moderate, filiform. Posterior tibiæ in of with outer middle-spur very short, rudimentary. Forewings in đ with a small flat tuft of enlarged broad scales beneath cell towards base on both surfaces; 10 closely approximated to 9 . Hindwings 1: $3,4,5$ approximated at base, 7 out of 6 near origin, anastomosing with 8 to middle.
$P$. leucula, sp. n.
of 25 mm . Forewings rather elongate-triangular, termen rounded, oblique; yellow-ochreous, suffusedly irrorated with ferruginous; costal edge dark fuscous; first line almost straight, dark fuscous, edged anteriorly with a fine silvery-white streak, not reaching costa; a dark fuscous discal mark; second line dark fuscous, edged posteriorly by a silvery-white interrupted streak, running from $\frac{4}{5}$ of costa to $\frac{2}{3}$ of dorsum, middle third moderately curved outwards; a terminal series of dark fuscous dots : cilia dark ferruginous-greyish, with dark fuscous subbasal line. Hindwings pale yellowish-ochreous ; secoud line straight, cloudy, grey, obsolete on lower half: cilia ochreous-whitish, with a grey subbasal line.

## Sangir ; one specimen.

> Pyrausta inscisalis, Walk. Talaut.
> $P$. tranquillalis, Led. Sangir.
> P. basalis, Walk. Sangir.
P. suffiusalis, Walk. Sangir.
P. celatalis, Walk. Sangir.
P. hipponalis, Walk. Talaut.
P. platycapna, sp. n.
t 23 mm . Head and thorax rather dark fuscous. Antennal ciliations minute ( $\frac{1}{4}$ ). Forewings rather elongate-triangular, termen bowed, oblique; light ochreous-yellowish ; a broad rather dark fuscous slightly purplish-tinged costal band from base to apex, thence continued as a terminal band to tornus, extending at base to dorsum, and between first and second lines extending as a cloudy suffusion over disc ; first and second lines dark fuscous, second somewhat waved, running from before $\frac{3}{5}$ of costa towards tornus to below middle, thence suddenly bent inwards to below discal mark, and again strongly curved round to beyond middle of dorsum ; a dark fuscous dot in disc beyond first line, and discal median mark: cilia fuscous, with a darker subbasal line. Hindwings pale ochreous-yellowish; a small roundish dark fuscous discal spot; second line hardly indicated by a few dark fuscous scales; a rather dark fuscous terminal band.

Sangir; one specimen. Allied to the Australian P. epitrota.

Evergestis anastomosalis, Guen. Sangir.

## PYRALIDID风.

Cirrhochrista fumipalpis, Feld. Sangir.
Cotachena histricalis, Walk. 'I'alaut.
Pyralis pictalis, Curt. Talaut.
Diplopseustis metallias, sp. n.
む 10 mm . Forewings elougate, rather narrow, suboblong, termen sinuate, little oblique ; deep ochreous-yellow ; a blackish costal streak from base to first line, marked with a bluish-leaden-metallic spot near base, extended at base to dorsum; first line nearly straight, bluish-leadeu-metallic, strongly blackish-edged ; a small semioval bluish-leaden-metallic spot mixed with black in middle of costa; second line nearly straight, oblique, bright leadenmetallic, posteriorly black-edged, preceded on upper half by a blackish blotch including a bright leaden-metallic discal spot, and with a leaden-metallic projection inwards below middle; bright leaden-metallic roundish terminal spots above and below middle : cilia ochreous-yellow, with series of dark fuscous points. Hind-
wings ochreous-yellow ; a small blackish dorsal spot before middle; second line nearly straight, bluish-leaden-metallic on lower half, anteriorly blackish-edged throughout, posteriorly edged on lower half by a blackish blotch extending to tornus, where it meets a leaden-metallic suffusion occupying lower third of termen : cilia as in forewings.

Sangir ; two specimens.
Sufetula sunidesalis, Walk. Sangir.

## SICULODIDÆ.

Siculodes anticalis, Walk. Sangir. S. astrodora, sp. n.
© 15 mm . Forewings elongate-triangular, termen bowed, oblique; pale brownish-ochreous, irregularly striated throughout with dark fuscous; five nearly straight dark fuscous fasciæ, second angularly prominent in dise posteriorly, fourth running to tornus, fifth to middle of termen. Hindwings as forewings, but first two fasciæ obsolete, third and fourth only distinct dorsally. Forewings beneath with ground-colour more whitish, strix more blackish, fasciæ more reddish-ferruginous; a bright ferruginous subcostal streak on posterior half; a black blotch in disc before middle, marked with longitudinal whitish lines on upper half and a row of bright bluish-silvery metallic dots in middle, beneath this finely whitish-sprinkled ; a broader blackish patch in disc beyond middle, marked with numerous fine whitish longitudinal lines throughout.

Talaut; one specimen.
Striglina reticulata, Walk. Sangir. Rhodoneura myrtæa, Drury. Sangir.

## ADDENDUM.

The following species of Galleriadæ I had supposed to be Callionyma semifcedalis, Walk.; I am indebted to Sir George Hampson for the information that it is not only specifically but generically distinct.

## Picrogama, gen. n.

Face with strong projecting ridge of scales. Labial palpi in đ very short, ascending, second joint rough-scaled, terminal short,
scaled, in $\%$ very long, porrected, with appressed scales. Forewings : cell in $\delta$ with lower angle very considerably produced, 4 and 5 in $\delta$ remote, in $\$$ almost connate, 8 and 9 out of 7. Hindwings : cell very short, 3 and 4 stalked, 7 anastomosing shortly with 8.
P. anticosma, sp. n.
© 41 mm ., ㅇ 34 mm . Head and thorax whitish-ochreous, partially tinged or suffused with light brown-red. Forewings elongate-oblong, more elongate in $\delta$, apex nearly rectangular, termen straight, hardly oblique ; reddish-brown, more or less suffused with light ochreous in disc from base to beyond middle; in 0 a white longitudinal streak above middle from base to ${ }_{5}^{3}$, lower edge margined posieriorly with a golden-ferruginous suffusion, indented at $\frac{2}{5}$, terminated by a small round dark fuscous discal spot; in $q$ a triangular dark fuscous blotch in disc before middle, and a transverse narrow reniform spot beyond middle ; a cloudy darker transverse line at $\frac{3}{4}$, in $\delta$ straight, in $?$ somewhat curved; an undefined pale ochreous narrow terminal fascia: cilia light reddish-brown. Hindwings in $\delta$ orargeyellow, in 9 light ochreous-yellowish.

## Sangir ; two specimens.

IV. New Coccidæ collected in Algeria by the Rev. Alfred E. Eaton. By R. Newstead, F.E.S., Curator of the Grosvenor Museum, Chester.
[Read Nov. 18th, 1896.]

## Plate IV.

Towards the end of December, 1895, and again quite recently, the Rev. A. E. Eaton very kindly placed at my disposal a most interesting lot of Coccidæ which he had collected principally in the neighbourhood of Constantine, Algeria, during 1895-6. It is with great pleasure that I am at last able to give a complete list of all the species he has taken, together with the descriptions of the new species. My only regret is that I have not been able to do so at an earlier date; but my studies of the British Coccidæ prevented my doing so until now. Mr . Eaton also furnished a most valuable list of the foodplants harbouring the Coccidæ, which has been appended to those insects to which the plants refer. He says :"The localities in which the Coccids were collected lie between 1700 ft . (in the lowest sites in the valleys quoted) and 2500 ft . above the sea. These are not the lowest nor the highest attainable parts of the district. Their character has more of the Hautes Plateaux than of the Mediterranean Region about it, and may be considered that of the mountains of the Tell or of the outskirts of the Plateaux. This will explain the absence of such shrubs as Viburnum tinus, L., and (practically) Laurus nobilis, L., from the list and collections.'"*

## Aspidiotus nerii, Bouché, ô 우.

This widely distributed and destructive pest was evidently the commonest species met with. It occurred on the following plants :--"Clematis flammula, L., Constantine, 4 , xii., ' 95 , on M'cid, above the Route de la Corniche, just beyond the last tunnel. Spartium junceum, L., Constantine, 24, x., '95, hedge above the railway skirting' the forêt at the commencement of the road up the Mansourab. Calycotome spinosa, Lk., Constantine, 28, x., '95,

[^2]on the slopes of the Mansourah. An abundant insect by the descent from the town to the Port d'Aumale, and below the railway between the railway tunnels beside the Route de la Corniche. Ceratonia siliquosa, L., 4, xii., '95, on M'cid in the pine wood. Bône, 4, xii., '96, Mimosa and Robinia pseudacacia, L., Constantine, hedge of a garden in the suburb el-Kantara. Cratægus azarollus, L., Constantine, December, on M'cid. Hedera hehx, L., Constantine, 26, x., '95, in the town garden ; it probably occurs at Algiers, since ivy there harbours abundance of a Coniopteryi. Phillyrea media, L., 18, x., '95, near the Route de la Corniche, on M'cid. Nerium oleander, L., Constantine, near the Route de la Corniche, by the stream, abont 3 kilometres from the town; chiefly on small short shoots near the ground in the shade. Bône, 26, xii., '95. Antirrhinum majus, L., Constantine, 23, x., ' 95 , on the brow of the point of the spur of M'cid opposite the Kasba. Stachys circinnata, L'Héritier, the same as the preceding. Laurus nobilis, L., Constantine, on a shrub planted in the public garden, 2, xii., "95."
"Osyris alba, L., Constantine, 23, x., '95. Olea europra, L. (as abundant on the fruit as on the leaves). Smilare aspera, L., Bône, 9, ii., '96, by the sea-shore. Chamærops humilis, L., Bône, 20, xii., '45. Preyed upon by Chrysopa vulgaris and Coccinellidæ."
A. napax, Comst., $q$.
"On Myrtle. Bône, up the valley beyond the Orphelinat, 27, ii., '96." Chiefly immature $f$, and situate on the uppersides of the leaves along the midrib. Does not appear a common species.

Diaspis calyptroides, Costa, ㅇ.
"On Opuntia ficus-indica, Haw. Bône, 20, xii., '95." Judging from the liberal supply of specimens, and the crowded nature of the scales, the species is very abundant where it occurs.

Mytilaspis pomorum, Bouché, + .
"On Salix pedicellata, Desf. (S. ægyptiaca, L., ?), Constantine, 26 , x., ' 95 , border of the Roumel by the garden of the tile-works near a ford below the Route de

Sétif, about half-an-hour's walk from the town." The scales were unusually grey, and larger than typical examples.

## Mytilaspis minima, sp. n. (Plate IV., figs. 1-5.)

o Scale very convex, filiform, straight or curved, margins irregular, owing to the numerous hairs on the leaf of the food-plant ; colour pale yellow- brown or red-brown, anal extremity usually paler. Larval pellicle terminal of the same colour as the scale. Long. $50-1 \cdot 50 \mathrm{~mm}$.
of Adult elongate, attenuated in front; antennæ rudimentary. Pygidium (figs. 1, 2, 3) rounded, lobes short, median pair large and widely separated, with the lateral margins usually emarginate ; second and third pairs rudimentary. There are generally three pairs of plates on each side beyond the median lobes, which are very long and broad; and between the median lobes a much shorter pair, widely separated. When present there is a rather long spine near the second, third, and fourth pairs of lobes, but they are often wanting. Five groups of compound spinnerets are present; anterior group with 2-5, anterior laterals 3-6, posterior laterals 3-6.
of Scale conrex, a little wider than the larval pellicle; white, with the larval pellicles darker.
of Second stage elongate-ovate, closely resembling the $\uparrow$ in character. Pygidium (fig. 4) with 5 almost continuous groups of compound spinnerets; the anterior with 3 , auterior laterals $7-8$. posterior laterals $4-6$; the median lobes are very broad and deeply emarginate ; the second and third pairs are scarcely visible. The plates are somewhat larger and more numerous than in the $q$.

Larva. Antennæ (fig. 5) of 6 joints, of which the third is nearly as long as the rest together; fifth shortest, first much the widest.

Hab. "Among the rocks at the brow of the wooded slopes of the Mansourah ; on Ficus. carica, L., 24, x., '95.'"

I'he $\&$ were scattered over both surfaces of the leaves; but the $\hat{\sigma}$ were on the upper side along the ribs. This is the smallest species I have yet studied; and in other respects it seems quite distinct. It belongs to that section of which M. cordylinidis, Mask., is the type.

## Mytilaspis ampelodesmæ, sp. n. (Pl. IV., figs. 6, 7.)

Scale of the $\%$ long and narrow, sides parallel, white; larval pellicle white or pale yellow, transparent; second pellicle redbrown inclining to piceous in the centre, usually covered with white secretion ; ventral scale white or yellowish white, and apparently incomplete. Long. $1-2 \cdot 25 \mathrm{~mm}$., lat. $\cdot 50 \mathrm{~mm}$.
$\uparrow$ Adult very elongate, sometimes attenuated and curved in front. Rostral filaments very short. Rudimentary antennæ with two or three spines. Margin in front with a few spiny hairs. Pygidium (fig. 6) slightly produced; first and second pair of lobes very large, chisel-shaped; third pair nearly obsolete. Plates very long, simple and stout; two between the median lobes and two between the latter and the second pair; beyond these are usually nine others, arranged in threes. Spines long and slender ; median pairs considerably within the margin ; the rest are arranged as shown in the figure. Ventral compound spinnerets in five groups; anterior group with $1-7$, anterior laterals 15 , posterior laterals $15-22$; in oue example the anterior group is entirely wanting.

Scale of the ot white, a little convex ; larval pellicle yellowish.
to Second stage possessing antemuæ (fig. 7) of six nearly equal joints.
This cbaracter I have not hitherto observed, and it may be exceptional ; but as my knowledge of the intermediate stages of the $\widehat{\delta}$ Coccidx is very limited, I cannot now offer an opinion. It is certain that the preceding species possesses none.

Hab. "Constantine, 5, xii., '95, mountain westward of the town across the valley, at an altitude of about 2500 feet ; 7, xi., '95, among rocks at the top of the wood on M'cid ; 8, xi., '95, among the rocks above the wood on the Mansourah, near the quarries below the barracks."

On Ampelodesma tenax [Vahl.], Lk. This species is allied to Mytilaspis cordylinidis, Mask., in the form and character of the scale; but the structure of the pygidium is clearly distinct.

Chionaspis nerii, Newst., $i+$ and $\hat{\delta}$ scales.
Although not exclusively confined to Nerium oleander, it is evidently partial to that plant. The Rev. A. E. Eaton says that "the mostly solitary of and its $\hat{8}$ are common on the oleander, on leaves of well-grown stems, and the $f$ makes a light-yellow rounded patch or spot of discoloration in the leaf."

Hab. Constantine, near the Route de la Corniche. Also on the same plant at Bône, 26, xii., '95. And at Constantine three $q$ on Olea europæа.

Chionaspis striata, sp. n. (Pl. IV., fig. 8.)
Scale of the $q$ very convex, generally widely pyriform, transversely striate, the striæ well separated, equidistant, and clearly defined ; shining satiny-white; pellicles pale ochreous yellow or
colourless; anal extremity of second pellicle of a more decided yellow than the rest. Long. $75-1 \cdot 25 \mathrm{~mm}$.

If Adult elongate ovate. Rostral filaments short. Pygidium (fig. 8) rather widely rounded and continuous with margin. Ventral compound spinnerets in five groups ; anterior group with $3-4$, anterior laterals $9-13$, posterior laterals $8-17$; median lobes short, very widely separated, and between them six very short spines, three on each side of the median line ; immediately beyond the lobes are two more spines, which are followed by faint traces of the second and third lobes and one or two plates. Often, however, spines, plates and lobes are entirely absent. Long. $1 \cdot 25 \mathrm{~mm}$.

む Scale white, closely felted, tricarinate ; pellicle pale ochreous, or greenish yellow, cephalic extremity darker.
© Adult unknown.
Hab. On Cypress. "Constantine, on the side of the Mansourah, on young trees planted by the garde forestier's house, and elsewhere in the wood. It occurs also more sparingly in the Mohammedan cemetery . . . . where in fact it was first noticed."

The study of this unique species has given me infinite pleasure. 'The interesting satiny-white striate scales may be recognized at a glance; and the widely separated median lobes are very characteristic.

It is strange, though, that many of the $q$ should be without marginal appendages to the pygidium, and even when these are present they are more or less rudimentary.

## Parlatoria afinis, sp. n. (Plate IV., figs. 9-12.)

Scale of the $q$ circular, when isolated and upon the smooth surface of the leaf or fruit, but when over-crowded it becomes elongate or widely pyriform ; dusky white or pale ochreous; larval pellicle at the margin in front, rarely extending beyond it ; second pellicle occupying nearly one-third of the scale; both pellicles variable in colour, usually dark obscure green or piceous, rarely ochreous red; the anal extremity of the second pellicle often dull orange. The scale is unusually thick, and dusted with ochreous or greyish meal. Diam. 1-1.25 mm.
$\ddagger$ Adult (fig. 9) almost circular. Rudimentary antennæ with a short curved spine (fig. 10). Rostral filaments extending to middle of body. Segmentation distinct. Margins of abdominal segments fringed with serrate and simple plates. Dermis at margins of trans. ent. soc. lond. 1897.-part I. (appil.)
free abdominal segments broadly set with numerous large pores or glands. Pygidium (fig. 11) somewha $\lrcorner$ angular ; ventral compound spinnerets usually in five groups; anterior group with 1-3, or entirely absent, anterior laterals 13-20, posterior laterals 14-19; margin crenulated; there are three pairs of well-developed lobes, of which the median pair are much the largest : all deeply emarginate at the outer extremity ; fourth pair of lobes almost obsolete. There are two serrate plates between each pair of lobes, beyond them several others, broader and more palmate, with the serrations rather shallow and the tips blunt and rounded. Within the margin on each side are 9-10 large crescent-shaped pores or openings. Long. $\cdot 25-75 \mathrm{~mm}$.

Scale of the of straight, without carinæ; pale ochreous or dusky ochreous when upon the undersides of the leaves, white when upon the upper surfaces or in exposed situations; larval pellicle terminal ; bright ochreous or dull orange, centre dark obscure green.
©. Antennx of 10 joints, thickly set with short hairs ; apical joint (fig. 12) very short, suddenly narrowed about the middle and pointed ; it is furnished with two long, stout, kuobbed hairs : the first projecting at right angles from the centre of the lower half, the other at the extreme tip. The articulation of the tibiotarsal joint wide; lower pair of tarsal digitules long and slender, and extending to tip of claw ; upper pair wanting. I can give no further information as the specimeus are too imperfect.

Hab. "Constantine, along the Ronte de Sétif, near the Camp des Oliviers, 6, xi., ${ }^{\circ} 95$; on Fraxinus oxyphylla, Marsh. ; also on Olea europæa, L., from the same locality ; and from the north side of M'cid."

Parlatoria zizyphi, Lucas, to ㄱ. (Plate IV., fig. 13.)
Hab. Bône, 2, ii., '96, on Tangerine oranges.
It is necessary here to call attention to some important characters which apparently have been hitherto overlooked. The adult $\circ$ has a large marginal tubercle (fig. 13) projecting from each side of the thoracic segment, and bearing on the dorsal (?) surface a minute spine. Below the tubercle on the extreme margin a similar isolated spine. P. pergandii, Comst., also possesses a similar character, but in this latter there is the merest extension of the body surmounted by a small angular spine.

## Parlatoria pergandii, Comst.

Hab. Bône, 8, ii., '96, on Tangerine orange.

Planchonia algeriensis, sp. n. (Plate IV., figs. 14-17.)
Test of the $q$ short ovate, hemispherical ; opaque: lemonyellow. Dorsum almost covered with very short woolly filaments, which gradually lengthen as they near the margin. Marginal fringe long, irregular and without desigu. Anal orifice almost erect and transversely elongate. When the dorsal filaments are worn away, as is often the case, the test presents a wax-like appearance. The test rests in a shallow depression, and is surrounded by an abnormal swelling of the plant-tissues, as in $P$. quercicola, Bouché, and $P$. hederce, Licht. Long. 2.50-3.50, lat. $1 \cdot 75-2 \cdot 50 \mathrm{~mm}$.
of Adult. Shape uncertain. Mentum monomerous, very short ; unexpanded filaments scarcely longer than mentum. Dermis (fig. 14) above, with numerous scattered figure-of-eight spinnerets ( $a$ ) and very long, slender, tubular spinnerets ( $b$ ); ventral surface with small simple spinnerets $(c)$, which occur chiefly near the margin ; at the margin is a double row of figure-of-eight spinnerets.
\& Second stage. Antennæ (fig. 15) of 6 joints; 1 widest, 2 longest and tapering; $3,4,5$, and 6 gradually widening towards apex; 2 and 4 with a single hair ; 6 with one long and two shorter hairs. Legs (fig. 16) longer than antennæ; tarsi twice the length of the tibiæ, with 3-4 rather long hairs arising from a central constrictiou; claw twice the length of the digitules. I could trace ouly a single tarsal digitule, but it is quite possible the others may hare been broken away. Dermis with a single marginal and two dorsal rows of figure-of-eight spinnerets of the same character as those in the adult.

Larva. Antennæ (fig. 17) of 6 joints; 1 widest, 2 narrow at base, $3,4,5$, and 6 equal.

Hab. "Constantine, 24, x., '95, hedge above the railway, skirting the forêt at the commencement of the road up the Mansourah ; on Spartium junceum, L."

In many respects this species resembles $P$. hederá, Licht., but differs in having the test more ovate and nut attenuated behind, and in the character of the antenma of the $o$ 2nd stage. The opacity of the test is also another mark of distinction.

## Planchonia ilicis, sp. n. (Plate IV., figs. 18, 19.)

Test of aủult $q$ glassy, almost circular, convex ; constricted at the margin by the first pair of spiracles, but this character is inconstant, and often asymmetrical ; anal orifice very large and slightly produced ; margin carinate ; without cilia. To the naked eye the colour is bright, shining, greenish yellow; with the anterior half, or anterior margin, bottle-green, sometimes inclining to browu. Under the microscope the yellow colour is seen to be due partly to the numerous effete larval skins; and the darker colour in front to the shrivelled body of the $q$. The old weathered examples present a greyish appearance. Ventral surface of test with the anterior half dark-brown ; posterior half and margin pale greenish yellow ; the line of separation between the colours abrupt. Diam. 1.50 mm .
i Adult circular. Rudimentary antennæ disc-like and without hairs. Mentum monomerous; unexpanded filaments ahout same length as mentum. Anal lobes minute, each with a single long hair, and between them two shorter ones. Anal ring small, simple, and apparently without hairs. Dermis (fig. 18) above, with very long tubular and circular spinnerets ( $a$ ) : the former most numerous near the margin; there is a complete single row of figure-of-eight spinnerets (c) placed close together all round the margin ; and near the anal ring a small group of 4 or 5 of the form shown at (b).

Test of the of elongate, with a faint median carina, and distinctly segmented. Margin (fig. 19) with a fringe of short glassy filaments arranged in pairs, curved outwards, and meeting together at the tips, somewhat like a pair of callipers. Long. 1 mm .

Hab. "Constantine, 23, x., '95, top of extreme corner of the spur of M'cid opposite the Kasba, on the scrub. 'The same scale occurs plentifully on the Mansourah, near the source of Sidi M'cid. Colour of Coccid, during life, bottle-green below, dusted above with light-yellow. Much infested by a parasitic Hymenopteron."

This is a brilliant species ; and in its structural characters difficult to separate from P. ilicicola, Targ. Tozz., but the absence of a marginal fringe at once distinguishes it from the latter. There can be no doubt as to the aicsence of the fringe, as I possess a large number of specimens in the most perfect condition.

## Lichtensia eatoni, Newstead, 우.

On Olea europæa, and Phillyrea media, at Constantine, in Oct., 1895.

Ceroplastes rusci, Linn., ․ . (Plate IV., figs. 20-23.)
\& Adult. Antennæ (fig. 20) of 6 joints, of which the third is much the longest. Anal lobes short, conical ; after treatment with potash somewhat triangular and obtusely pointed, each with two gland-pits near the centre towards the apex.

Stigmatic area (fig. 21) with about 12 large, irregular, pocketlike processes (fig. 22), near the margin a group of $3-4$ circular spinnerets; and on the margin an irregular row of conical spines (fig. 23). The external characters are not given here, as Signoret (Essai, p. 191) very clearly describes them; but as he gives no structural characters of the adult $q$, the description and figures given above may be of use for future reference.

Hab. "Constantine, 18, x., '9ั. near the source of Sidi M'cid."

Ceroplastes nerii, sp. n. (Plate IV., figs. 2 t, 25.)
of Adult. External covering dull white, with a beautiful roseate hue ; there are one dorsal and eight marginal plates, all clearly defined and outlined in dark grey, the grey shading off and extending into the plates; nuclei pure white. Anal lobes slightly protruding through the covering. Dermis after treatment with potash non-chitinised, transparent. Anteunæ (fig. 24) of 7 joints; 3 longest, $4,5, \& 6$ shortest, and equal. Anal lobes with 2-4 long, slender hairs, each arising from a transparent gland towards the apex. Stigmatic area (fig. 25) with $20-25$ grouped spinnerets ; margin with large, very obtuse, conical spines, arraug ad two deep at the centre.

Legs normal. Long. $3 \cdot 5$; wide $2 \cdot 50-3 \cdot 50$; high $1 \cdot 7-2 \cdot 25 \mathrm{~mm}$.
Hab. "Constantine, 23, x., '95, on Nerium oleander. Very local, and found only on young healthy shouts of this year's growth."

This is a large handsome species, and apparently quite distinct. It is like C. Amidensis, Comst. (Report, 1881, p. 331), in having a non-chitinised skin, but differs in having fewer and shorter stigmatic spines, and marginal hairs; in C. floridensi; the latter are closer together and much longer.

## Lecanium hesperidum, Linn., ㅇ.

Hab. Constantine, October and November; on Ficus rarica; Convolvulus tricolor, L.; Clematis flammula; Morus sigra, L, and on Mimosix. As only a few specimens cccurred on the above-named plants, I imagine the species was not very abundant.

Eriococcus formicicola. sp. n. (Plate IV., figs. 26, 27.)
\& Adult clongate ovate, narrowed behind. Antenne (fig. 26) of 6 joints, 3 longer than 4, 5 , and 6 together, has sometimes a central false joint with a very faint articulation. Mentum short, biarticulate. Anal ring with 6 hairs. Anal lobes normal. Legs ordiuary ; tibix and tarsi, exclusive of claw, in length equal ; digitules to tarsi and claw simple. Dermis (fig. 27) above, with many short tubular spinnerets; and at wide intervals a minute spine. Margin with a single row of short spines.

Sac of $q$ short ovate, convex, slightly attenuated and recurred behind ; anal orifice large; white and closely felted. Long. 3-3 25, lat. $\cdot 50 \mathrm{~mm}$.

Sac of ot elongate orate, slightly convex. Colour and texture as in the $q$. of unknown.

Hab. "Constantine, 2 1, x., '9.3, on wooded slope of the Mansourah. Brought up by ants after the first rain, and carried underground again within a few days when the weather became fine. Apparently a very local insect ;" on Cynodon dactylon, L.

It would seem from the foregoing that prior to the formation of the sac, this species lives underground in company with the ants; but fo: what purpose the latter bring the Coccids to light, after a heavy rain, is a mystery. It is very singalar too that the Coccids should leave their subterranean home and construct their sacs on the leaves and stems of the C!modon, as was certainly the case with those specimens sent to me. It is the first and only species of Eriococcus known to frequent ants' nests, and is therefore of great interest.

Eriococcus tingmelæx, sp. n. (Plate IV., figs. 28, 29.)
Sac of the $q$ short ovate, slightly produced behind, very convex; anal orifice small. Owing to overcrowding of the sacs, they are often irregular in form. Long. 3, wide 2 mm .
i Adult elongate ovate, uarrowed behind. Anal lobes large,
normal. Antennæ (fig. 28) of 7 nearly equal joints, 3 and 4 the longest ; there are a few hairs on the last joint, but none discoverable on the others. Legs long and rather stout. Mentum large, biarticulate, with 8 long hairs near the apex ; unexpanded filaments extending to insertion of posterior legs. Anal ring with 6 hairs. Dermis (fig. 29) above almost covered with strong spines : those on the margin much the longest. Scattered amongst the spines are many simple spinnerets. Beneath are numerous minute spines, and a few simple spinnerets. Long. $\cdot 50-75 \mathrm{~mm}$.

Hab. "Constantine, 28, x., '95, on the slopes of the Mansourah near the Depôt des fourrages of the Chasseurs d'Afrique ; on Thymelra hirsuta, Endlicher."

This species may be readily distinguished by the form of the antennæ, and the numerous long irregularly arranged dorsal spines.

Explanation of Plate IV.
[See Explanation facing the Plate.]

## V. Seasonal Dimorphism in African Butterflies. By Arthur G. Butler, Ph.D., F.L.S., etc.

[Read February 3rd, 1896.]

Mr. Guy A. K. Marshall's "Notes on Seasonal Dimorphism in South African Rhopalocera" (Trans. Ent. Soc. Lond., 1896, p. 551), as observed by him in Mashunaland, are of great interest and form a contribution to science which will be very useful to future workers, as exhibiting a part of the truth relating to this engrossing subject ; but a part only, as it is now my object to show.

Mr. Marshall has evidently misunderstood my remarks respecting seasonal and local modifications of species; he has indeed wholly missed my point, which is this :in a country which is hot and dry throughout the year wet-season forms will be naturally extremely rare (if present at all), whereas the reverse will be the case in an uniformly moist climate. Now where a species ranges throughout Africa to Arabia, it exhibits in one locality a single type (say dry-season), and perhaps in abnormal seasons when light showers fall, a second type (intermediate between dry and wet); or if the country be moist a wet-season and an intermediate-season form oecur, but no dry-season form. Such is frequently the case in Sierra Leone.

In countries where the wet season is out of all proportion to the dry, the wet-season form of a species will be naturally better marked; and the reverse will hold good where the dry season has the advantage.

It is very likely that Mr. Marshall may be correct in his opinion, based upon practical experience in Mashunaland, that, in Acrexa, I have called the dry-season form "wet," and the wet-season form "dry,"* but I am

[^3]satisfied that in an unusually dry country the so-called "wet-season form" is sometimes identical with the socalled "dry-season form" of a moister country. Indeed, the conditions, as far as the absence of one modification and presence of a new one are concerned, are practically very similar to those which obtain in the N. American Lycænid, Cyaniris pseudargiolus, beautifully worked out by Mr. W. H. Edwards (Butt., N. Am., ii., pp. 315 et seq.).

Mr. Marshall is quite correct in saying that it is extremely difficult to define "the specitic differences of butterflies merely from a series of museum specimens when not backed up by a practical knowledge of the habits and range of the species involved." But, on the other hand, it is impossible for a worker in any one part of so vast a country as Africa arbitrarily to settle, to the satisfaction of everyone, the extent of variation of any one widely distributed species under seasonal and climatic conditions. That Mr. Marshall has amply proved this I can readily show ; and 1 do so, not with any desire to detract from the value of his observations, as applied to South African butterflies when in southern S. Africa, but to prove that the conditions differ in the same species when found only so far northward as Nyasaland.

In my notes on "Seasonal Dimorphism in Acrra" I took what I regarded as the extreme dry and wet developments of the species, not of that phase of the species represented either in the Cape Colony or in Mashunaland; whether the intermediate forms occur as the dry-season form in one part of Africa, the wet-season form in another, as the sole representatives of the species in a third, or not at all in a fourth, is perfectly immaterial. As developments of the species, intimately connected with and incapable of sepa:ation from it, they must be taken into account; but I frankly admit that it is extremely probable, as already granted, that I ought to have called the dry-season form "wet," and the wet form "dry." The fact, therefore, that one of my seasonal forms does not occur in conjunction with the extreme southern form throughout its range, or that it occurs apart from the latter at any part of its range, is not enough to show that it is not a seasonal phase of a species in some part of Africa.

The species of Acræa mentioned in my former paper will be now separately referred to.
(1). A. anacreon, Trim. = A. borba, Grose-Smith.

As Mr. Marshall observes (p. 564), when he examined the British Museum collection there were five specimens labelled as A. bomba (=induna), four of which I have m5self proved to be A. anacreon, inasmuch as the apical patch is not filled in, though more heavily marked than in typical A. anacreon. When, however, Mr. Marshall asserts that the female, admitted to be A. induna, has no connexion with the latter, he is certainly wrong, for we have since received the male, agreeing perfectly with Mr. Grose-Smith's figure and tolerably closely with Mr. Trimen's. This example was captured together with a typical male of A. anacreon, by Mr. Crawshay, on the 15th September, $18^{\prime 5}$, on the Chuona River, Mwewe's Town, Unyika. If there were any constant difference of pattern on the under surface of the wings between A. anacreon and A. bomba ( $=$ induna), it would be possible to force oneself to credit the distinctness of these forms, even though they were captured simultaneously. But there is no constant difference, and absolutely the only distinction between these two specimens, on the under surface, consists in the absence, in the A. anacreon type, of the three dots beyond the cell of the primaries, which (in that type) are usually strongly defined. As a matter of fact the only constant difference between typical A. anacreon and typical $A$. bomba consists in the absence or presence of the tawny submarginal spots on the apical area of the primaries above. I am therefore certain, in spite of these two forms having been taken together (which Mr. Marshall frankly admits to be immaterial and due to the overlapping of seasons), that A. anacreon and A. bomba represent the extreme developments of one species in Nyasaland, whether they do or not in southern S. Africa.
(2). With regard to the seasonal character of A. periphanes and A. guillemei, Mr. Marshall, having seen two specimens of the former in our collection, has his doubts thereon; but he does not comprehend the want of the heavy marginal border in the secondaries. I am now able to resolve those donbts, as other specimens (linking the two in an extraordinary manner) have been since received; these specimens prove beyond all question
that the two extremes belong to one species in which the border of the secondaries is sometimes lightly and sometimes heavily marked, as in A. anacreon. As with that species also there are no constant differences of pattern on the under surface of the wings.
(3). A. doubledayi, Guér. = A. dircra, Westw.

Westwood's description agrees well with the insect which I identified as that species, and which, I have no doubt, is a seasonal form of A. doubledayi. Mr. Marshall, however, when in England, informed me that he had seen Westwood's type and found it identical with A. caldarena, Hew.; this was sufficient for me, and I immediately altered the identification. In his paper, however, Mr. Marshall speaks of Westwood's insect as a seasonal form of $A$. caldarena, which can be hardly possible, since Westwood says that it is "allied to Acr. onсra, but with a very well defined broad black apex to the primaries "; this exactly tallies with the form of A. doubledayi (=oncæa) which I identified. Of the latter we now have additional examples linking it to typical A. doubledayi beyond all question, and received in the same collection with the white-banded female of that species. Mr. Marshall's recently published statement has made me feel that I should like personally to compare Westwood's type both with $A$. caldarena and the form of A. doubledayi with black apex.
(4). Acræa stenobea, Wallengr. $=$ A. caldarena, Hew.

Of this identification I never felt very certain, because we have a wet development of $A$. stenobea in A. crcilia of the West Coast. Both A. cacilia and A. stenobea occur rather commonly in S.- $W^{W}$. Africa.

When Mr. Marshall made his remarks respecting my " lamentable confusion as to what are real specific differences in Acrra," " the fallacy of my supposition," etc., he had not had the advantage of studying our very fine series. Had he done so he would have discovered that A. lygus, Druce (=allomaculata, Weym.) was a form of $A$. stenobea varying in the direction of A. crecilia, and occurring with it on the Congo. Mr. Irrmen's description does not accurately describe it, inasmuch as the basal blackish suffusion is more pronounced on the forewing in typical A. lygus, than in any other form of that variable species, A. cæcilia. The examples from the " Eastern extremity of Cape Colony and Basutoland," if such examples of
A. lygus exist (which is not directly stated by Mr . 'Trimen) may link A. stenobea to typical A. lygus, and so to A. crcilia, but that they are a seasonal form of it in the extreme south seems exceedingly improbable; they are far more likely to be a mere albinistic sport, such as occurs in many other species of Acræa. This seems the more probable from the fact that, as far as I have seen, they are always females.

It is not at all a conclusive argument that, because in southern South Africa A. stenobea has not been found associated with A. caldarena and because, in Mashunaland, the latter occurs the whole year round without $A$. stenobect making its appearance, the two do not occur as seasonai forms of one species in any part of Africa. Nevertheless, as all the forms of A. cæcilia appear to occur chiefly in Southern and South-Western Africa (although typical $A$. cxcilia is also found in Abyssinia), I think the claim of A. caldarena to be regarded as distinct has a firm basis. Regarding this species as a wet-season form, we then still have to look for its dry development; and this leads me to point out to Mr. Marshall that, when he assumes that each species varies seasonally in the same way throughout its entire range, or, because it does not vary in one district, it therefore varies nowhere, he makes an assumption which can be easily disproved by anybody in charge of a sufficiently large and carefully collected series of specimens.*

When we see that $A$. zetes is the extreme wet development in Sierra Leone of that brightly coloured type of A. menippe found at Uganda, and that A. pseudegina is the extreme wet development in Sierra Leone of the southern A. natalica; whilst in both cases intermediate forms occur, sometimes side by side with the wet form, and sometimes, to the exclusion of both extremes, in intermediate localities, we must be very careful not to be too dogmatic in our statements respecting the constancy of either the species themselves, or their seasonal varieties.
(5). A. pudorina, Staud. = A. chæribula, Oberth.

Accepting Mr. Marshall's correction as to the blacktipped forms being "wet" and the forms without black tips "dry," it is curious that in this species

[^4]he seems to reverse the order, telling us that he captured A. acrita in the dry season, and referring me to a paper of Mr. 'lrimen's which distinctiy suggests that the slightly marked type (which, by the way, is almost the same as $A$. pudorina) is the winter form of the species captured by Mr. Marshall during the heavy rain ; and he says that, by quietly ignoring this, I have fallen into the error of confusing local with seasonal variation. If Mr. Trimen's insect were the wet-season form of Mr. Marshall's, he would have followed my original course ; but what he has done is to confound seasonal and local forms.

Admitting that A. pulorina is probably the extreme dry- (not wet-) season form of the species, the form described and figured by Mr. Trimen may occur with it as its wet-season form; whilst if A. acrita occurs (as in Nyasaland it undoubtedly does) with A. chreribula, the latter would be the wet-season, and $A$. acrita, as Mr. Marshall says, the dry-season form.

From Nyasaland however we receive A. chæribula (wet-season), A. acrita (intermediate), and A. pudorina var., of Mr. 'Trimen's plate (dry-season), which shows that in dogmatizing respecting seasonal forms, locality must be taken into account.

My decision respecting this species throughout its range remains as it was, allowing only for the substitution of "dry" for "wet"; and Mr. Marshall's assumption that, if I had been correct, he ought to have taken $A$. pudorina and not A. acrita in Mashunaland is based upon a confusion of ideas between local and seasonal forms. To put the matter brielly:-If in any part of Africa $A$. chæribula does not exist with $A$. acrita, the extreme wetseason form of the species is not developed in that region, and if A. pudorina does not exist, the extreme dry-season development of the species is wanting, but this does not alter the fact that these intimately connected forms are all one species. Their differences are all limited to the black apex of the primaries above; the borders of the secondaries vary too much in most species of Acræa to be relied on, and these variations are not limited either by season or locality.

Respecting the seasonal forms of Precis (= Junonia) I have spoken elsewhere. They may be quite correct as regards Mashunaland; indeed I had already published
my idea as to J. nachtigali being a seasonal form of $J$. artaxia when we received a collection from Nyasaland distinctly proving that both occurred together in splendid condition at the same season. I have also proved that J. simia, J. trimeni, and J. cuama fly there together throughout a considerable portion of the year, and certainly both in the dry and wet seasons; this is somewhat disconcerting.

In conclusion, I would observe that, whether the forms of Acrea with black apex be proved by breeding to be a seasonal development of those which lack it, or not, there is not the slightest doubt that they are varietal forms, and not distinct species ; all of them, with the exception of $A$. caldarena, being already linked together by intergrades in the British Museum series.

## VI. The Prothoracic Gland of Dicranura vinula, and other Notes. By Oswald H. Latter, Assistant Master at Charterhouse, formerly Tutor of Keble College.

[Read March 3rd, 1897.]

Plate V.

i. The Function, and Structure, and Homologies of

Tee present communication is the outcome and continuation of my previous investigations, of which accounts are to be found in Trans. Ent. Soc. Lond., 1892, pp. 287-292, and 1895, pp. 399-412. Being desirous of tracing the source of the potassium hydroxide solution by the aid of which the imago softens the cocoon at the time of emergence, and having already shown that this solution is stored in a special dorsal diverticulum at the anterior extremity of the mid-gut of the pupa, I proceeded in the summer of 1895 to inquire into the nature of the alkaline fluid which is abundantly present in the alimentary canal of the larva. Twenty larvæ in their last stage were procured, their alimentary canals were dissected out, and thrown into deci-normal hydrochloric acid of known weight and there minced, while the remainder of their bodies was likewise placed in another vessel containing hydrochloric acid of similar strength.

I will deal with these latter first, for they led me to more complete results.

On the day following the dissections above mentioned I was astonished to find at the bottom of the beaker containing the hydrochloric acid into which the bodies of the larvæ had been thrown, a thick gelatinous deposit covering all the bottom to a depth of about $\frac{1}{4}$ inch. This deposit was semi-opaque, pale yellow in colour and sufficiently firm to allow of its being removed en masse from the beaker and of being lifted by one side without breaking or indeed bending trans. ent. soc. lond. 1897.-part if. (July) 8

## 114 Mr . O. H. Tatter on the Prothoracic Gland of

excessively. Examination of this deposit revealed shreds of the walls of the silk glands scattered throughout the sheet. It at unce occurred to me that if this effect was produced by the action of hydrochloric acid upon the contents of the silk glands, it was possible that the formic acid secreted by the prothoracic (" neck ") glands, as described by Klemensiewicz (8) and Poulton $(12,13)$ might perhaps in a similar way give rise to the peculiar horny and non-fibrous character of the silk of the cocoon of this species. This suspicion was rendered the more strong by the fact that the sheet taken from the hydrochloric acid when exposed to the air and allowed to dry assumed in the course of a few hours an appearance and consistency very similar indeed to that of a Vinula cocoon spun without fragments of wood, etc. Unfortunately I was unable, in consequence of want of material, to proceed further with the subject in 1895, and accordingly was obliged to defer the work till the summer of 1896 , when I procured a large number of larvæ from Messrs. Edmonds of Windsor. My first step was to determine whether formic acid behaved towards the excised silk glands in the same manner as hydrochloric acid. Accordingly the silk glands of a fully grown larva were dissected out and at once placed in formic acid, and there cut up into several pieces. In the course of a few hours the whole mass had swollen greatly and had set into a tolerably firm and nearly transparent jelly. On exposing this jelly to the air so as to permit evaporation, shrinkage took place, and eventually there was left a hard horny mass very closely resembling a cocoon both in texture and appearance. I may here add that I treated the silk glands of several other species, notably of $L$. cossus and of the larva of the Japan Silk-Moth, A. permyi, with formic acid in the same way but with totally different results. The glands of $L$. cossus remained flaccid, but became whiter and more opaque, while those of $A$. pernyi became very tough and much harder. It is thus evident that a special relation exists between the composition of the undischarged silk of $D$. vinulu and formic acid, and it is further probable that the chemical composition of the silk of various species is very far from constant.

I next endeavoured to ascertain whether the larva did as a matter of fact employ its formic acid when con-
structing its cocoon. Prof. Poulton (12) has already pointed out that the freshly-made cocoon while still moist is strongly acid, which observation I can amply confirm. Moreover, if a larva is watched when spinning it is at once seen that the aperture of the prothoracic gland is brought into close proximity with that of the silk glands, and further that the former is constantly moist. I interrupted a larva in this occupation, and by means of a fine roughened pair of forceps caught the end of the thread projecting from the silk-gland aperture; I then held the larva against a glass slide which was flooded with formic acid, and drew the thread into the acid; the larva continued to discharge the silk as I gently pulled the thread out. The first portion of the thread, which was dry and hard when I seized it, remained unaltered, but the portions following passed at once into the formic acid, swelled a little, and adhered firmly to the glass and also to those portions of the thread with which they came in contact, for I was able to draw out several inches of silk and to coil it up and down the slide. I then removed the glass slide, and substituted another free from formic acid. The silk which was drawn out on to this slide adhered feebly to the glass, did not swell, nor did the various lengths adhere to one another, but I was able to lift from the slide a tine thread of fibrous silk in no way partaking of the gelatinous character which had been assumed by that which had been led into formic acid.

In order to put the matter beyond doubt I tried to prevent the formic acid from being employed in the construction of the cocoon. By means of blotting-paper and fine glass tubes I endeavoured to remove all the formic acid from the glands of a few larve which had just begun to spin up. The handling necessary for this so disturbed the larvæ that in most cases they died without pupating, only one of them succeeded in pupating, but not one of them made any further attempts at spinning. I therefore abandoned this method in favour of neutralising the acid. Two larvæ ready to spin were placed in a glass vessel whose sides and bottom had been moistened with a solution of sodium carbonate ; no materials were given for incorporation with the cocoon. Both these made cocoons which were very similar to those usually constructed in the absence of wood-chips, etc., but at those
places where the cocoons touched the glass numerous fine silky threads could be seen which had not become agglutinated to the main mass of the cocoon. Six other larvæ of like age were placed in other glass vessels and provided with fragments of blotting-paper which had previously been soaked in solution of sodium carbonate and then dried. Five of these made cocoons incorporating the paper fragments and pupated. Each of these cocoons presents a very large number of loose silk fibres on the external surface, and especially in the immediate neighbourhood of the alkaline scraps of paper, but on the inner surfaces and where the external surface touches the glass the texture is smooth and horny as usual.

These experiments conclusively prove that the formic acid secreted by the larva is utilised not only for defensive purposes during larval life, but also for giving a special character to the silk of the cocoon, whereby the latter is rendered extremely tenacious to any foreign substance brought in contact with it and also extraordinarily hard, waterproof, and completely closed against all aggressors. When the exposed position of the cocoon on a tree trunk is considered it will at once be seen that this remarkable relation between the silk of this species and formic acid constitutes a wonderfully complete adaptation to the specific needs.
lt would be interesting to endeavour to decide which of these two functions of the prothoracic gland is phylogenetically the older. Personally, I am inclined to think that the defensive is the more ancient; for the gland is as fully developed and relatively of the same size in the freshly-hatched larva as in that ready to pupate. This evidence is certainly not conclusive; and, indeed, the question can hardly be settled until more is known of the function of the prothoracic glands of other larvæ-a point to which I hope to direct my attention this year.

Passing now to the structure of the prothoracic glands in this species. By way of preliminary I wish to enter an emphatic protest against the use of such terms as " neck" or "chin" glands in reference to these structures. The word " neck" assuredly refers to the region between the head and thorax-a region which I have not yet seen in any lepidopterous larva; and to many minds an idea of dorsal position is associated with the word, whereas those glands are ventral, while "chin," though
preferable to the former term, conveys an entirely misleading idea as to the true position in the prothoracic segment.

Klemensiewicz (8) has already given a very full description and figure of the gland and its appendages, while in this country Poulton $(12,13)$ has described and figured the external appearances. The existence of this gland has long been known, but the literature dealing with it and with analogous structures appears to be so little known in this country that I have thought it advisable to give a short history of the work that has been done, and to append a bibliographic list to this paper.

De Geer (3). It is very singular that the work of this author has been so very generally overlooked. I have found no mention of him in any of the authorities cited, yet so long as one hundred and fifty years ago1745 and 1746 -the main features of the organ now under discussion were accurately described. De Geer does not name his species, but describes it as "la Chenille à double queue du Saule." He points out and figures the exact position of the aperture of the gland, the existence of "le reservoir intérieur," the power of ejecting the liquid to a distance, the freedom of the sac from all but tracheal attachments and that of its duct, and the presence of two pairs of eversible lateral tubes covered all over with "un grand nombre de poils courts." These lateral tubes, however, he fancies to be perforated by numerous minute holes, appearing similar to the "rose" of a watering-can, and suggests, though confesses he bas not seen the process, that the fluid is ejected through these foramina. He also mentions the irritating nature of the fluid, having received part of a discharge "daus mon œil droit, où cette liqueur me causait d'abord une douleur cuisante et comme ardente mais qui, à ma grande satisfaction, ne duroit pas longtemps." The defensive value of the apparatus is mentioned, and its "odeur très forte et pénétrante, entièrement semblable à celle de la liqueur que jettent les grands Fourmis des bois."

Very full details are given as to the habits of the larva in using this gland, and it is clear that this early author made a very complete study of the subject. I am indebted to Professor Poulton for directing my attention to de Geer's work, and to my friend Mr. W. Hatchett

Jackson for very kindly furnishing me with an abstract of these memoirs.

Rengger (16), writing in 1817, incorrectly asserts that the gland discharges its secretion by means of two eversible rnuscular tubes, from which the secretion is ejected.

Von Siebold (20), in 1848, mentions that the larva can defend itself by discharges of a corrosive liquid.

I can find no further contribution of any importance before that of Klemensiewicz (8), 1882. This author gives a very full and, in the main, accurate account and figures of the structures, and suggests that the secretion is formic rather than acetic acid; at the same time, he rightly assigns the actual discharge to the action of the muscles of the body-wall.

Poulton (12), 1886, proved the acid to be formic acid, but erroneously described the eversible processes. In 1887 (13) this error was corrected by him, but, as pointed out by Schäffer (18) and (19), he only described the external appearances, and thus fell into the error of regarding the median sac as a storage organ; whereas the true sac is not eversible, and is the actual secretory gland. I'he same author in 1887 (14) and (15) determined the strength of the formic acid solution, and proved its protective value by experiments on natural foes.

Since the specimens I have examined, both by dissection and series of microscopic sections, exhibit several differences to those described by the above authors, I give my own results in full. The horizontal slit-like aperture which is visible upon the red margin of the prothorax leads into a shallow cavity, which I shall refer to as the "vestibule." This is compressed antero-posteriorly, but of slightly greater width than the slit laterally. From nearly the right and left corners of the vestibule there pass backward and outward (in the retracted condition) a pair of hollow tubes capable of eversion. Each tube, after a very short course, divides into two main parts, about 1.3 mm . long when extracted and preserved in alcohol, which end blindly (ride Fig. 1, $t^{1}, t^{2}$ ) ; from the point of bifurcation a very short third tube is given off $\left(t^{3}\right)$. Of the two tubes the anterior, when everted $\left(t^{1}\right)$, is slightly the longer, and its cavity is divided into two for a very short distance at the apex (vide Fig. 6) : to the apex of this tube is attached a pair of retractor muscles (r.m. ${ }^{1}$ ),
while but a single retractor $\left(r \mathrm{~m}^{2}\right)$ is attached to the apex of $t^{2}$, a second, however, being attached to this tube at a point about half-way along its length ( $r m^{2}$ ). These tubes are lined with chitin of the ordinary kind covering the external surface of the body, but towards their extremities are provided with a number of fine needle-like bristles, arising in tufts from the summits of low knobs (vide Figs. 1 and 3). 'Their epithelia have none of the usual characters of glandular cells, and I am confident that they are not of this nature. I can form no positive opinion of the function of these eversible tubes.

Schäffer (19) suggests that these side pouches are reservoirs for the acid, and that the bristles serve to keep the tubes from being crushed by the body-fluids pressing upon them. It seems to me unlikely that such relatively small structures should be the reservoirs for so large a gland, whose own internal capacity appears ample for the purpose; nor am I convinced that these tubes do as a matter of fact ever contain acid. It seems highly improbable that they are of any service in the discharge of the formic acid, for they are not everted by the larva unless external pressure is put upon its body, and even then not until the acid has been already discharged. This at least is my experience, and Professor Poulton in conversation confirms me, though Klemensiewicz (8) asserts that they are everted just before the discharge. It is possible that they may be of service in dire necessity when the larva is seized by a foe in somewhat increasing the terrifying aspect of the victim, and affording a somewhat larger surface for the evaporation of the formic acid in close proximity to the aggressor. There are no protractor muscles to these tubes, their eversion being solely due to pressure of liquid.

The vestibule itself is provided with powerful protractor and retractor muscles. The former are situated along the anterior side of the vestibule on either side of the median region from which they are absent; they are inserted about half-way up the side of the vestibule and take origin from the internal surface of the body wall anterior to the slit aperture ; on each side, right and left, these muscles form an almost continuous sheet, which can, however, be separated into some five or six main bundles which are visible to the naked eye (vide Figs. 1 and 4, $p n v$ ). These muscles come into action prior to the
discharge of acid and cause evagination of the vestibule, which then appears as a green band externally; at the same time they bring the orifice of the true gland (vide infra) up to the external surface. The retractor muscles are arranged in four groups of three each; a pair are inserted a little to the right and left respectively of the middle line on to the extreme posterior wall of the vestibule (Fig. 1, $r m v$ ). In the resting position of the larva these muscle bands have a curved course to their origin from the ventral body-wall, but in the attitude assumed under alarm the course would be almost, if not entirely straight. The other retractors of the vestibule are inserted on to the extreme lateral corners of the vestibule (Fig. 1, $l r m v$ ) and originate from the ventrolateral body-wall.

From the middle of the posterior wall of the restibule there leads backward a short cylindrical or funnel-shaped duct (Fig. 1, d), which issues from the large flask-shaped glandular sac (Fig. 1, gs). The duct is strengthened and doubtless kept open by a number of stout chitinous hoops, which project some distance in the lumen of the duct (vide Fig.

The gland sac in a full-grown larva may be 8 mm . long, 5 mm . wide, and about 3 mm . deep. Except for tracheal attachments it lies almost free in the body cavity; its anterior end by which it is connected to the duct lies just behind the first thoracic ganglion and (generally) to the right of the nerve cord which is thrust over slightly to the left in consequence (vide Fig. 5) ; the bulk of the gland is dorsal to the nerve cord between it and the alimentary canal.

The minute structure of this gland has been described by Klemensiewicz (8), and I have not much to add to his description. The epithelial cells that secrete the cbitin lining the vestibule gradually pass into those of the gland without any sharp line of demarcation, all stages of transition being found along the course of the discharging duct. The cells of this duct get larger in passing towards the gland, and there is a corresponding increase of nucleus. The cells are arranged in more or less circular (spiral ?) rows round the duct, and each row produces a well marked ridge of chitin projecting into the lumen of the duct; the anterior ridges are very small, and they gradually become more pronounced in passing backwards
(vide Figs. 7, 8, 9). At the posterior end of the duct, and in the gland proper, the cells are very large with fluted sides, and the secreted chitin is extremely thin and often difficult to identify, though I believe it to be always present, the plasma of the cells is relatively far more abundant, and presents a curiously striated appearance at its free border owing to vacuolation of this portion of the cell, at the same time the nuclei are of great size and branch out into numerous blunt processes corresponding with the external flutings. The general appearance both of the cell plasma and of the nucleus is very similar to that of the cells of the silk-glands.

I now pass on to consider the homologies of this sternal prothoracic gland and of similar structures.

Bernard (1) has endeavoured to show that the trachew arose from setiparous sacs of a Chætopod ancestor, and considers that the stink-glands of Julus among the Myriapoda represent the glands of parapodial setæ, while coxal glands may represent acicular gland sacs. Packard (10) has expressly stated his opinion that these sternal glands of lepidopterous larve are the homologues of coxal glands of other Arthropods, and, if I understand him aright, that the same view is tenable of the lateral and dorsal glands of many species of larvæ. In the following discussion I shall confine my attention to the sternal glands, and chiefly to those of Lepidoptera. It is very striking to note how large a number of the segments of the entire body possess, in various species, structures which may with reason be regarded as serial homologues of the gland seen in D. vimula. A tabular arrangement will show this most clearly.

Head segment. 1. Oil (stink) glands opening at base of mandibles of C. ligniperda.*
3. Silk glands. $\dagger$

Thorax. 1. All species of Dicranura (Cerura), Macrurocampa marthesia, Packard (11), Schizura concinna (id.); species of Lacosoma, Astyanax, Danima, Nola, Hyperchivia, Hyponomeuta, and Plusia, Schäffer (19).

[^5]Thorax. 2. Perophora melsheimeri, Schäffer (19), Lacosoma, 5 species of Nolidæ. Many Hemiptera.
3. P. melsheimeri, Lacosoma, 5 species of Nolidæ. Imago of Bed-bug.
Abdomen. 1. Hyperchiria varia, Dimmock (4). H. io, Packard (11). Hemileuca maia (id.).
6. H. maia.
7. H. varia ; H. io.
8. H. maia.

In Campodea staplylinus similar glands have been descriked by Packard (10) in abdominal segments 1 to 8, and in 1 to 7 in Madulis.*

It is thus seen that in all the segments of the body, with the exception of the difficult segments of the head, glands of this nature are present within the limits of the Insecta. A closer examination of the accounts given by various authors affords very striking support to Bernard's view alluded to above.

Packard (11) describes the larva of Perophora melsheimeri as possessing small sternal tubercles on the 2nd and 3rd thoracic segments. There are four of these structures on each segment, two on each side of the middle line. The square area enclosed by these four has in its centre the mouth of an eversible gland. The same author describes similar structures on all the thoracic segments of Lacosoma, and mentions further the interesting fact that, according to C. D. Ash, the posterior pair on the 3 rd segment are " armed at the end with several crowded spine-like granulations." The correspondence of the above structures with the prothoracic sternal gland of $D$. vinula is very obvious, especially when the lateral tubes of the latter are in the everted condition.

Other species present a most striking series of transitions towards the actual conditions found in D. vimula. On the 6th and 8th abdominal segments of Hemileuca maia, according to Packard (10), are "indications of aborted glands (which are well developed in segments 1 and 7 of the abdomen) encroached upon by two or three pale flattened minute spiniferous warts, which are wanting (invaginated ? O. H. L.) in segments 1 and 7."

The larva of Astyanax archippus possesses in the 1st

[^6]thoracic segment an "eversible soft tubercle covered with short hairs." That of Nola strigula has glandular sternal apertures in the 2 nd and 3rd thoracic segments, and carries "tubiform appendages near the thoracic feet,'" Packard (10).

Schäffer (19) describes the sternal prothoracic gland of Hyponomeuta evonymella as being divisible into anterior and posterior portions, provided with two retractor muscles, and furnished with a spiny internal lining.

The dorsal abdominal glands of Porthesia similis are stated by Klemensiewicz (8) to secrete a clear, odourless fluid, and the interior of each cell to form a separate projection into the lumen of the gland.

Professor Poulton has told me in conversation, and given me permission to mention the fact that the secretion of the sternal prothoracic gland of Stauropus fagi is acid.

A large number of other larvæ and imagines have been described by various authors, particularly Schäffer (18), Haase (6), Packard (10, 11), as possessing similar glandular structures, but the details of their descriptions are not sufficient for purposes of comparison. The above statements, however, make it clear that there exists a fairly complete series which commences with projecting setiparous warts or tubercles surrounding a glandular opening, and leads up to invaginated spiny (setiparous) tubes placed laterally to the opening of the median gland. This evidence appears to me sufficient to justify the supposition that these lateral structures are directly derived from setiparous projections of a Chætopod ancestor, and I would maintain that the spines now present in the lateral tubes of $D$. vinula and other species are the actual representatives of original setæ. Bernard (1) suggests that the ventral parapodium is represented by the tracheate leg, that the acicular gland sac of the dorsal parapodium gave rise to the trachea itself of the Hexapod, that the scattered tracheæ of Peripatus are derived from ordinary setiparous glands, and that the stink-glands of Julus found origin in the glands of parapodial setæ, the coxal glands, perhaps, in acicular gland sacs. The relations which I have described above, especially when taken in connection with the results of other observers lead me to the conclusion that the glands under discussion are the homologues of the coxal glands and of the acicular gland sacs of Chætopods, while the laceral appendages (spiny pro-
jections or tubes) are groups of parapodial setæ. It is noticeable as pointing to similarity of origin of these glands and tracheal tubes that in many cases the cells are spoken of as forming distinct chitinous projections into the cavity of the gland and its duct. This is notably the case in the duct of the gland of $D$. vinula, and is very suggestive of the well-known spiral thickenings of tracheal tubes; at the same time attention may be called to the branching nuclei of the cells of these glands and of those of the silk-glands which have been claimed as homologous with tracheæ (Bütschli, loc. cit.), though much importance cannot be attached to this feature.

Should the significance here claimed for these structures prove to be correct, they will go far towards establishing the primitive nature of the eruciform larva, of which many observers are already in favour.

## ii. The Presence of Potassium Hydroxide in the Alimentary Canal.

In my communications already referred to I have shown that the imago of $D$. vinula discharges potassium hydroxide from a sac in connection with the alimentary canal. The digestive fluid of the larva being strongly alkaline rendered it probable that this fluid was of the same nature. In order to test this I examined the digestive system and the rest of the body with a view to finding potassium salts. Twenty larvæ were employed for the purpose; their alimentary canals were placed in dilute hydrochloric acid, and the remainder of their bodies in another lot of the same acid. In both cases I was able to determine by the platinum perchloride method the presence of potassium, which was also confirmed by spectroscopic examination. In the alimentary canal I could find no sure indication of any other salt than the hydroside, but, the remainder of the body appeared to contain traces of the carbonate as well. An unfortunate accident prevented me from making a reliable quantitative analysis.

## iii. A Correction.

I stated in Trans. Ent. Soc. Lond., 1895, p. 403, that near the hinder end of the mesenteron of the freshlyemerged imago a short wide tube opened from the gut
cavity into the body cavity. I find that this is an abnormal occurrence, and though present in all the imagines that I examined in $1894-5$, is due to an unnatural obstacle (a glass tube) having been substituted for the natural cocoon. I believe that the unusual efforts made by the imago in endeavouring to escape from such an artificial confinement causes rupiure of the thin wall of a bladder connected with the hind end of the gut. In those imagines which have emerged from true cocoons there is such a bladder charged with excretions of a brownish-red colour, but in a few that I caused to emerge in glass tubes I found the wide tube that [ previously described, and have no doubt that the explanation I now give is the correct one.

List of Authors dealing with thoracic sternal glands and similar structures in Lepidoptera and other insects.

1. Bernard, H. M., Zool. Jahrb. (Anat. Abth.), v., p. 511, 1892.
2. -, Ann. Nat. Hist. (6), xi., pp. 24-30.
3. de Geer, Mém. Acad. Paris savants étrang. 1748, pp. 29-32 ; 1750 , i., pp. 530 \& 531 . Mém. Hist. Ins., Tom. i., Stockholm, 1752. Mėmoire i., p. 28. Mémoire x., p. 324.
t. Dimmock, Psyche, iii., June, 1882.
4. Goossens, Ann. Soc. Ent. France (sér. 4), ix., 1869.
5. Hadse, Iris, i., pp. 159, 303, 188t-88.
6. Holmgrè̀, Bih. Svenska. Akad., xviii., No. 8.
7. Klemensiewicz, Verh. k. k. Zool. bot. ges. Wien, xxxii, pp. 459-474, 2 plates, 188.
8. Packard, Proc. Bost. Soc., xxiv., p. 494.
9. -, Proc. Bost. Soc., xxv., p. 82.
10. -, J. New York Ent. Soc., iii., pp. 110-127, 1895.
11. Poulton, Trans. Ent. Soc. Lond., 1886, p. 187.
12. -—, Trans. Ent. Soc. Lond., 1887, pp. 295-301.
13. —, Rep. Brit. Assn., 1887 (Manchester), pp. 765-66.
14.     - The Colours of Animals, pp. 274-276, 1890.
15. Rengger, Physiologische Untersuchungen über die Thierische Haushaltung der Insecten. Tübingen, 1817, p. 81.
16. Rogenhofer, Verh. k. k. Zool. bot. ges. Wien, 1862.
17. Schäffer,' Dr. C., Zool. Anz., xiii., pp. 9-11, 1889.
18. -, Zool. Jahrb. (Anat. Abth.), iii., pp. 611-652, 1889. (Abstract in J. R. Micr. Soc., 1889, pp. 633-4.)
19. von Siebold, Vergleich. Anat., 1848.

Explanation of Plate V.
[See explanation facing the PLate.]
VII. On the classification of two subfamilies of Moths of the family Pyralidæ: the Hydrocampinæ and Scoparianæ. By Sir George F. Hampson, Bakt., B.A.

## [Read March 3rd, 1897.]

The following paper is a continuation of the classification of the subfamilies of Pyralidæ, of which two parts have already appeared in the Proceedings of the Zoological Society and the Transactions of the Entomological Society for 1896. The subfamilies here dealt withthe Hydrocampinæ and Scoparianæ-are both early offshoots from the most generalized group-the Pyraustina.

The Scoparianz are a small group of genera characterized by the small tufts of raised scales on the forewing; and usually by their triangularly scaled maxillary palpi resembling those of Crambus, the genus Micraglossa alone being aberrant in having upturued palpi, and the scaling of the maxillary palpi consequently more compact, it has, however, all the other characters, the habits, and peculiar facies of the subfamily. There can be little doubt that the group is a homogeneous one and that it is derived from the Pyraustinæ near Pionea. It is largely represented in the Palæarctic region, but attains its maximum development in New Zealand, where a large proportion of the species of Pyralida belong to the genus Scoparia and have been exhaustively examined and classified by Mr. Meyrick, to whom I am indebted for the gift and loan of most of the species. Nearly all the species feed on lichens on trees or rocks, and harmonize with them in appearance, but in New Zealand a few species feed on and live among grasses. The most generalized genus is Dasyscopa in essential points of structure, though it has specialized secondary sexual characters; it has the normal palpi, and vein 5 of the hindwings widely separated from 4. From it were derived

[^7]through Scoparia with vein 5 stalked or from a point with 4, Mestolobes with vein 3 absent, Tetraprosopus with porrect tufts of hair on the palpal joints, Eclipsiontes: with the median nervure of hindwing loosely pectinated, and Micraglossa with the palpi upturned.

Of the value of the Hydrocampinæ as a group there is considerably more doubt; they are primarily distinguished from the Pyraustinæ by vein 10 of the forewing being stalked with 8,9 , but this character breaks down in many individuals of several species of Nymphula, Oligostigma, etc., not in the genera most closely allied to the early genera of Pyraustinx, but in the more specialized genera where one would have expected the character to have become fixed; these are to be distinguished by their long maxillary palpi and long upturned palpi with acuminate Srd joint, except from a few Pyraustine genera such as Sufetula, Massepha, and Homophysa, from which they are to be separated by their facies only. It may in consequence be contended that it would be more natural to distribute the Hydrocampinæ among the Pyraustinæ, as Mr. Meyrick does, in accordance with the forms of their palpi, placing the group of genera allied to Nymphula near Sufetula and Homophysa, the group allied to Coptobasis and Tatobotys near Sylepta and Nacoleia, and Stenia, Diathrausta, Eurrhypara, etc., in the true Pyrausta group; but the fact that the genera Talanga, Daulia, and Parthenodes, which are undoubtedly closely allied to the Nymphula group, have short porrect palpi, and appear to form the transition between the porrect and upturned palpi groups, seems to make it advisable to retain the group, at all events pending further evidence, and not to merge it in the already very inconveniently large subfamily Pyraustinx.

The genus Cenoloba from Australia is extremely aberrant and not at all closely allied to any other Pyrale, though the well-developed maxillary palpi and the neuration of the hindwing show clearly that it belongs to the family; vein 5 of the hindwings from the middle of the discocellulars is a very generalized character, only found elsewhere in the Pyralidæ in Simæthistis, Tineodes, and Oxychirotis, the first Indian, the two latter also Australian, and all three coming among the very early Pyraustinæ; the palpi are like those of Tineodes or a Crambus, whilst the fore and hindwings are
each divided into two lobes like a Pterophorid, and it must be descended from a very ancestral form of Pyrale, having collateral affinities to the ancestor of the Pterophoritæ.

Apart from Cenoloba, the most generalized form in the group is Mabra, with short porrect triangularlyscaled palpi giving rise to Diathrausta with vein 4 of the hindwing absent ; secondly, to a group with upturned palpi, the 3rd joint short and blunt, of which Bradina is typical, and Perisyntrocha, Stegothyris, etc., specialized developments with different neuration of the forewing; and, thirdly, through Talanga and Parthenodes to the typical Nymphula group with upturned palpi, the 3rd joint long and acuminate, the maxillary palpi long and often dilated with scales, of which Tetrernia and Argyractis are forms with specialized neuration.

The genus Hydrocampa having been merged in Nymphula, it will be thought by some that the name of the subfamily also should have been changed; but as the word Hydrocampinæ expresses the habits of a larger number of the species in the group, it seems to me quite legitimate to retain it. The constant reckless changing of names in zoology disgusts a large number of keen naturalists who are unable to waste a large amount of time over the literature of the subject, and it seems a great mistake to change well-known names before there is some general agreement as to the principles on which the change should be made and some prospect of its being permanent, which cannot be the case whilst everyone makes his own rules of nomenclature and his principles of selecting the types of genera. In accordance with these opinions, I have, in this and other papers, retained the well-known names for European genera in preference to the Hübnerian names of the Verzeichniss and other works, merely indicating, by placing their names in the synonymy, that they may at some future time be adopted for the genera in question.

I have to thank Mr. Herbert Druce for the loan of the species described in the 'Biologia Centrali-Americana'; Mr. W. Schaus for the loan of specimens of American Pyralidæ compared with Guenée's types in Monsieur Oberthur's collection ; the Hon. Walter Rothschild for the loan of the whole of his magnificent collection of Pyralide from the Indian, Malayan, and Australian regions; Mr .
trans. ent. soc. Lond. 1897.—Part il. (July) 9

Elwes for the gift of the types described by Mr. Meyrick from the Malayan region; and Mr. Meyrick for much help with the Australian species, and I wish specially to acknowledge the help derived from his papers, which have cleared the whole groundwork of the classification of the Pyralidx.

As in my other papers on the Pyralidæ, species of which the type is in the British Museum are marked with at; species I have examined, but which are not in the Museum, with a $*$; whilst species $I$ have been unable to see, and the classification of which is doubtful, are enumerated at the ends of the genera. When it is stated "Types in Coll. Rothschild and B. M.", the type is in Mr. Rothschild's Collection, a co-type in the British Museum. Of a large number of the species not in the Museum, which have never been figured, coloured drawings have been made from the types and pinned into their places in the collection, among others of the whole of the types of Pyralidæ in the Oxford Museum Collection, for the loan of which I am indebted to Prof. Poulton.

## Subfamily Hydrocampine.

Moths usually of very slender build, the legs very long. Proboscis present. Forewing with rein 7 from the cell; 10 stalked with 8,9 , except in a few species of Nymphula and Oligostigma, and in a small percentage of specimens of other species in these genera, this character, though highly characteristic of the subfamily, not baving become a very stable one in the subfamily; these exceptions may be discriminated from the Pyraustince by their long maxillary palpi dilated at the extremity. Hindwing with the median nervure non-pectinate.

The larve of some species of Nymphula feed on mater-plants, and are fitted for a life below the surface of the water.
Phylogeny of the Hydrocampine.


## Key to the Genera.

A. Palpi upturned.
a Palpi with the 3rd joint long and acuminate.
$a^{1}$ Frons rounded and not prominent.
$a^{2}$ Maxillary palpi filiform and of moderate length.
$a^{3}$ Hindwing with the outer margin evenly rounded.
$a^{\frac{1}{4}}$ Antennæ with the shaft smooth.
$a^{5}$ Palpi with the 2nd joint short and
broadly rounded with scales . Palpi with the 2nd joint long and
$b^{5}$ Palpi with the 2nd joint long and
$b^{4}$ Antennæ with the shaft annulate :
22. Orphnophanes.
21. Luma.
$b^{3}$ Hindwing with the outer margin excised towards anal angle.
$a^{4}$ Palpi with no sharp tuft at end of 2nd
joint in front.
$a^{5}$ Forewing with vein 4 present, 11 from cell or absent; hindwing with veins 4, 5 from cell.
14. Ambia.
$b^{5}$ Foreming with vein 4 absent; 1i stalked with 8, 9,10 ; hindwing with veins 4,5 stalked
13. Tetrernia.
$\ell^{4}$ Palpi with a stiarp tuft at end of 2nd joint in front
12. Thysanoidma.
$b^{2}$ Maxillary palpi filiform and very long; palpi
with the 2nd joint smoothly scaled

1. Mixophila.
$c^{2}$ Maxillary palpi long and dilated with scales at extremity.
$a^{3}$ Hindwing with vein 4 absent
2. Argyractis.
$b^{3}$ Hindwing with veins 4, 5 stalked
3. Eristena.
$c^{3}$ Hindwing with veins 4,5 from cell.
$a^{4}$ Palpi extremely long; hindwing with
vein 5 from above angle of cell .
b4 Palpi moderate; hindwing with vein 5
from angle of cell.
$a^{5}$ Hindwing with the outer margin evenly rounded.
$a^{6}$ Foreswing with veins 4,5 from cell;
11 present.
$b^{6}$ Forewing with veins $4, \dot{5}$ stalked;
11 absent
4. Arxama.
5. Nymphula,
6. Margarosticha.
$b^{5}$ Hindwing with the outer margin excised below apex and lobed at middle.
7. Oligostigma.
$b^{1}$ Frons produced to a rounded prominence; maxillary palpi minute; hindwing with vein 7 from before end of cell
8. Cymoriza.
$b$ Palpi with the 3rd joint long and spatulate at extremity; hindwing with vein 7 given off from before end of cell.
c Palpi with the 3rd joint short and blunt.
al Palpi with a small triangular tuft in front of 3rd joint.
$a^{2}$ Forewing with the cell more than half the
length of wing.
$a^{3}$ Hindwing with the cell more than half the leugth of wing; abdomen of moderate length.
$a^{4}$ Hindwing with the outer margin slightly angled at middle
9. Symphonia.
$b^{4}$ Hindwing with the outer margin excised below apex and lobed at vein 5 , or rounded
10. Aulacodes.
$b^{3}$ Hindwing with the cell about one-third the length of wing ; abdomen very long.
as Forewing with vein 7 curved and approximated to $8,9,10$
11. Coptobasis.
$b^{4}$ Forewing with vein 7 straight and well separated from $8,9,10$
12. Dracenura.
$b^{2}$ Forewing with the cell less than half the length of wing
13. Hymenoptychis.
$b^{1}$ Palpi with the 2nd and 3rd joints conically
scaled and tapering to apex
$c^{1}$ Palpi with the 3rd joint naked.
$a^{2}$ Hindwing with the outer margin rounded.
$a^{3}$ Forewing with veins 4,5 stalked
14. Cœlorhynchidia.
$b^{3}$ Forewing with veins 4,5 stalked
$a^{4}$ Forewing with vein 2 from well before angle of cell
15. Perisyntrocha.
16. Stegothyris.
$b^{4}$ Forewing with vein 2 from angle of cell.
$a^{5}$ Forewing with vein 11 from the cell
$b^{5}$ Forewing with vein 11 stalked with 8 , 9, 10
17. Duponchelia.
18. Strepsinoma.
$c^{3}$ Forewing with veins 3, 4, 5 from the cell.
$a^{4}$ Hindwing with veins 4,5 from the cell. $a^{5}$ Hindwing with vein 7 anastomosing with $S$ almost to apex or coincident with it
19. Niphostola.
$b^{5}$ Hindwing with vein 7 anastomosing with 8 to about two-thirds of wing. $a^{6}$ Forewing with vein 11 stalked with 8, 9,10 $b^{6}$ Forewing with vein 11 free $a^{7}$ Antennæ with the shaft annulate.
20. Eurytorna. $b^{7}$ Antennæ with the shaft smooth $a^{8}$ Abdomen of normal length $b^{8}$ Abdomen very long, especially in male.
21. Bradina.
22. Piletocera.
23. Tatobotys.
$b^{4}$ Hindwing with veins 4,5 stalked
24. Diathraustodes.
$b^{3}$ Hindwing with the outer margin truncate and excised towards anal angle
25. Almonia.
B. Palpi with the 2nd joint porrect, the 3rd upturned
26. Omphaloptera.
C. Palpi porrect.
a Palpi once to twice the length of head.
$a^{1}$ Palpi triangularly scaled, the 3rd joint hidden
by hair.
$a^{2}$ Hindwing with vein 4 absent.
$b^{2}$ Hindwing with vein 4 present.
$a^{3}$ Both wings with veins 4,5 stalked . . 37. Deuterophysa.
$b^{3}$ Hindwing with veins 4, 5 closely approxi-
mated for a short distance.
$a^{4}$ Forewing long and narrow, vein 3 from
before angle of cell .
27. Stenia.
${ }^{4}$ Forewing subtriangular, vein 3 from angle of cell.
$a^{5}$ Palpi projecting about the length of head; antennæ with the shaft smooth.
$a^{6}$ Forewing with vein 7 straight and well separated from S, 9, 10
28. Hyaloplaga.
$b^{6}$ Forewing with vein 7 curved and approximated to $8,9,10$
29. Zebronia.
```
            l
                                    of head; antennæ with the shaft
                            annulate. . . . . . 18. Daulia.
                            c3}\mathrm{ Hindwing with veins 4,5 not approximated
                towards origin.
                    at Masillary palpi dilated with scales.
                            46. Psammotrs.
                            b& Maxillary palpi filiform.
                            a}\mp@subsup{}{}{5}H\mathrm{ Hind tibiæ with the spurs long and
                                    equal
                            48. Mabra.
                    b5}\mathrm{ Hind tibie with the outer medial spur
                    not more than half the length of
                    imner
                            47. Eurrhypara.
    b1 Palpi straightand fringed with long hair below,
                the 3rd joint prominent.
            a}\mp@subsup{a}{}{2}\mathrm{ Maxillary palpi filiform.
            a3}\mathrm{ Frons rounded
                                    20. Talanga.
            b3 Frous with a conical prominence : . 19. Margarochroma
            \ell2}\mathrm{ Maxillary palpi triangularly scaled : 17. Parthenodes.
    b Palpi projecting three times length of head and
            downcurved at extremity.
    a1
    42. Zagiridia.
    b1 Forewing with vein }11\mathrm{ present.
                            43. Clupeosoma.
c Palpi projecting three times length of head and
        straight.
    a}\mp@subsup{}{}{1}\mathrm{ Wings not bifid; forewing with veins 5, 6
        present, }11\mathrm{ from cell
    41. Camptomastyx.
    b1 Wings each divided into two plumes; forewing
        with veins 5, 6 absent; 11 stalked with
        8, 9, 10.
                            49. Cenoloba.
```


## Genus Mixophila.

Mixophila, Meyr., Trans. Ent. Soc. Lond., 1887, p. 269. Angonic, Snell., Tijd. v. Ent., xxxvi., p. 56 (1893).
Palpi upturned, the 2nd joint smoothly scaled and not reaching vertex of head, the 3rd well developed and acuminate; maxillary palpi long and filiform ; frons rounded ; antennæ annulate ; tibiæ


Mixophita renatusalis, ${ }^{\circ}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
with the spurs long and equal. Forewing with the apex rectangular ; vein 3 from well before angle of cell ; 4,5 well separated at origin ; 7 straight and well separated from $8,9,10$. Hindwing with vein 3 from angle of cell ; 4,5 well separated at origin ; 6, 7 from upper angle.

## Sect. I. Hind tibia of male without groove and tuft. A. Hindwing of male normal.

Type. (1). Mixophila revatesalis, Wlk., xvii., 484. E. Himalayas, $\dagger$ Crambus ermineus, Moore, Lep. Ceyl., Ceylon,Buriii., p. 580, pl. 184, fig. 7.

Angonia crambidalis, Snell., Tijd. v. Ent., xxxvi., p. 56, pl. 3, fig. 1. ma, Borneo, Java, Sambawa.

## (2). Mixophila trilinealis, sp. n.

む. Head, thorax, and abdomen white suffused with fuscous. Forewing white, the inner half suffused with fuscous ; ante- and postmedial fuscous lines widening to costa, the former highly excurved at middle, the latter strongly angled at middle, and interrupted by yellow streaks on vein 6 and the median vervules, a fuscous line across apical area; a fine black line on apical part of margin ; three submarginal black specks between the yellow streaks on median nerrules with the cilia beyond them metallic silvery. Hindwing white tinged with ochreous and fuscous.

Hab. Fergusson Island, N. Guinea (Meek). Erep., 20 mm . Type in Coll. Rothschild.
$B$. Hindwing of $\hat{\delta}$ with a tuft of red scales in cilia at anal angle, the inner area more or less clothed with ochreous scales below.
(3). †Mixophla xanthocasis, Meyr., Trans. N. W. HimaEnt. Soc. Lond., 1897, p. 81 . layas, Pulo Laut, Sangir, Fergusson I., New Guinea.
Sect. II. Hind tibire of $\hat{\sigma}$ dilated with groove and tuft of long yellow hair.
(4). Mixophila chrysias, Meyr., Trans. Ent. Amboina,BanSoc. Lond., 1897, p. 82 . . . . da, N.Guinea.

## Genus Argyractis, nov.

Palpi upturned, the 3rd joint long and acuminate ; maxillary palpi long and dilated with scales at extremity ; frons rounded


Argyractis argentilinealis, $\delta$, $\frac{5}{2}$.
antennæ of male ciliated. Forewing with veins $3,4,5$ from angle of cell ; 7 straight and well separated from 89,10 . Hindwing
with the outer margin evenly curved ; veins 3 and 5 from angle of cell, 4 absent ; 6, 7 from upper angle.

Type. (1). †Argyractis argentilinealis, sp. n.
む. Orange-yellow and white; fore tibiæ banded with black; abdomen tinged with black. Forewing with the basal costal area suffused with black; a large triangular black-suffused patch on costa beyond middle with the black-edged white discocellular line on it, defined by a black line, and with a similar irregular patch below it on inner margin, the two patches surrounded with white ; a submarginal white line with silvery edges bent inwards above inner margin; some black specks on outer margin towards apex ; cilia grey. Hindwing white, with subbasal, antemedial, aud medial black lines, the last expanding into a large patch below costa and small spot at lower angle of cell ; a curved postmedial black line with the area beyond it orange; a silvery submarginal line sending spurs inwards on veins 6 and 5 , and with a series of black spots on it ; a marginal black line; the cilia grey.

Hab. Espiritu Santo, Brazil (Jones). Eap., 16 mm .
(2). ©Aggyractis masusalis, Wlk., xix., 951 . Brazil.
(3). †Argyractis niphoplagalis, sp. n.

ㅇ. Head, thorax, and abdomen fulvous brown and white. Forewing with the ground-colour pure white; the costa orange; a subcostal brown fascia emitting an oblique antemedial band and terminating at a small discocellular lunule ; an oblique triangular brown postmedial patch with its base on costa and apex on vein 2. A marginal orange band defined on inner side by a fine black line and expanding below vein 2 into a large quadrate patch; cilia black-brown towards apex. Hindwing white with brown marks at lower angle of cell and near anal angle; an oblique orange discocellular line, the outer area orange from costa to vein 2 and with four large black-centred, white and silver-ringed ocelli with black spots between them on margin.

Hab. Dominica (W. H. Eliott). Exp., 18 mm.
(4). Argyractis samealis, Feld., Reis. Nov., pl. 136, fig. 14. . . . . . Brazil.

## Genus Eristena.

Eristena, Warr., A. M. N. H. (6), xvii., p. 150 (1896).
Palpi upturned, the 2nd joint moderately fringed with hair in front and reaching vertex of head, the 3rd well developed and
acuminate; maxillary palpi long and dilated with scales at extremity; frons rounded; antennæ slightly annulated; legs long, the tibix smooth with the spurs almost equal; wings very long and narrow. Forewing with veins $3,4,5$ from angle of cell ;


Eristena postalbalis, $\uparrow$, $\frac{3}{2}$ (from Moths Ind., vol. iv.).
7 straight and well separated from $8,9,10$. Hindwing with the cell about half the length of wing; vein 3 from angle ; 4,5 on a long stalk; 6, 7 from upper angle, 7 anastomosing with 8 almost to apex.
Type. (1). +Eristena postalbalis, Hmpsn., Ill. Het., ix., p. 175, pl. 174, fig. 3 . . . Ceylon.
(2). Eristena murinalis, Warr., A. M. N. H. (6), xvii., p. 150 . . . . . Khásis.

## Genus Arxama.

Arxama, Wlk., xxxiv., 1183 (1865).
Palpi upturned widely in front of head, very long, the 2nd and 3rd joints each about $2 \frac{1}{2}$ times length of head, the 2nd fringed with scales below, the 3rd naked and acuminate ; maxillary palpi dilated with scales; frons rounded ; antennæ annulate; tibiæ with


Arxama subcervinalis, ${ }^{t}, \frac{1}{1}$.
the spurs long and equal. Forewing with veins 3, 4, 5 well separated at origin ; 6 from below angle of cell; 7 from angle; $8,9,10$ stalked; 11 free. Hindwing with veins 3,4 from angle of cell; 5 from near middle of discocellulars; 6, 7 from upper angle, 7 anastomosing with 8 to two-thirds of wing.

Sect. I. Hindwing with the outer margin excised below apex and towards anal angle.
(1). Arxama monetalis, Snell., Tijd. v. Ent., Pulo Laut, xxiii., p. 244 ; id., xxvii., pl. 5, fig. 3 . Celebes.
(2). Arxama atralis, sp. n.
q. Black-brown; palpi white below; antennæ ringed with white ; thorax mixed with white ; abdomen banded with brown. Forewing with white speck at base and dentate white subbasal line; a nearly straight white antemedial line; a discocellular speck ; a short postmedial bar from costa with a speck below it above vein 5 and wedge-shaped mark on inner margin ; a submarginal series of white specks ; cilia mixed with white towards apex and outer angle. Hindwing with white antemedial line expanding towards costa; two white postmedial specks below costa; a marginal orange band with white lunule on its inner side below costa, a curved white line inside its medial portion and another towards anal angle, dentate on vein 2.

Hab. Gunong Ijau, Malay Peninsula. Exp., 16 mm . Type in Coll. Rothschild.
Sect. II. Hindwing with the outer margin evenly curved.
Type. (3). Arxama subcervinalis, Wlk., xxxiv., 1183. Ceram.

## Genus Nymphula.

Nymphula, Schrank, Faun. Boica, ii., p. 162 (1802).
Hydrocampa, Latr., Faun. Nat., p. 478 (1825).
Parapoynx, Hübn., Verz., p. 362 (1827).
Synclita, Led., Wien Ent. Mon., 1863, p. 448.
Nymphæella, Grote, N. Am. Ent., i., p. 97 (1880).
Hygraula, Meyr., Tr. N. Z. Inst., xvii., 129 (1885).
Hydeuretis, Meyr., Trans. Ent. Soc. Lond., 1895, p. 435.
Palpi upturned, the 2nd joint moderately fringed with hair in


Nymphula fluctuosalis, ${ }^{t}, \frac{3}{2}$ (from Moths Ind., vol. iv.).
front, and reaching vertex of head, the 3rd well developed and acuminate ; maxillary palpi long and dilated with scales at extre-
mity ; frons rounded; antennæ usually annulated; ocelli usually prominent; legs long, the tibiæ usually smooth, with the spurs almost equal. Forewing with veins 3, 4, 5, from angle of cell; 7 straight and well separated from $8,9,10$. Hindwing with the cell about half the length of wing; veins $3,4,5$ from angle ; 6, 7 from upper angle, 7 strongly anastomosing with 8 .

Sect. I. Antennæ annulate; fore tibiæ of male smoothly scaled.
(1). Nymphula rivulalis, Dup., Lep. Fr., viii., p. 341, pl. 233, fig. 8 . . . . S. Europe.
(2). Nymphula stagnata, Don., Nat. Hist., xi., 9, pl. 363, fig. 3

Europe.
Type. (3). Nymphula nymphéata, Linn., Syst. Europe, Nat., x., p. 274 . . . . . Armenia.
Phalena potamogata, Linr., Syst. Nat., x., p. 275.

Hydrocampa rivulata, Scop., Ent. Carn., 573.
(4). †Nymphula interruptalis, Pryer, Cist. Ent., ii., p. 233, pl. 4, fig. 5

Japan ;
" Var. separatalis, Leech, Ent., xxii., p. 71, pl. iv., figs. 2, 13
(5). $\dagger$ Nymphula nigrolinealis, Pryer, Cist. Ent., ii., p. 233, pl. 4., fig. 6 . . . China.
(6). Nymphula etalis, Wlk., xix., 954 . . Brazil.

Nymphula lotialis, Feld., Reis. Nov., pl. 135, fig. 4.
(7). $\dagger$ Nymphula icciusalis, Wlk., xix., 971 . U. S. A.
†Leucochroma faulalis, Wlk., xix., 973. Hydrocampa formosulis, Clem., Pr. Ac. N. H. Phil., 1860, p. 217.

Hydrocampa genuialis, Led., Wien Ent. Mon., 1863, p. 451.
Hydrocampa pacalis, Grote, Papilio, i., p. 17.
(8). $\dagger$ Nymphula ekthlipsis, Grote, Can. Ent., viii., p. 111
U. S. A.
(9). $\dagger$ Nymphula dentilinea, sp. n.

す. Head and thorax brown, ochreous and white; abdomen ochreous ringed with white. Forewing ochreous, with a fulvous

[^8]tinge ; a dark antemedial band edged by waved white lines; a similar medial band with a white spot on it above vein 1 , and black spot at costa; a black-edged white lunule before the cell ; a black-edged postmedial white line sharply angled below the costa, then retracted to the lunule and ending at lower angle of cell ; a slightly waved dark line just inside the margin, with a series of dentate white marks on its inner edge, the one on vein 6 long. Hindwing white; ante- and postmedial waved black lines, the latter incurved below cell, and joining the antemedial line towards inner margin; a fulvous marginal band with black line on its inner edge, inside which is a dentate white band.

## Hab. Florida (Grote). Exp., 20 mm .

## (10). $\dagger$ Nymphula lanceolalis, sp. n.

才. White; abdomen ringed with brown; wings irrorated with brown; an antemedial waved line defined by brown, and arising from a black spot on costa; a double postmedial brown line oblique from costa to near middle of outer margin, then retracted to near lower angle of cell, waved, and less well defined; the apical part of costa fulvous; the apex acute and produced with a curved black line enclosing a brown mark on margin below it. Hindwing with curved antemedial and sinuous postmedial brown lines; a short line from costa below apex and a curved subapical mark.

Hab. Espiritu Santo, Brazil (Jones). Exp., 10 mm .
(11). Nymphula adiantealis, Wlk., xix., 949 . Brazil.
(12). *Nymphula abrotalis, Wlk., xix., 956 . Brazil.
(13). *Nymphula nigra, Warr., A. M. N. H.(6), xviii., p. 220 . . . . . Khásis.
(14). Nymphula fedalis, Guen., Delt. and Pyr., Æthiopian, p. 228, pl. 4, fig. 7 . . . . . Oriental, and Isopteryx tenellelis, Guen., Delt. and Pyr., Australian p. 228. regions.
$\dagger$ Isopteryx leucothoalis, Wlk., xvii., 400.
$\dagger$ Isopteryx spilomelalis, Wlk., xvii., 403. Zebronia cethonalis, Wlk., xvii., 484.
$\dagger$ Hydrocampa scitalis, Led., Wien Ent. Mon., 1863, p. 451.
Physematia epispila, Meyr., Trans. Ent. Soc. Lond., 1886, p. 257.
(15). $\dagger$ Nymphula fengwhanalis, Pryer, Cist. Ent., ii., p. 235, pl. 4, fig. 11 . . N. China.
(16). $\dagger$ Nymphula sinicalis, sp. n.

Head, thorax, and abdomen brown, fuscous and white. Forewing mostly suffused with black variegated with yellow and white, an antemedial line dentate inwards in cell and outwards below cell and with some yellow inside it ; a triangular white spot below end of cell ; a postmedial black-edged white lunule below costa with a yellow patch on its inner side; a series of dentate white marks just inside the margin. Hindwing yellow; a white antemedial band with waved black edges and irregular black band at middle bearing a white spot; a postmedial black-edged white lunule below costa ; the apical area black with a series of white marks just inside the margin ; both wings with the cilia rufous.

Hab. Chekiang, China. Exp., 22 mm .
(17). †Nymphula responsalis, Wlk., xxxiv., Japan, India, 1326
$\dagger$ Nymphula turbata, Butl., P. Z. S., 1881, p. 586.
$\dagger$ Nymphula marmorea, Meyr., Trans. Ent. Soc. Lond., 1885, p. 434.
$\dagger$ Isopteryx enixalis, Swinh., P. Z. S., 1885, p. 869.
$\dagger$ Cymoriza linealis, Moore, Lep. Atk., p. 210.
(18). $\dagger$ Nymphula obliteralis, Wlk., xvii., 399.

Parapoynx obscuralis, Mœschl., Verh. Z.-B.
U. S. A., Ver., 1876, p. 432, pl. 18, fig. 39.
(19). Nympiula gurgitalis, Led., Wien Ent. Mon., 1863, p. 449, pl. 17, fig. 17

Brazil.
Synclita modestalis, Led., Wien Ent. Mon., 1863, p. 449, pl. 18, fig. 1.
(20). $\dagger$ Nymphula filigerahis, Wlk., xxxiv., 1533

Brazil.
(21). Nymphula affinialis, Guen., Delt. and Socotra, Pyr., p. 270

Iudia, Nico-
Botys ardealis, Feld., Reis. Nov., pl. 134, fig. 31.
$\dagger$ Oligostigna incommoda, Butl., P. Z. S., 1881, p. 180.
(22). Nymphula crisonalis, Wlk., xix., 961, China, CeyHmpsn., Ill. Het., ix., pl. 174, fig. 8 . lon, Java,
Parapoynx hebraicalis, Snell., Tijd. v. Ent., xxiii., p. 240; id., xxvii., pl. 4, fig. 11

Parapoynx myina, Meyr., Trans. Ent. Soc. Lond., 1885́, p. 432.
(23). Nymphula dicentra, Meyr., Trans. Ent. Soc. Lond., 1885, p. 431

Australia.
$\dagger$ Oligostigma pallida, But1., Trans. Ent. Soc. Lond., 1886, p. 423.
(24). Nymphula diminutalis, Snell., Tijd. v. China, India, Ent., xxiii., p. 242; id., xxvii., pl. 5, fig. 1 Ceylon,Java, Celebes.
(25). †Nymphula endoralis, Wlk., xvii., 459

Parapoynx distinctulis, Snell., Tijd. v. Ent., xviii., p. 261, pl. 14, fig. 14 .
(26). Nymphula stratiotata, Linn., Syst. Nat., x., p. 529

## Europe.

Phalrenia paluduta, Fabr., Ent. Syst., 213.
(27). †Nymphula hermeasalis, Wlk., xix., 945
S. America.
(28). †Nrmphula alifonealis, Wlk., xvii., 453
U. S. A.
(29). $\dagger$ Nrmphula plexilinealis, Grote, Pap., i., p. 17
U. S. A.
(30). Nymphula hydrothioxalis, Snell., Tijd.
v. Ent., xviii., p. 262. pl. 14, fig. 15 . S. America.
(31). $\dagger$ Nymphula nitexs, Butl., Cist. Ent., ii., Australia, p. 536

New Zealand.
(32). †Nymphula circealis, Wlk., xvii., 460
S. Africa, Madagascar.
(33). $\dagger$ Nymphula tullialis, Wlk., xvii., 462
(34). †Nraphula seminivella, Wlk., xxxv., 1717
$\dagger$ Nympheeella dispar, Grote, N. Am. Ent., i., p. 97.
(35). $\dagger$ Nymphula obscuralis, Grote, Pap., i., p. 18

Australia.
U. S. A.
U. S. A.
(36). Nymphula badiusalis, Wlk., xix., 955 .
$\dagger$ Nymphula curriferalis, Wlk., xxxiv., Canada, p. 1331
U. S. A.

> Oligostigma albalis, Robo., Ann. Lyc. N. Y., ix., p. 153, pl. 1, fig. 3.
(37). Nimphula vittalis, Brem., Lep. Ost. Sib., p. 66, pl. 6, fig. 3

Japan, China.
†oligostigma regularis, Pryer, Cist.Ent., ii., p. 234, pl. 4, fig. 8.
(38). †Nymphula itealis, Walk., xvii.. 458 . Parapoynx cretacealis, Led., Wien Ent. Mon., 1863, p. 452.

Nearctic and Neotropical regions.
(39). †Nymphula votalis, Wlk., xvii., 433, India, CeyHmpsn., Ill. Het., ix., pl. 174, fig. 4 . lon, Burma.
(40). †Nymphula fluctuosalis, Zell.,Lep.Caffr., The tropical p. 27 . . . . . . . and sub-

Parapoynac linealis, Guen., Delt. and Pyr., tropical p. 271
$\dagger$ Oligostigma chrysippusalis, Wlk., xvii., 432. Oligostigma obitalis, Wlk., xvii., 432. Parapoynx aptalis, Led., Wien Ent. Mon., 1863, p. 452.
$\dagger$ Oligostigma curta, Butl., Ent. Mo. Mag., xv., p. 270.

Parapoynx oryzalis, Woodmason, Rice Pest of Burma, Calcutta, 1885.
(41). $\dagger$ Nymphula leucostola, Hmpsn., Moths Ind., iv., p. 194

Burma.
(42). †Nymphula fusalis, Hmpsn., Moths Ind., iv., p. 195

Assam.
(43). $\dagger$ Nymphula fuscicostalis, Hmpsn., Moths Ind., iv., p. 195

Bengal.
(44). Nymphula nivalis, Schiff., Wien Verz., p. 316

Europe.
Phalcena candidata, Fabr., Ent. Syst., 321.
(45). Nymphula dentizonalis, sp. n.

む. White. Head, thorax, and abdomen marked with fulvous brown. Forewing with the costa suffused with fuscous brown to the postmedial line ; an oblique subbasal fulvous band from cell to inner margin with some dark irroration near it ; a black spot in cell and another at upper angle ; an oblique fulvous line with some black scales on it from $\frac{3}{4}$ of costa to $\frac{1}{3}$ of inner margin, slightly excurved below costa ; an oblique submarginal fulvous band with highly dentate outer edge. Hindwing withoblique black subbasal and medial lines ; a postmedial fulvous band with waved outer edge ; both wings with fine black line near the margin, a fulvous marginal line and series of black points on the cilia.

Hab. Cedar Bay, Cooktown, Queensland. Eap., 18 mm . Type in Coll. Rothschild.
(46). $\dagger$ Nymphula perlalis, sp . n .
d. Pure white. Forewing with black spot below base of costa followed by a fulvous patch on costa; an antemedial fulvous line angled below costa and interrupted in cell ; a fulvous spot on costa beyond middle ; a postmedial line straight from costa to vein 4 then retracted to upper angle of cell where there is a black speck on it and sinuous to inner margin ; traces of a curved submarginal
line ; a fine marginal line. Hindwing with curved ante- and postmedial, obscure submarginal, and fine marginal lines.

Hab. Guadalupe, Peru. Exp., 16 mm .
(47). + Nymphula medusalis, Wik., xvii., 486 . Australia.
(48). Nymphula depunctalis, Guen., Delt. and S. Africa, InPyr., p. 27.
+Farapoynx stagnalis, Zell., Lep. Caffr., p. 26 (preocc.).

Zebronia decussalis, WJk., xvii., 481.
(49). ${ }^{\text {Nymphula simplalis, Snell., Trans. Ent. }}$ Soc. Lond., 1896, p. 638.

Sikhim.
(50). Nymphula aruxdinalis, Ev., F. V. U. p. 469 ; Herr.-Schaff., Eur. Schmett., iv., fig. 95 dia, Ceylon and Burma, Java, Australia.
(50) Lond 1896, p. 638 , Tras.
S. Russia.
(51). Nymphula titanalis, Wlk., xviii., 706.
+Eudotricha stenialis, Warr., A. M. N. H. (6), viii., p. 68

Borneo.
Sect. II. Antennæ of male laminate; forewing with a hyaline fovea below base of cell.
A. Fore tibiæ of male clothed with long black hair.
(52). Nymphula seriopunctalie, sp. n.

White; head, thorax, and abdomen tinged with yellow. Forewing with the costal and inner areas suffused with yellow; black subbasal and antemedial specks on costa, the latter with traces of a line from it expanding into a brown mark above inner margin; a submarginal brown line bent inwards along vein 2 and running to the cell ; a marginal orange band defined on inner side by a fine black line; cilia black. Hindwing with the inner half suffused with yellow ; traces of an antemedial line; a marginal orange band with series of black points on its inner edge ; cilia black.

The Fergusson Island form has a black discocellular spot on forewing.

Hab. Amboina; Fergusson Island. Exp., 16-20 mm . Types in Coll. Rothschild and B. M.
B. Fore tibiæ of male not fringed with hair.
(53). Nympiula pleoxaxalis, sp. n.

Head, thorax, and abdomen golden orange mixed with white; wings golden orange. Forewing with the basal and costal areas whitish in parts; a postmedial white band from costa curving round to vein 2 then back to the cell ; a submarginal white line distinct at
costa, fining off and ending before inner margin ; a fine marginal black line. Hindwing with submarginal series of five or six black specks on medial area with others beyond them on the cilia.

Hab. Humboldt Bay and Fergusson Island, New Guinea. Exp., 20 mm . Types in Coll. Rothschild and B. M.

## Auctorum.

Parapoynx indomitalis, Berg, S. E. Z., 1876, p. 352

Uruguay.
Hydrocampa minimalis, Saalm., Ber. Senck. Ges., 1879, p. 298

Madagascar.
Parapoynx fregonalis, Snell., Tijd. v. Ent., 1880, p. 241, and 1884, pl. 4, fig. 12

Celebes.
Hydrocampa algiralis, Guen., Expl. Alg., p. 404
Algeria.
Hydrocampa distinctalis, Rag., Ann. Soc. Ent. Fr., 1894, p. 174

Amur.
Hydrocampa sultschana, Rag., Ann. Soc. Ent. Fr., 1894, p. 174

Amur.
Nymphulafuscomarginata, Bethune-Baker, Trans. Ent. Soc. Lond., 1894, p. 48, pl. 1, fig. 17. . Egypt.
Parapoynx pudica, Lucas, P. Linn. Soc. N. S. W., viii., p. 157
W. Australia.

Nymphula sinuosa, Lucas, P. Linn. Soc. N. S. W. (2) vii., p. 261

Queensland.
Hydrocampa cenosalis, Suell., Tijd. v. Ent., xxxviii., p. 157.

Celebes.
Parapoynx rugosalis, Moeschl., Abh. Senck. Ges., xvi., p. 318

Portorico.
Hydrocampa nebulosalis, Fern., Ent. Am., iii., p. 127
U. S. A.

Hydrocampa proprialis, Fern., Ent. Am., iv., p. 37
U. S. A.

Parapoynx chrysota, Meyr., Trans. Ent. Soc. Lond., 1886, p. 221

Fiji.
Parapoynx infimalis, Moeschl., Abh. Senck. Ges., xiv., p. 82

Hydrocampa gyralis, Hulst, Tr. Am. Ent. Soc., xiii., p. 159

Jamaica.

Hydrocampa australis, Hulst, Tr. Am. Ent. Soc., xiii., p. 168
U.S. A.

Hydreuretis euryscia, Meyr., Trans. Ent. Soc. Lond., 1885, p. 435

Australia.
Parapoynx minoralis, Mab., C.R. Ent. Belg., xxv., p. lxiii
U. S. A.
trans. ent. soc. lond. 1897.-part if. (july) 10

Parapoynx unguicalis, Snell., Midd. Sum. iv. (1) 8, p. 77 . . . . . . . . Sumatra.
Hydrocampa diffualis, Snell, Midd. Sum. iv. (1) 8, p. 76 . . . . . . . . Sumatra.
Nymphula luteivittata, Mab., C.R. Ent. Belg., xxiii., p. xxvii

Madagascar.
Parapoynx effrenatalis, Berg, S. E. Z., xxxvii., p. 352

## Uruguay.

Nymphula vitrinalis, Feld., Reis. Nov., pl. 136, fig. 11
Glyphodes impuralis, Feld., Reis. Nov., pl. 135, fig. 2

Haiti.
Synclera bleusei, Oberth., Ann. Ent. Soc. Fr. (6) vii., p. Ixxxiii., and Et. Ent., xii., pl. vi., fig. 42

Algeria.

## Genus Margarosticha.

Margarosticha, Led., Wien Ent. Mon., 1863, p. 454.
Palpi upturned, the 2nd joint moderately fringed with scales, the 3rd long and acuminate; maxillary palpi well developed and dilated with scales at extremity; frons rounded; antennæ minutely ciliated; legs long and slender. Forewing with vein 3


Margarosticha pulcherrimalis, ठ才, 今.
from angle of cell ; 4,5 stalked; 7 straight and well separated from 8, 9, $10 ; 11$ absent. Hindwing with the outer margin evenly curved; veins $3,4,5$ from angle of cell; 6, 7 stalked, 7 coincident with 8.
Type. (1). Margarosticila pulcherminalis, Led., Wien Ent. Mon., 1863, p. 454, pl. 18, fig. 11 . . . . . .
(2). Margarosticha bimaculalis, Snell., Tijd. v. Ent., xxiii., p. 245, and xxvii., pl. 5, fig. 5

Celebes.

(3). Margarosticha autrtralis, Feld., Reis. Nov., pl. 136, fig. 10 . . . . Australia. Margarosticha sphenotis, Meyr., Trans. Ent. Soc. Lond., 1887, p. 204.

## (4). Margarosticha leucozonalis, sp. n.

d. Orange-yellow : abdomen with some white at base and fuscous segmental lines. Forewing with fuscous streak on costal nervure ; a broad oblique medial white band edged with fuscous from median nervure to inner margin with fuscous suffusion above it, a silvery streak from it along extremity of median nervure and a fuscous streak with metallic scales on it below vein 2; a postmedial oblique white fuscous-edged triangular patch from costa to vein 3 , and a similar narrow submarginal band from below costa ; cilia blackish. Hindwing with broad fuscous-edged white band from near base to middle, expanding below the cell ; five black spots on middle of outer margin, the three middle spots very large placed on a patch white internally, orange between the spots, and metallic on margin, and bounded on inner side by a curved fuscous-suffused band.

Hab. Fergusson Island, N. Guinea. Exp., 20 mm. Type in Coll. Rothschild.

## Gemus Cataclysta.

Cataclysta, Hübn., Verz., p. 363 (1827).
Chrysendeton, Grote, Pap., i., p. 16 (1881).
Anydraula, Meyr., 'Trans. Ent. Soc. Lond., 1885, p. 427.
Palpi upturned, the 2nd joint reaching vertex of head, and slightly fringed with hair in front, the 3rd long and acuminate ;


Cataclystc Ulandialis, of, $\frac{3}{2}$ (from Moths Ind., vol. iv.).
maxillary palpi small and filiform ; frons rounded : antennæ annulate, with rings at the joints; legs long and slender, the spurs long and nearly equal. Forewing with veins $3,4,5$ from angle of cell ; 7 straight and well separated from 8, 9, 10. Hindwing with veins $3,4,5$ from angle of cell ; 6, 7 from upper angle or stalked.

Sect. I. Hindwing with vein 7 becoming coincident with 8.
A. Forewing with vein 10 stalked with 8,9 ; fore tarsi of male with the proximal joints fringed on both sides with hair.
(1). †Cataclysta blandialis, Wık., xvii., 448 ; Japan, Moore, Lep. Ceyl., iii., pl. 179, fig. 15 . India, CeyCataclysta patualis, Feld., Reis. Nor., lon, Borneo. pl. 136, fig. 7 (var.).
$\dagger$ Cataclysta bombayensis, Cotes and Swinh., Cat. Moths Ind., No. 4417.
$\dagger$ Cataclysta cuneifera, Moore, Lep. Ceyl., iii., p. 300, pl. 179, fig. 14.
$\dagger$ Cataclysta junctalis, Hmpsn., Ill. Het., viii., p. 140, pl. 155, fig. 24.
$\dagger$ Cataclysta nigritulis, Hmpsn., Ill. Het., ix., p. 178, pl. 174, fig. 5.

Cataclysta mesorphna, Meyr., Trans. Ent. Soc. Lond., 1894, p. 10.
$\dagger$ Anydraulu xanthobuthra, Meyr., Trans. Ent. Soc. Lond., 1894, p. 474.
(2). †Cataclista fuscalis, Hmpsn., Ill. Het., Bhutan, Ceyix., p. 178, pl. 174, fig. 13 ( $\ddagger$ ) . . lou, Borneo. $\dagger$ Cataclysta nyctopis, Meyr., Trans. Ent. Soc. Lond., 1894, p. 475.
B. (Anydraula). Forewing with vein 10 from cell.
a. Fore tarsi of male with the proximal segments fringed with hair on both sides.
(3). Cataclysta drusiusalis, Wlk., xvii., 450. Borneo, Australia, Fiji.
b. Fore tarsi of male naked.
(4). †Cataclysta glycerialis, Wlk., xvii., 450. Australia.

Sect. II. (Cataclysta).-Hindwing with vein 7 anastomosing with 8.
Type. (5). Cataclysta leminata, Linn., Syst. Nat., x., 529 . . . . . . . Europe.
Phalena uliginata, Fabr., Ent. Syst., 317.
(6). Cataclysta magnificalis, Hïbn., Pyr., fig. 104
U. S. A.
Cataclysta helopalis, Clem., Pr. Ac. N. Sci.Phil., 1860, p. 217.$\dagger$ Cataclysta lamialis, Wlk., xvii., 436.(7). Cataclysta bifascialis, Rob., Ann. Lyc.N. Y., ix., p. 153, pl. 4, fig. 3Texas.
(8). ©Cataclysta catenalis, Guen., Delt. andPyr., p. 267
Brazil.
(9). †Cataclista medicinalis, Grote, Pap., i.,p. 15
U. S. A.
(10). Cataclysta rulicalis, Clem., Pr. Ac. N. Sci. Phil., 1860, p. 217
U. S. A., Jamaica.
Cataclysta angulatalis, Led., Wien Ent. Mon., 1863, p. 435.
$\dagger$ Cataclysta confusalis, Wlk., xxxiv., 1234.
(11). CCataclysta annulalis, Guen., Delt. and Pyr., p. 266
Brazil.
(12). Cataclysta romanalis, Druce, Biol. Centr. Am. Het., ii., p. 273, pl. 63, fig. 14
Mexico.
(13). ©Cataclysta cronlalis, Druce, Biol. Centr. Am. Het., ii., p. 274, pl. 63, fig. 18 .
(14). †Cataclysta gratalis, Wlk., xxxiv., 1335.
Cataclysta cerussalis, Feld., Reis. Nov.,
Mexico.
Haiti, Brazil. pl. 136, fig. 8.
(15). †Cataclysta axis, Hmpsn., A. M. N. H. (6) xvi., p. 343
(16). Cataclysta onyxalis, n. n. . . Cataclysta diculsalis, Druce, Biol. Centr. Venezuela. Am., pl. 63, fig. 13 (nec Wlk.).
(17). Cataclysta moniligeralis, Led., Wien W. Indies, Ent. Mon., 1863, p. 454, pl. 18, fig. 10 . Honduras, Columbia.
(18). *Cataclysta ceesalis, Wik., xix., 952 . Brazil.
(19). †Cataclysta tessellalis, sp. n.
Head and thorax golden brown and white; abdomen white. Forewing golden brown, with a triangular white basal patch on inner area, followed by two reniform spots; a short streak beyond cell followed by a short transverse line ; a submarginal band from below costa to vein 3 ; an orange marginal band emitting an orange fascia to lower angle of cell. Hindwing with the base white ; a medial broad fulvous band crossed by a white band angled below cell, and followed by a white area irrorated with brown scales; five marginal black spots centred with metallic silvery-blue; some orange on margin.

Hab. São Paulo, Brazil (Jones). Exp., 16 mm .
(20). Cataclysta alyealis, Feld., Reis. Nov., pl. 136, fig. 3 . . . . . . Brazil.
(21). ©Cataclysta cumalis, Druce, Biol. Centr. Central Am. Het., ii., p. 273 , pl. 63, fig. 15
(22). †Cataclysta divulsalis, Wlk., xxxiv., 1336 Brazil.
(23). Cataclista Chalcitis, Feld., Reis. Nor., pl. 136, fig. 9 .

Brazil.
(24). †Cataclysta fulvicinctalis, sp. n.

Reddish brown ; abdomen with pale rings. Forewing with broad fulvous band just before middle, edged by pale and dark lines; a pale and dark postmedial line oblique from costa to vein 3 , then recurved to lower angle of cell and running to outer angle, forming a sinus enclosing a fulvous patch; a black-edged orange marginal band with a pale line inside it towards costa. Hindwing with fulvous medial band edged by pale and dark lines, the latter angled beyond lower angle of cell; an orange marginal band with four black spots on it, with metallic spots between them and a marginal series of small spots.

Hab. Jamaica (Cockerell). Exp., 18 mm .

## (25). †Cataclysta payonialis, sp. n.

Reddish brown; abdomen with pale rings. Forewing with traces of waved subbasal and medial lines ; a postmedial angulated whitish mark formed by a streak from lower angle of cell met by a line from costa; a fulvous marginal band. Hindwing pale; a fulvous patch in and beyond end of cell crossed by an oblique opalescent whitish discocellular band ; a marginal cluster of black spots disposed somewhat in three series, with metallic colours between them and a black line on its inner edge.

Hab. Guadalupe and Callao, Peru (J. J. Walker). Exp., 14 mm.
(26). Cataclysta gueneealis, Snell., Tijd. v. Brazil, ArEnt., 1875, p. 260, pl. 14, fig. 13 . . gentina. $\dagger$ Cataclysta trilinealis, Warr., Trans. Ent. Soc. Lond., 1889, p. 295.
(27). Cataclysta ealie, Wik., xix., 953 . . W. Indies, Cataclysta gemmiferalis, Led., Wien Ent. Venezuela, Mon., 1863, p. 454, pl. 18, fig. 8. Brazil.
(28). Cataclysta insulalis, Wlk., Trans. Ent. Soc. Lond. (3), 1 p. 123

Haiti, Brazil.
(29). ©Cataclysta eglesalis, Wlk., xix., 952 . Brazil.
(30). ©Cataclysta pantheralis, Wlk., xvii., 442 Brazil.
(31). Cataclysta ofulentalis, Led., Wien Ent. Mon., 1863, p. 453, pl. 18, fig. 7 +Cataclysta divisalis, WJk., xxxiv., 1336.
(32). "Cataclista inaurata, Cram., Pap. Exot., iv., p. 135̌, pl. 359, G. (33). +Cataclysta claudialis, Wlk., xvii., 437 . (34). †Cataclysta constellalis, sp. n.
t. Head and thorax white and yellow ; abdomen white ringed with yellow ; wings white. Forewing with basal and antemedial yellow bands with brown patches on the costa above them; an oblique medial line sharply angled below costa ; an obliquely-curved postmedial brown line from costa to vein 5 where it runs into a yellow patch at outer angle, a brown spot on costa beyond it followed by a triangular yellow patch with a line from its apex parallel to the postmedial line; a marginal yellow band with fine black line on its inner edge ending in a spot at apex. Hindwing with basal and antemedial yellow lines; a discocellular spot; a marginal metallic silvery patch with two series of five black spots on it and bordered inwardly by a fine black line.

Hab. St. Martha, Brazil (Bouchard). Exp., 14 mm . (35). ${ }^{\circ}$ Cataclysta pulcherialis, Druce, Biol. Centr. Am. Het., ii., p. 274, pl. 63, fig. 16 Centr. Am. (36). +Cataclysta llialis, Wik., xvii., 441 . Brazil. (37). Cataclysta premalis, Druce, Biol. Centr. Mexico, BraAm. Het., ii., p. 272, pl. 63, fig. 11 . zil, Argentina. (38). CCataclysta suborvata, sp. n.

White ; abdomen ringed with brown. Forewing slightly tinged with brown; a subbasal brown line; a curved antemedial line with slightly waved line beyond it ; a postmedial line oblique from costa and acutely angled to near middle of outer margin, then recurved and waved ; a triangular patch on costa beyond it, and a patch on inner margin near outer angle; a marginal yellow band with brown line on its inner edge. Hindwing with brown spot in cell and another below it ; an oblique line from upper angle of cell to vein 2 ; a discocellular spot; a submarginal line angled outwards at middle to the marginal yellow band which has a brown line on its inner edge.

Hab. São Paulo (Jones). Exp., 14 mm . (39). +Cataclysta trimacula, Hmpsn., Ill. Het., viii., p. 139, pl. 155, fig. 14
S. India.
(40). +Cataclysta ${ }^{\circ}$ lampetialis, Wlk., xvii., 451 Australia.
(41). Cataclysta pomperialis, Druce, Biol.

Centr. Am. Het., ii., p. 276, pl. 63, fig. 24 Centr. Am.
(42). +Cataclysta angulata, Moore, Lep. Ceyl., ii., p. 300 , pl. 181, fig. 12
(43). Cataclysta midas, Butl., Trans. Ent. Soc.

Lond., 1881, p. 585 . . . . Japan.
(44). +Cataclysta supercilialis, sp. n.

Head and thorax red-brown with white on collar and patagia. Forewing rufous with a white patch at base of inner area; a large white patch before middle below the cell ; a spot at lower angle ; a postmedial patch from costa to vein 4 ; a submarginal semicircular patch from below costa to vein 4 ; a marginal orange band with dark line on its inner edge expanding into an orange patch at outer angle with two silvery spots on it. Hindwing with the base and costal area white, the area beyond the cell and at anal angle yellow, with a dark-edged white discocellular band on it; the outer area white irrorated with black; two postmedial black lines sharply angled below costa; four black spots on the margin with a sinuous line inside them, the two middle ones with bluish-white centres.

Hab. Madagascar. Eap., 今 18, \& 20 mm .
(45). †Cataclysta albipunctalis, sp.n.
§. Differs from C. supercilialis in the postmedial white patch of forewing being reduced to the part between veins 4 and 5 . Hindwing with a broad straight edged yellow band across end of cell with no discocellular band on it.

Hab. Madagascar. Exp., 26 mm .
(46). +Cataclysta pervenustalis, sp.n.

む. Head and thorax brown and white, the patagia white; abdomen yellow. Forewing orange-yellow; the costal area rufous; the basal inner area white, crossed by a rufous subbasal line and sending a white fascia to end of cell; an oblique rufous line from costa to lower angle of cell followed by a triangular white patch with wedge-shaped rufous mark on its outer edge ; a black-edged white submarginal band from costa to vein 2 where it emits a silvery streak to join two silvery postmedial spots on inner area; a series of marginal black specks; the cilia grey. Hindwing orange; the basal area white with brown spot in cell; a white patch on outer area with two fine dark lines on its inner edge
traversed by two fine lines, and with four black marginal spots with silvery crescentic marks on them.

Hab. Accra, W. Africa. Exp., 22 mm .
(47). Cataclysta repetitalis, Warr.,
A. M. N. H. (6), xvii., p. 205 . . . Queensland.
(48). +Cataclysta albidentata, sp. n.

ㅇ. Dark fuscous. Forewing with white postmedial band from costa to vein 4 followed by an orange band. Hindwing with four black marginal spots with obscure orange lunules on their inner edges and white specks between them.

Hab. Java (Horsfield). Exp., 14 mm .
Auctorum.
Cataclysta pyropalis, Guen., Delt. \& Pyr., p. 265 . Brazil.
Cataclysta coloralis, Guen., Delt. \& Pyr., p. 265. Mauritius, Cataclysta pusillalis, Saalm., Ber. Senck. Ges., Madagascar. 1879, p. 295.
Cataclysta sumptuosalis, Moeschl., Abh. Senck. Ges., xvi., p. 319 . . . . . . Porto Rico.
Cataclysta miralis, Moeschl., Abh. Senck. Ges., xvi., p. 319

Porto Rico.
Cataclysta hexalitha, Meyr., Trans. Ent. Soc. Lond., 1886, p. 219 . . . . Fiji
Anydraula cyanolitha, Meyr., Trans. Ent. Soc. Lond., 1886, p. 220

Fiji.
Cataclysta vestigialis, Snell., Midd. Sum., iv. (1), 8, p. 78 . . . . . . . . Sumatra.
Cataclysta tripunctalis, Snell., Tijd. v. Ent., 1872, p. 98, pl. 8, fig. 1 . . . . . Guinea.
Cataclysta minimalis, H. S., Ver. Regensb., xxv., p. 26

Cuba.
Cataclysta plusialis, H. S., Ver. Regensb., xxv., p. 26 .

Cuba.
Chrysendeton avernalis, Grote, Tr. Kansas Ac., viii., p. 53
U. S. A.

Cataclysta callichromalis, Mab., Bull. Soc. Z. Fr., iii., p. 94

Madagascar.

## Genus Symphonia.

Symphonia, Hmpsn., Moths Ind., iv., p. 198 (1896).
Palpi upturned and hardly reaching vertex of head, the 2 nd joint fringed with long hair in front, the 3rd with a small triangular tuft;
maxillary palpi dilated with scales; frons rounded; antennæ of male thickened and flattened : tibie with the outer spurs half the length of inner; male with the claspers elongate. Forewing with the outer margin slightly angled at middle : reins $3,4,5$ from


Symphonia multipictalis, ${ }^{*}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
angle ; 6 from below upper angle ; 7 straight and well separated from $8,9,10 ; 11$ free. Hindwing with the outer margin slightly angled at middle ; the cell more than half the length of wing ; veins $3,4,5$ from angle ; 6, 7 from upper angle.
Type. †Symphonla mulitipictalis, Hmpsu., Moths

$$
\text { Ind., iv., p. } 195 \text {. . . . Ceylon. }
$$

## Genus Musotima.

Musotima, Meyr., Trans. Ent. Soc. Lond., 1884, p. 288.
Palpi upturned, the 2nd joint not reaching vertex of head and thickly fringed with hair, the 3rd well developed and spatulate at extremity ; maxillary palpi short and filiform, frons rounded; antennæ of male thickened and flattened with appressed serrations;


Musotima acclaralis, '才, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
tibiæ with the spurs long and equal ; male with a tuft of long hair springing from base of fore coxæ. Forewing with the apex produced and acute, the outer margin excised below apex ; vein 2 curved and arising near angle of cell; 3,4 from angle; 5 from above angle; 7 straight and well separated from $8,9,10$; male with a more or less prominent foveal depression in cell. Hind-
wing with the outer margin excised below apex and towards anal angle; veins 3,4 from angle of cell ; 5 from above angle ; 7 from before upper angle.

Sect. I. Outer margin and fore and hindwings deeply excised below apex, three indentations towards anal angle of hindwing.
(1). †Musotima suffusalis, Hmpsn., Ill. Het., S. India, ix., p. 178, pl. 17f, fig. 20

Ceylon.
Sect. II. Fore and hindwings with the outer margin slightly excised below apex; hindwing excised, but not indented towards anal angle.
A. Antennæ of male normal.

Type.
(2). Musotima aduncalis, Feld., Reis. Nov., pl. 135, fig. 11 . . . . . New Zealand.
(3). +Musotima acclaralis, Wlk., xvii., 403 ; S. India, Hmpsn., Ill. Het., ix., pl. 174, fig. 24 . Ceylon.
(4). Musotima ochropteralis, Guen., Delt. Australia, and Pyr., p. 230 . . . . . Tasmania.
(5). +Musotima nitidalis, Wlk., xxxiv., 1317 . Australia, Diathrausta timaralis, Feld., Reis. Nov., N. Zealand. pl. 135 , fig. 23.
(6). Musotima acrias, Meyr., Trans. Ent. Soc. Australia, Lond., 1884, p. 289 . . . . Tasmania
(7). Musotima narcissusalis, Wlk., xix, 956 . Brazil.
B. Antennæ of male with a large angular projection on outer side below middle, then strongly serrate; of female laminate.
(8). Musotima persinualis, sp. n.

White ; head, thorax, and abdomen tinged with fulvous and fuscous. Forewing with subbasal orange patch from costa to median nervure and curved antemedial band; an orange blackedged reniform spot with very oblique wedge-shaped orange mark from costa above it, expanding beyond it into an elongate patch, and with a triangular mark on costa above it; a black-edged orange reniform mark below lower angle of cell with some diffused black beyond it; a very sinuous submarginal line; black from costa to vein 4, and with orange beyond it, then interrupted, greatly bent inwards, fuscous, and with an orange lunule on its outer edge ; a marginal band consisting of orange lunules below aper and
above outer angle, conjoined at middle, and with a fine black line on their inner edge. Hindwing with black-edged orange subbasal and medial bands, the latter with some black between it and the very sinuous black-edged white postmedial band ; outer area fuscous tinged with fulvous and with white patch towards anal angle.

Hab. Amboina; Tenimber ; Fergusson Island, New Guinea; Cedar Bay, Cooktown, Queensland (Doherty, Meek). Exp., 16 mm. Types in Coll. Rothschild and B. M.
(9). Musotima fuscidiscalis, sp. n.

White. Forewing with oblique subbasal orange band, ending on vein 1, and with orange spot beyond it on costa ; a black and white discocellular lunule with oblique orange band from it to inner margin before middle, and very oblique wedge-shaped orange patch, with white costal spot on it from above it on costa to near the submarginal black and orange band from costa to vein 5 ; the whole area beyond the medial orange band and below the orange wedge and submarginal band suffused with fuscous; a marginal orange band from apex to vein 3 defined by a black line on inner side. Hindwing with orange antemedial band not reaching costa ; a fuscous medial band from below costa expanding and enclosing a white spot beyond lower angle of cell, and with an obliquely sinuous line beyond it, with the area beyond it fuscous to near margin which is white.

Hab. Fergusson Island, N. Guinea (Meek). Exp., 14 mm . Types in Coll. Rothschild and B. M.

## Auctorum.

Musotima incrustalis, Snell., Tijd. v. Ent., 1894,
p. 57 . . . . . . Java.

## Genus Cymoriza.

Cymoriza, Guen., Delt. and Pyr., p. 27 (185ّ4).
Palpi upturned, the 2nd joint reaching vertex of head and


Cymoriza ustalis, ${ }^{\text {ot, }} \frac{1}{2}$ (from Moths Ind., vol. iv.).
thickly scaled, the 3rd well developed, acuminate and conically
scaled; maxillary palpi minute; frons produced to a rounded prominence ; antennæ of male thickened and flattened; tibir clothed with rough hair on outer side, the spurs long and equal. Forewing with veins $3,4,5$ from angle of cell ; 6,7 stalked in male and well separated from $8,9,10$; a glandular swelling on costa just beyond the middle. Hindwing with the outer margin excised below apex and twice towards outer angle ; veins $3,4,5$ from angle ; 7 from before upper angle.
Type. (1). Cyboriza irrectalis, Guea., Delt.and Pyr., p. 272 . . . . . . . N.-E. India.
(2). $\dagger$ Cymoriza ustalis, Wlk., xxxiv., 1529.

Cymoriza irrectalis, Guen., Delt. and Pyr., Himalayas, p. 272 (part), pl. 9, fig. 4 . . . Java.

Cymoriza fascialis, Warr., A. M. N. H. (6), xviii., p. 223.

## Genus Omphaloptera, nov.

Palpi with the 2nd joint porrect and extending about the length of head, the 3rd well developed, acuminate and upturued; maxillary palpi dilated with scales; frons rounded ; antennia laminate ; legs and spurs long, slender, and naked. Forewing


Omphaloptera randalis, ${ }^{\mathbf{\delta}}, \frac{1}{1}$.
with vein 3 from before angle of cell; 4, 5 from angle ; 7 straight and well separated from $8,9,10$; male with a large antemedial swelling on vein 1 . Hindwing with veins $3,4,5$ from angle of cell ; 6, 7 irom upper angle, 7 anastomosing with 8 to two-thirds of wing.
Type. Omphaloptera randalis, Druce, Biol. Centr. Am. Het., ii., p. 275, pl. 63, fig. 21 . . . Mexico.

## Genus Thysanoidma.

Thysanoidma, Hmpsn., Ill. Het., viii., p. 142 (1891).
Palpi upturned, the 2nd joint not reaching vertex of head, and with a long pointed tuft of hair in front at extremity, the 3rd well
developed and acuminate; maxillary palpi filiform; frons round̄ed; antennæ of female minutely ciliated; legs long and slender, the spurs nearly equal. Forewing with veins $3,4,5$ from angle of cell ; 7 straight and well separated from 8, 9, 10; 11 from angle of


Thysanoidma octalis,,$\frac{7}{2}$ (from Moths Ind., vol. iv.).
cell. Hindwing with the outer margin much excised below apex, and with three indentations towards anal angle; the inner and outer margins towards anal angle fringed with long spatulate cilia of varying lengths ; veins $3,4,5$ from angle of cell ; 6, 7 from upper angle.
Type. †Thysanomada octalis, Hmpsn., Ill. Het., viii., Assam, Nilp. 142, pl. 156, fig. 19 . . . . . giris.

## Genus Tetrernia.

Tetrernia, Meyr., P. L. Soc. N. S. W. (2), iv., p. 1109 (1890).

Palpi upturned, the second joint moderately scaled in front, the 3rd well developed and acuminate ; maxillary palpi short and filiform; frons rounded; antennæ minutely annulate. Forewing with vein 2 from near angle of cell ; 3 and 5 from angle, 4 absent;


Tetiernia terminitis, ${ }^{\dagger}, \frac{3}{2}$.
7 well separated from $8,9,10,11$ which are stalked. Hindwing with the outer margin slightly indented above vein 5 , and excised towards outer angle ; vein 3 from angle ; 4,5 on a long stalk ; 6,7 from upper angle, 7 anastomosing with 8 .

Type. *Tetrennia terminitis, Meyr., P.L. Soc. N.S.W.
(2), iv., p. 1109

Australia.

## Genus Ambia.

Ambia, Wlk., xix., 957 (1859).
Opistheideicta, Warr., A. M. N. H. (6), v., p. 478 (1890). Oligernis, Meyr., Trans. Ent. Soc. Lond., 1894, p. 470. Leucogephyra, Warr., A.M.N.H. (6), xviii., p. 219 (1896).
Palpi upturned, the 2 ad joint reaching vertex of head and nearly naked, the 3rd long and acuminate ; maxillary palpi filiform and of moderate length; frons rounded; legs of moderate length, the spurs long and equal. Forewing with the apex slightly produced, the outer margin somewhat excised below apex;


Ambia iambealis, ô, $\frac{\mathrm{T}}{2}$ (from Moths Ind., vol. iv.).
veins $3,4,5$ usually from angle of cell; 7 straight and well separated from $8,9,10$. Hindwing with the apex produced; the outer margin somewhat excised below apex, and with two excisions towards anal angle; the inner margin very short; veins 3,4 from angle of cell ; 5 usually from somewhat above angle ; 6, 7 from upper angle.
Sect. I. Forewing with vein 11 absent; antenuæ of male thickened and flattened.
a. Both wings with veins 4,5 stalked.
(1). †Ambia tenebrosalis, Hmpsn., Moths Ind., iv., p. 203 . . . . . . Ceylon.
b. Both wings with veins 4,5 from cell.
(2). Ambia albipunctalis, Warr., A. M. N. H. Assam, Cey. (6), xvii., p. 202 lon.
(3). +Ambla xavtholevca, Hmpsn., Moths Ind., Ceylon, Boriv., p. 203
neo.
Sect. II. Forewing with vein 11 present ; 4 from cell.
A. (Oligernis.) Hindwing of male with no brands or fringes of hair beyond lower angle of cell or on inner area.
a. Forewing of male with no glandular swelling on middle of costa or fovea in cell.
(4). †Ambia colonalis, Brem., Lep. Ost. Sib., Amur, N.-W. p. 67, pl. 6, fig. 4 .

Himalayas.

Oligostigma locuples, Butl., Ill. Het., vii., p. 97, pl. 135, fig. 7.
$\dagger$ Oligostigma dives, Butl., Ill. Het., vii., p.97, pl. 135, fig. 8 (var.).
(5). †Ambia leucochrysa, Meyr., Trans. Ent. Soc. Lond., 1894, p. 471

Borneo.
Type. (6). ${ }^{\circ}$ Ambia prolycusalis, Walk., xix., 958 . Borneo, Cele-
Canostola eromenalis, Snell., Tijd. v. Ent., xxiii., p. 226, pl. 3, fig. 4.
(7). *Ambia debalis, Druce, Biol. Centr. Am. Het., ii., p. 276, pl. 63, fig. 23

Centr. Am.
(8). ${ }^{\text {ambia dendalis, Druce, Biol. Centr. Am. }}$ Het., ii., p. 277, pl. 63, fig. 27

Guatemala.
(9). †Ambia endophthalma, Meyr., Trans. Ent. Soc. Lond., 1894, p. 470

## Borneo.

(10). †Ambia falliolatatis, Swinh., Trans. Ent. Assam, BurSoc. Lond., 1890, p. 287
ma.
(11). †Ambla instrumentalis, Swinh., A.M.N. H. (6), xiv., p. 209

Assam.
(12). †Ambia oculalis, sp. n.
$\delta$. Fulvous, thickly irrorated and suffused with fuscous; wings with specks and patches of a white ground colour showing on basal half. Forewing with faint traces of curved subbasal and sinuous antemedial pale lines; a prominent large somewhat 8 -shaped white discocellular spot; a postmedial black line defined by white on outer side, slightly curved and minutely dentate from costa to vein 3 then retracted to lower angle of cell. Hindwing with elongate white discocellular spot with a large white patch beyond it below costa; a minutely dentate postmedial white line bent outwards between veins 5 and 2 ; both wings with rufous marginal band defined by a minutely waved black line on inner side, inside which is a series of white specks.

Hab. Mt. Macedon, Australia (Raynor). Exp., 16 mm .
(13). *Ambia complicata, Warr., A.M. N. H. (6), xviii., p. 222 . . . . . . Assam.
(14). Ambia fulvobasalis, Snell., Tijd. v. Ent., Borneo, Celexxiii., p. 244 ( $\%$ ) . . . . . bes.
(15). †Ambia picalis, sp. n.

Black; palpi white below; abdomen tinged with white; legs banded with white. Forewing with sinuous white antemedial line with specks in cell beyond it; a spot in end of cell extending upwards to the costa, and with a series of specks beyond it bent
inwards at vein 2 ; a submarginal series of specks bent outwards at vein 5 , and terminating at outer angle, with a wedge-shaped mark beyond them on costa ; cilia white below apex and at outer angle. Hindwing with subbasal white band; a spot in end of cell with sinuous line from below it to inner margin ; a postmedial series of specks ending at anal angle ; cilia white at apex and anal angle.

Hab. São Paulo, Brazil (Jones). Exp., 16 mm .
(16). †Ambia tenella, sp. n.

ㅇ. White with a fuscous tinge. Forewing with fuscous spot in cell and larger discocellular spot; a fuscous postmedial band sinuous from costa to vein 2, then bent inwards above inner margin ; a marginal band broad at costa, narrowing to outer angle. Hindwing with discocellular fuscous spot; a sinuous postmedial line broad from vein 5 to anal angle; a marginal band narrowing to a point at vein 2.

Hab. Callao, Peru (J. J. Walker'). Exp., 14 mm. (17). Ambia semifascialis, Warr., A. M. N. H. (6), xviii., p. 212 . . . . . Assam.
b. Forewing of male with a glandular swelling on costa at middle, often with fovea below it.
$a^{1}$. Antennæ of male with long cilia.
(18). Ambia rhabdotalis, sp. n.
§. Fulvous orange : head and thorax suffused with fuscous; abdomen banded with white and fuscous. Forewing with blackedged white subbasal and antemedial bands, the former oblique; the fovea white ; a short white streak from discocellulars to postmedial band, with another above it below costa; the postmedial band oblique white and black-edged from costa to vein 4, connected by a very oblique black line with a black-edged white mark placed nearer the base between vein 2 and inner margin ; a curved blackedged white submarginal band with its lower extremity bent inwards and connected with the postmedial mark. Hindwing with the base white ; a black-edged white antemedial band ; an oblique postmedial band from costa to vein 4 near the submarginal band, which is bent inwards and dentate at vein 2. Both wings with marginal series of black points and black line through the cilia, which are whitish; the black edges of the markings somewhat diffused.

Hab. Amboina (Doherty). Exp., 20 mm . Type in Coll. Rothschild.
trans. ent. soc. lond. 1897.—Part II. (July.) 11

> (19). †Ambia iaviesalis, Wlk., xix., $950\left(\begin{array}{c}\text { j) }\end{array}\right.$ Assam, $\dagger$ Musotimu fulvalis, Hmpsn., Ill. Het., ix., Ceylon. p. 180, pl. 174, fig. $26($ of).
> Cymoriza albiflavalis, Warr., A. M. N. H. (6), xviii., p. 223 .
(20). Ambia interstrigalis, sp. n.

Head, thorax, and abdomen white marked with black and sometimes tinged with orange, abdomen with black band and terminal line to each segment, wings orange suffused with brown towards base. Forewing with two subbasal white lines divided by a black line; a curved antemedial white band defined by black lines; a short black line from costa at the fovea and another on discocellulars; white streaks between the veins beyond upper part of cell to the black-edged white postmedial band, which is straight and extends from costa to vein 4 ; a curved black-edged white submarginal band emitting a tooth below vein 2 almost to cell and with diffused fuscous on its inner side. Hindwing with straight black-edged white antemedial band; a postmedial black-edged white patch from costa to vein 4; a submarginal black-edged white band curved from costa to vein 2 where it is bent inwards towards lower angle of cell and with diffused fuscous on its inner side; an orange marginal band defined by black.

Hab. Amboina (Doherty); Fergusson Island, N. Guinea (Meek). Erp., 16 mm . Types in Coll. Rothschild and B. M.

## (21). Ambia atristrigalis, sp. n.

Head, thorax white and black; abdomen white tinged with fulvous and banded with black. Forewing orange largely suffused with black; an indistinct oblique white subbasal line; a curved antemedial band ; the interspaces beyond the cell prominently streaked with black and with more or less developed white streaks above veins 5 and 7 ; a postmedial black-edged white band curved and ruuning up vein 2 to the cell, then very oblique from origin of vein 2 to inner margin; an orange marginal band defined on inner side by a black line with a white band inside it bent round and sending a tooth inwards above inner margin. Hindwing with the base white, followed by an orange-centred black band, then a sinuous white band expanding towards costa and with an orange discocellular spot on its outer edge ; medial area black, the veins streaked with orange; a black-edged white postmedial band curved from costa to vein 2, along which it is bent upwards almost to the
cell ; outer area orange with sinuous black-edged white submarginal band bent inwards below vein 2 .
© with veins 6,7 of forewing stalked.
Hab. Amboina (Doherty) ; Fergusson Island, New Guinea (Meek). Exp., 16 mm . Types in Coll. Rothschild and B. M.
(22). †Ambia leucoplaca, Meyr., Trans. Ent.

Soc. Lond., 1897, p. 85 . . . Sangir, Fergusson Isl., N. Guinea.
$b^{1}$. (Ambia). Antennæ of male thickened and flattened.
(23). †Ambia semiluxaliś, sp. n.
ot Head, thorax, and abdomen yellow and white. Forewing yellow with obscure white subbasal and antemedial bands; a postmedial patch on inner area, a semicircular dark-edged white band from costa before apex to discocellulars ; a submarginal dark-edged white band expanding into a patch above inner margin. Hindwing with antemedial white band ; a semicircular dark-edged white band from costa beyond middle to discocellulars; a submarginal lunulate band following the curves of outer margin.

Hab. Petropolis, Brazil. Exp., 16 mm .
(24). †Aubia fulvitinctalis, sp. n.

Fulvous suffused 'with fuscous. Forewing with antemedial white line expanding into a patch on inner margin ; a postmedial white patch on inner area; a dark discocellular lunule with a white streak from it to the curved dark-edged postmedial white band which terminates at the origin of vein 2 ; a submarginal darkedged white band curving inwards above inner margin. Hindwing with the base white; an antemedial white band; a dark discocellular spot; a postmedial dark-edged white band bent inwards to lower angle of cell ; a submarginal lunulate band following the curves of outer margin.

## Hab. Callao, Peru (J. J. Walker). Exp., 14 mm .

(25). Aybla bolusalis, Wlk., xix., 457 . . Brazil.
(26). †Ambia flavalis, Warr., Trans. Ent. Soc. Lond., 1889, p. 293. . . . Brazil.
(27). $\dagger$ Aybla leucostictalis, Hmpsn., A.m.n.H. (6), xvi., p. 344 (ㅇ) . . . . Grenada.
(28). Anbia damescalis, Guen., Delt. and Pyr., p. 272 . . . . . . . Brazil. Cymoriza bocusalis, Wlk., xix., 955.
(29). Ambia Marginalis, Moore, Lep. Atk., p. 211 . . . . . . N. E. India.
$\dagger$ Cymoriza albicomma, Swinh., A. M. N. H. (6), xiv., p. 210.

Cymoriza fulvalis, Warr., A., M. N. H. (6), xviii., p. 224.
(30). Ambia magnificalis, Swinh., A. M. N. H. (6), xvi., p. 299
N. E. India.

Cymoriza interruptalis, Warr., A. M. N. H. (6), xviii., p. 224.
c. Forewing of male with a fovea in end of cell, mid tibiæ dilated with a fold and tuft of long hair; hind femora with two long styliform processes from extremity, one curved and fringed with thick tufts of hair, the other finer and fringed with long fine hair ; tibia slender without spurs, the tibia and tarsus fringed with fine long: hair.
(31). Ambia trichostylalis, sp. n.

Head, thorax, and abdomen orange; hind legs with the tufts on larger process mostly black. Forewing orange ; a white patch in cell surrounded by diffused fuscous; an obliquely curved postmedial dark-edged white patch with its apex on costa and its base pointing towards lower angle of cell and surrounded by fuscous irroration ; a curved submarginal white band ending on vein 1 , edged by fuscous on inner side and with a fine black line on outer ; a marginal series of black points becoming a line towards outer angle. Hiudwing orange with large black-edged subbasal elliptical patch; a submarginal black line from vein 4 to near inner margin; a fine white and black subapical line; a white-centred black spot on marginal lobe, with black marginal mark beyond it ; a marginal black line from vein 4 to anal angle.

Hab. Celebes (Doherty). Exp., 22 mm . Types in Coll. Rothschild and B. M.
B. (Opisthedeicta.) Hindwing of male with two long brands beyond lower angle of cell on upper side between veins 2 and 4 and two short brands below their extremity.
(32). †Ambia poritialis, Wlk., xix., 951, S.-E. India, Moore, Lep. Ceyl., iii., pl. 179, fig. 11 . Ceylon, Sumatra.

## (33). A mbia aulacophora, sp. n.

Differs from poritialis in the white markings not being edged with brown except the postmedial and submarginal bands slightly; forewing with the m edial markings connected into an irregular V -shaped mark; the postmedial mark between costa and vein 5 more erect and with two streaks from its outer edge; the submarginal band diffused at its angle on margin, and the marginal band incurved below apex and running out to the margin at middle.

Hab. Fergusson Island (Meek). Exp., 16 mm . Types in Coll. Rothschild and B. M.
$C$. Hindwing of male with fringes of hair along: veins $2,3,4$ on under side; the apical area clothed with thick fulvous scales; the inner margin with a lobe fringed with very long hair; abdomen with paired tufts of black hair from base; the hind tibiæ fringed with blackish tufts on outer side.
(34). Aybia lobophoralis, Hmpsn., Moths Ind., Assam, Pulo
iv., p. 207 . . . . . . Laut.
D. Hindwing of male with fringes of long thickened hair on median nervure and vein $1 a$; the cilia long and spatulate towards anal angle.
(35). †Ambia albomaculalis, sp. n.
9. Bright fulvous irrorated with black. Forewing with indistinct dentate subbasal, ante- and postmedial black lines; the outer area not irrorated ; three black specks on costa towards apex ; silvery fascie on veins 7 and 6 ; a large round white spot beyond lower angle of cell ; an orange marginal band with black line on its inner edge, inside which is a white line. Hindwing with irregularly sinuous postmedial line, with yellow on its outer edge ; three white-edged black spots on an orange ground at middle of margin ; cilia of both wings dark.

Hab. Aburi, W. Africa (Carter). Exp., 18 mm .
(36). Ambia iriusalis, Wlk., xvii., 434 . Borneo, Pulo Laut. (37). †Aybla tigridalis, sp. n.
q. Head and thorax black and white; abdomen fulvous. Forewing with the basal area black with broad white streaks on the veins, in and below cell and on discocellulars; a wedge-shaped fulvous patch from middle of cell occupying the whole outer area; a large lunulate postmedial yellow patch surrounded by dark brown; a similar submarginal band ending at vein 2 ; a speck on
vein 1 and a marginal line. Hindwing with the base fuscous with some white on inner area; the rest of wing bright orange with a wedge-shaped black patch with two white marks on it from origin of vein 2 to outer margin; the margin fuscous from apex to rein 2 with a series of black and white ocellate marks on it.

Hab. Pulo Laut (Doherty). Eap., 22 mm .

## $E$. Hindwing with a large tuft of scales below lower angle of cell on upper side.

(38). †Ambia metalophota, sp. n.

ㅇ. Head and thorax whitish and rufous; abdomen fuscous ringed with white and with some rufous on basal segment ; wings roughly scaled and variegated with whitish, fuscous and ferruginous. Forewing with the ferruginous chiefly confined to a band before the obscure antemedial line and to patches at apex and outer angle; obscure white postmedial and marginal lines, the former much excurved beyond cell and with a fuscous subapical patch beyond it. Hindwing with the basal and costal areas pale ; an irregularly waved postmedial white line; four black, white, and metallic marginal spots towards anal angle.

Hab. Jamaica (Cockerell). Exp., 12 mm .
Sect. III. Forewing with veins 3, 4 stalked; 11 present.
(39). †Ambla catachistahis, sp. n.

ㅇ. Head, thorax, and abdomen fuscous brown. Forewing grey irrorated with fuscous; an inwardly oblique sinuous medial black line; a postmedial sinuous line arising from almost the same point on costa as the medial line running almost to outer angle, then retracted above iuner margin, the area beyond it dull fulvous with an oblique wedge-shaped black-edged fuscous-speckled patch from costa to vein 4 ; a submarginal black line with some white inside its costal portion and a leaden spot near outer angle. Forewing grey irrorated with black; an oblique fulvous band from end of cell to outer margin near anal angle, with a black-edged white discocellular band on its outer edge ; a double submarginal black line angled below costa; the margin fulvous, with four black spots with white specks above them and black spots between them.

Hab. Pulo Laut (Doherty). Exp., 20 mm .

## Auctorum.

Nymphola thyridialis, Led., Zool. bot. Ver., 1855, p. 219, pl. 4, fig. 2 . . . . . Syria.

## Genus Ohigostigia.

## Oligostigna, Guen., Delt. and Pyr., p. 260 (1854).

Palpi upturned, the 2nd joint moderately fringed with hair in front and reaching vertex of head, the 3rd well developed and acuminate; maxillary palpi long and dilated with scales at extremity; frons rounded : antennæ of male usually annulated; ocelli rarely prominent ; legs long, the tibiæ smooth, with the spurs


Oligostigma picale, $\uparrow$, $\frac{3}{2}$ (from Moths Ind., vol. iv.).
almost equal. Forewing with veins $3,4,5$ from angle of cell ; 7 straight and well separated from $8,9,10$. Hindwing with the cell about half the length of wing ; veins $3,4,5$ from angle; 6,7 from upper angle, 7 strongly anastomosing with 8 ; the outer margin excised below apex, then lobed.

Sect. I. Hind tibiæ of male without groove and tuft.
A. Antennre of male not thickened and flattened.
a. Hindlegs of male without tufts of hair on the сохæ.
(1). Oligostigma cryptale, Druce, Biol. Centr. Mexico, Am. Het., ii., p. 274, pl. 63, fig. 19 . Centr. Am.
Type (2). Oligostigma Junceale, $\ddagger$ Gueri., Delt. and Pyr., p. 261, pl. 4, fig. 6 . . . . Brazil.
(3). †Oligostigma semineale, Wlk., xvii., 430 . U.S.A.
(4). †Oligostigma flavimarginale, Warr., Trans. Ent. Soc. Lond., 1889, p. 294 . Brazil.
(5). †Oligostigma angulipenne, Hmpsn., Ill.

Het., viii., p. 139, pl. 155, fig. 6 . . S. India.
(6). †Oligostigma niveinotatum, Hmpsn., Ill.

Het., ix., p. 176, pl.174, fig. 32 . . Ceylon.
(7). †Oligostigma corculina, Butl., Ill. Het.,
iii., p. 75, pl. 59, fig. 7 . . . . Japan.

[^9](8). †Oligostigma hapilista, Swinh,, Trans.

Ent. Soc. Lond., 1892, p. 20, pl. 1, fig. 11 Assam. Oligostigma albidivisa, Warr., A. M. N. H. (6), xviii., p. 221.
(9). †Oligostigna fuscifusale, Hmpsn., Ill. Assam, CeyHet., ix., p. 177, pl. 174, fig. 28 . . lon.
(10). Oligostigma syagrusale. Wik., xix., 953. Borneo.
$\dagger$ Oligostigma melanodes, Meyr., Trans. Ent. Soc. Lond., 1894, p. 473.
(11). Oligostigma conspurcatale, Warr., A. M. N. H. (6), xvii., p. 202

Assam.
(12). †Oligostigma irisale, Wlk., xvii., 444 . W. Africa.
(13). †Oligostigma parvale, Moore, P. Z. S., Andamans, 1877, p. 616 . . . . . . Borneo.
(14). Oligostigma dominulale, Wlk., xxxiv., 1338

New Guinea.
(15). †Oligostigma fumibasale, Hmpsn., Moths Ind., iv., p. 208

Ceylon.
(16). †Oligostigma insectale, Pryer, Cist. Ent., ii., p. 234, pl. 4, fig. 7

China.
(17). †Oligostigna bilineale, Snell., Tijd. v. Punjab, BenEnt., xix., p. 196, pl. viii., fig. 1 . . gal.
(18). Oligostigma villidale, Wlk., xvii., 435 . Assam, Cey$\dagger$ Hydrocampa sacadasalis, Wlk., xix., 963 . lon, Java, Oligostigma unilinealis, Snell., Tijd. v. Ent., Borneo, Aus1875, pl. 8, fig. 2. tralia, Fiji.
(19). Oligostigma argyrilinale, sp. n.

White. Forewing with the costal area yellow with a streak of black scales on it, and joined to a yellow discocellular patch outlined with black; a diffused yellow fascia above middle of inner margin ; the outer area golden yellow with a triangular white patch from costa beyond the discocellulars, and a silvery submarginal band defined on outer side by a black line. Hindwing with the outer area yellow defined on inner side by a black line between veins 5 and 2 ; a silver subapical spot and a silver band defined on outer side by a black line and with four black marginal spots beyond it.

Hab. Cedar Bay, Cooktown, Queensland (Meek). Exp., 12 mm . Types in Coll. Rothschild and B. M.
(20). Oligostigma exhibitale, Wlk., Trans. Ent. Soc. Lond. (3), 1, 123 . . . Brazil.
(21). Oligostigma phedrale, Wlik, xvii., 443 . Brazil.
(22). Oligostigma eronenale, Snell., Tijd. v. Celebes, AusEnt., xxiii., p. 226 ; id., xxvii., pl. 3, fig. 4 tralia.
(23). +Oligostigma polydectale, Wlk., xvii., Australia, 451 Fiji.
b. Hindlegs of male with large tufts of curved hair extending backwards from the coxæ.
(24). †Oligostigma orthoteles, Meyr., Trans. Ent. Soc. Lond., 1894, p. 472 . . Sambawa.
(25). Oligostigma picale, Guen., Delt. and Pyr., p. 274; Hmpsn., Ill. Het., ix., pl. 174, India, Ceyfig. 23 . . . . . . . lon.
B. Antennæ of male thickened and flattened by appressed serrations.
a. Palpi of male normal ; fore tibiæ not dilated.
(26). †Oligostigma diavale, Hmpsn., Ill. Het., ix., p. 177, pl. 174, fig. 27 . . . Ceylon.
(27). †Oligostigma hemicrypte, Meyr., Trans. Ent. Soc. Lond., 1897, p. 84. . . Sangir.
b. Palpi of male very long, the 3rd joint porrect; fore tibiæ dilated with a terminal process ; forewing with a small fovea below base of cell covered by a flap of scales; hindwing with the costa lobed at base.
(28). Oligostigna camptozonale, sp. n.

丸. White ; palpi of male tipped with black: abdomen tinged with fuscous. Fore wing with subbasal fuscous line interrupted at middle; an antemedial curved line more or less interrupted at middle ; a discocellular ocellate spot; a postmedial fuscous line bent inwards at vein 3 and running to middle of inner margin, expanding at the bend and atinner margin; a submarginal line not reaching costa and expanding at inner margin; a pale orange marginal band with fine fuscous line on its inner side reduced to black specks towards costa; cilia fuscous. Hindwing with antemedial and medial fuscous lines, the latter excurved at middle ; a submarginal diffused line expanding towards costa; a pale orange marginal band with series of black points on its inner edge; cilia fuscous.
९. Much whiter, with the markings pale and fine.

The Amboina and Fergusson Island forms have the markings broader and more interrupted than the Australian.

Hab. Amboina; Fergusson Island; Queensland; W. Australia. Exp., 18 mm . Types in Coll. Rothschild and B. M.

Sect. II. Hind tibiæ of male with a tuft of long hair contained in a groove.
A. Male without tufts of long hair on hind tibiæ and spurs.
a. Male without tufts of hair on base of mid and hind femora.
(29). †Oligostigma pulcuellale, Hmpsn., Ill. Assam, CeyHet., ix., p. 178, pl. 174, fig. 30 . . lon.
b. Male with short tufts of hair from base of mid and hind femora, hind tibiee, and on כth segment of abdomen below.
(30). $\dagger$ Oligostigma ornatum, Moore, Lep. Ceyl., iii., p. 299, pl. 181, fig. 11 . . . Ceylon.
(31). Oligostigma tripletale, sp. n.

White. Forewing with the basal half of costa suffused with fuscous; two yellowish marks on inner margin before middle and one below end of cell, an oblique yellow band with fuscous edges from costa across end of cell to vein 2 where it is met by a curved fuscous postmedial line and a curved fuscous submarginal band both from costa; au orange-yellow marginal band defined on inner side by a fine black line bent inwards along inner margin and up to near the yellowish mark below end of cell. Hindwing with curved fuscous medial line; an orange-yellow marginal band, broken and bent inwards below apex, some black marks on its inner side on medial area and three prominent black spots on the margin with a black streak below them.

Hab. Fergusson Island, New Guinea. Exp., 18 mm . Types in Coll. Rothschild and B. M.
$c$. The tufts on hind femora developed into large tufts directed towards the base and enclosing: a hollow ; abdomen without tufts.
(32). †Oligostigma mifurcale, Pryer, Cist.Ent., China, Assam, ii., p. 232, pl. 4, fig. 14 . . . Burma.
$B$. Male with the hind tibir and spurs tufted with long hair; short tufts at base of mid and hind femora.
(33). Oligostigma areale, sp.n.
ot. White ; head, thorax, and abdomen slightly tinged with
fulvous and fuscous. Forewing with streaks of diffused fuscous scales below costa, from base of inner margin to cell and along vein 2 , and from inner margin before middle along vein 1 ; slight yellow spots at base of vein 2 and on discocellulars, the latter with a dark speck above it on costa; an ill-defined yellow submarginal band with some dark scales on its edges; a marginal yellow band defined on inner side by a fine black line and with a marginal series of minute black points. Hindwing with slight oblique fuscous line across end of cell ; two sinuous fuscous diffused submarginal lines with some yellow between them at middle; a yellowish marginal band defined on inner side by a waved black line and with three marginal black spots with orange between them on the lobe.

Hab. Kandy, Ceylon. Exp., 16 mm . Type in Coll. Rothschild.

## Auctorum.

Parapoynx chrysota, Meyr., Trans. Ent. Soc. Lond., 1886, p. 221 . . . . . . Fiji.
Oligostigma quinqualis, Snell., Tijd. v. Ent., Java, xxav., p. 176 . . . . . . . Celebes.
Oligostigma adjunctalis, Snell., Tijd. v. Ent., 1894, p. 56, pl. 6, figs. 17 \& $18 . \quad$. . Java.
Oligostigma candidalis, Pag., J. B., Nass. Ver., xxxix., p. 176 . . . . . . . Aru.

Oligostigma argyrotoxalis, Pag., J. B., Nass. Ver., xxxix., p. 176 . . . . . . Aru.
Oligostigma prestabilis, Pag., J. B., Nass. Ver., xxxix., p. 177

Aru.
Oligostigma orphninulis, Pag., J. B., Nass. Ver., xxxix., p. 177 . . . . . . . Aru.

Genus Aclacodes.
Aulacodes, Guen., Delt. and Pyr., p. 285 (1854).
Hydrophysa, Guen., Delt. and Pyr., p. 259.
Chnaura, Led., Wien Ent. Mon., 1863, p. 435.
Palpi upturned and hardly reaching vertex of head, the 2nd joint fringed with long hair in front, the 3rd usually short with a small triangular tuft in front; maxillary palpi as long as the labial and dilated with scales at extremity ; frons oblique; antennæ of male thickened and flattened with appressed serrations; ocelli usually indistinct; legs very long and slender ; wings long and narrow. Forewing with vein 3 from angle of cell, which has
the lower part produced and acute and the discocellulars very oblique; 7 straight and well separated from $8,9,10 ; 11$ from near end of cell and touching or anastomosing with 8, 9, 10. Hindwing


Aulacodes peribocalis, ${ }^{+}, \frac{1}{2}$ (from Moths Ind., vol. iv.).
with vein 3 from before lower angle of cell, which is very much produced and the discocellulars oblique : 6,7 from upper angle, 7 anastomosing with 8 , which is much curved.
Sect. I. Mid tibire of male with a tuft of long hair contained in a fold, no fringes of hair on fore coxæ and femora or on medial spur of hind tibiæ; the outer margin of hindwing excised below apex and lobed at vein 5 .
A. Fore and hindwings with veins 4,5 stalked; antennæ of male with no process on basal joint; a small fovea in end of cell of forewing.
a. Forewing of male with a costal fold on upper side containing a fringe of long hair.
$a^{1}$. Antennæ of male thickened and flattened; palpi with the 2 nd joint short.
$a^{2}$. Forewing of male with a fringe of very long hair from base of costal fold; the inner margin produced into a large rounded lobe ; hind tibiz with the fringe of hair long.
(1). †Aulacodes polydora, Meyr., Trans. Ent. Soc. Lond, 1897, p. 82.

Celebes.
Oligostigma ochreipicta, Meyr., Trans. Ent. Soc. Lond., 1894, p. 472 (nec Moore).
$b^{2}$. Forewing of male with no fringe of long hair from the costal fold ; inner margin not lobed.
(2). Aulacodes crassicornalis, Guen., Delt. and Pyr., p. 261; Snell., Tijd. v. Ent., xix., pl. 9, fig. 8 Java.
Oligostigma jaranalis, Guen., Delt. and Pyr., p. 262.
+Oligostigma bipunctalis, Wlk., xxxiv., 1531.
$b^{1}$. Antennæ of male filiform ; palpi with the 2nd joint very long ; mid femora with a tuft of hair from near extremity; hind tibiæ with the medial spurs minute.
(3). Aulacodes aureolalis, Snell., Tijd. v. Java, SamEnt., xix., p. 200, pl. 8, fig. 5 . bawa.
$b$. Forewing of male with no costal fold.
$a^{1}$. Hindwing of male without large tuft of hair at anal angle.
(4). Aulacodes colonialis, Guen., Delt. and Pyr., p. 262 ; Snell., Tijd. v. Ent., xix., Sikhim, Bompl. 8, fig. 3
bay.
(5). $\dagger$ Allacodes idiotis, Meyr., Trans. Ent. Soc.

Lond., 1894, p. 472 . . . . Celebes.
(6). †Aulacodes metriodora, Meyr., Trans. Ent. Soc. Lond., 1897, p. 83 . . Talaut.
$b^{1}$. Hindwing with a large tuft of black and white hair at anal angle, outer margin excised towards anal angle, inner margin very short.
(7). $\dagger$ Aulacodes exdos.rris, Meyr., Trans. Ent. Soc. Lond., 1894, p. 472 . . . Pulo Laut.
$c^{1}$. Hindwing of male with the anal angle produced into a pointed lobe, the inner area clothed with hair; antennæ with the base of shaft fringed with scales; hind femora with tuft of hair near base, then a triangular corneous process on inner side.
(8). †Aulacodes ceratucha, Meyr., Trans. Ent.

Soc. Lond., 189t, p. 471 . . . Pulo Laut.
$B$. Forewings, and almost always the hindwings, with veins 4,5 from angle of cell.
a. Antennæ of male with the basal joint dilated and bulbous, the shaft laminate, bent and fringed with hair on outer side at middle; forewing with a large triangular costal fold on under side, with fringe of rough hair at lower extremity and tuft of large scales at costal extremity ; cell shortened but produced at lower angle; hindwing with veins 4, 5 stalked, the outer margin strongly angled at
middle, the outer medial area clothed with silky scales below.
(9). Aulacodes trichoceralis, sp. n.

犬. Head and thorax white and brown; antennæ yellow; abdomen white with yellow band and brown line on 2nd segment, the extremity yellow. Forewing white with large triangular brown patch on medial area below the cell, its apex runuing outwards along vein 1 , and with a yellow mark inside on inner margin ; an oblique wedge-shaped brown mark from middle of costa to vein 2; a submargiual wedge-shaped brown patch with its apex on vein 1; a marginal orange band with fine black line on its inner side, and series of black points on outer margin ; costal fold dark brown mostly orange towards extremity. Hindwing with the basal area white suffused with yellow scales; the outer half bright yellow bounded on inner side by a black line between veins 5 and 2 and with silvery submarginal suffusion between vein 3 and inner margin ; three marginal white ocelli, each with some black scales on inner side and two black points on outer ; a black point at the angle of margin.

Hab. Humboldt Bay, New Guinea (Doherty). Exp., 24 mm . Type in Coll. Rothschild.
b. Antennæ of male with a curved clubbed process from basal joint; palpi with the 3rd joint short.
$a^{1}$. Male with no tuft on hind femora; forewing with a small costal fold at base and no costal fringe; the tuft of scales confined to end of cell, and no sparse fringe on median nervure.
(10). †Aulacodes seruxctalis, Snell., Tijd. v. Himalayas, Ent., xix., p. 207, pl. 9, fig. 11 . . Ceylon.
$\dagger$ Cataclysta delicata, Moore, Lep. Ceyl., iii., p. 556 , pl. 215 , fig. 8.
(11). Aulacodes plicatalis, Wik., xxiv., 1332 Himalayas, Oligostigma simplicialis, Snell., Tijd. v. Java, Ent., xix., p. 201, pl. 8, fig. 6.

Celebes.
(12). Aulacodes heptoris, sp. n.

ㅇ. Differs from A. plicatalis in the markings of the forewing being browner, especially the sinuous fascia above inner margin ; the oblique band across the end of cell much more oblique, and the submarginal band which joins it more curved. Hindwing with
the submarginal band narrower, more defined, and sharply angled inwards on vein 1 ; seven small marginal ocelli.

Hab. Fergusson Island, New Guinea. Exp., 44 mm . Type in Coll. Rothschild.
$b^{1}$. Hind femora of male with a thick tuft of short hair near extremity.
$a^{2}$. Forewing of male with large costal fold on upper side ending in a fringe of large scales at end of cell; the process from basal joint of antennæ short.
(13). Aulacodes parafomasllis, sp. n.

む. Head orange; thorax dark brown ; abdomen brownish, the two basal segments white. Forewing dark red-brown on costal area extending almost to inner margin on basal half, and as a triangular postmedial patch nearly to outer angle ; a leaden grey triangular patch on the postmedial brown area; inner area white extending upwards beyond middle to lower angle of cell and on inner side of the marginal band to below apex ; a marginal orange band defined by fine black lines and joined to an orange patch on outer part of inner margin. Hindwing white with curved oblique postmedial orange band defined on inner side by a fuscous line, not reaching inner margin, and below apex running out to the marginal orange band defined by fine black lines, and with three small white centred ocelli at middle.

Hab. Alor, Flores. Exp., 22 mm . Type in Coll. Rothschild.
$b^{2}$. Forewing with a slight costal fringe on upper side ; a thick ridge of large scales from base through the cell widening to end of it.
(14). $\dagger$ Aulacodes hamalis, Snell., Tijd. v. Ent., Himalayas, xviii., p. 199, pl. 8, fig. 4 . . Nilgiris.
$\dagger$ Cataclysta ochripicta, Moore, Lep. Atk., p. 409.
(15). †Aulacodes melanops, Hmpsn., Moths Ind., iv., p. 214 . . . . . Sikhim.
$c^{2}$. Forewing of male with sparse fringe of long: hair from median nervure; the tuft of large scales confined to end of cell.
(16). Aulacodes peribocalis, Wlk., xvii., 446. Aden, China, Cataclysta halialis, Wlk., xvii., 447 . . India,Burma.

> †Cataclysta sobrina, Pryer, Cist. Ent., ii., p. 432.
> Oligostigma papulalis, Snell., Trans. Ent. Soc. Lond., 1890 , p. 640.
(17). Aulacodes sinensis, sp. n.

Head, thorax and abdomen whitish tinged with pale red-brown; ground colour of wings white. Forewing with the basal costal area tinged with red-brown extending along vein 2 to the submarginal markings ; a large V-shaped postmedial red-brown mark defined by fuscous with its apex at lower angle of cell and arms on costa and vein 2, where it is joined bya curved submarginal band; a curved orange-brown fascia defined by fuscous above inner margin ; a marginal orange band defined by black lines. Hindwing with subbasal fulvous fuscous-defined band; a similar submarginal sinuous band diffused to the margin below apex; a marginal orange band defined by black lines with three ocelli on it at middle, the last with a blind spot below it.

Hab. Omei Shan, W. China. Exp., of 30, ㅇ 38 mm . Type in Coll. Rothschild.
(18). Adlacodes saturalis, Snell., Trans. Ent.

Soc. Lond., 1890, p. $639 . \quad$. . Sikhim.
(19). †Aulacodes dominalis, Wlk., xxxiv., 1337;

Hmpsn., Ill. Het., viii., pl. 156, fig. 4 . S. India.
(20). Aulacodes tripunctalis, Snell., Tijd. v. Java, Sam-

Ent., xix., p. 205, pl. 9, fig. 9 . . bawa.
$d^{2}$. Forewing of male with the costa highly arched at middle, the area below it roughly scaled; a thick fringe of long hair in cell expanding towards extremity.
(21). Aulacodes gibbosalis, Guen., Delt. and

Pyr., p. 262 . . . . . . Java.
$\dagger$ Oligostigma tripunctalis, Wlk., xxxiv., 1531.
c. Antennæ of male with no process from basal joint.
$a^{1}$. Palpi with the 3rd joint long and porrect; hind femora with slight tufts; forewing with elongate furrow in cell and fringe of scales from subcostal nervure.
(22). †Aulacodes mormodes, Meyr., Trans. Ent. Borneo, Soc. Lond., 1897, p. 83 . . . . Sangir.

## $b^{1}$. Palpi with the 3 rd joint short. $a^{2}$. Hind tibire with slight tufts of hair at base. $a^{3}$. Forewing with elongate furrow in cell and fringe of hair from subcostal nervure.

(2i). Aulacodes latifascialis, Snell., Tijd. v. Ent., 1876, p. 202, pl. 202, pl. 8, fig. 7 . Celebes.
$l^{3}$. Forewing with large fovea in end of cell and no fringe of scales.
(2f). Aulicodes siexvata, Warr., A. M. N. H. (6), xvii., p. 206 . . . . . Queensland.
(25). Aulacodes acroperalis, sp. n.

Head orange-yellow ; thorax white in front, dark brown behind; abdomen fulvous yellow with the first segment white. Forewing with the apex produced and acute, dark brown ; the costa orange-yellow ; a white spot followed by an orange patch at base ; a triangular white patch from cell to inner margin just bofore middle ; a pear-shaped white patch beyond the cell with its apex pointing outwards below costa; an orange marginal band defiued on inner side by a fine black line, inside which is a somewhat irregular white band ; a marginal series of black points. Hindwing dark brown at base; a broad antemedial white band defined on outer side by a fine black line; the outer area golden yellow with a black-edged white subapical spot; five medial submarginal black spots, the middle one with white centre and with black points on the margin beyond them, the middle ones placed in three pairs ; cilia of both wings silvery at base.

Hab. Fergusson Island, New Guinea. Exp., 22 mm . Types in Coll. Rothschild and B. M.
(26). *Aulacodes whighomlis, Swinh., Cat. Het.

Mus. Oxon. ined. . . . . . Waigaou.
(27). Aulacodes diopsalis, sp. n.

Head and thorax white ; palpi and legs marked with brown; antennæ ochreous; abdomen pale yellow, white at base. Forewing silvery white with the basal two-thirds of costal area fulvous, expanding into an oblique triangular patch beyond discocellulars with its apex on vein 2 ; a sinuous orange fascia above inner margin with a dark antemedial patch on it ; a wedge-shaped fulvous submarginal band from costa with its apex on vein 2; a marginal orange band joining the fascia on inner area, defined on inner side by a fine black line and with a marginal series of black points. Hindwing with the basal two-thirds silvery white from costa to below the cell, bounded by a black line from vein 5 to the sub-

[^10]median fold ; the inner and outer areas golden yellow ; an oblique white mark across apex ; a pair of black-edged white ocelli with black spots on their outer edges below the iudentation of margin and followed by a black point then a short black line on margin ; cilia silvery at base on medial area.

Hab. Amboina ; Fergusson Island, New Guinea. Exp., 24 mm . Types in Coll. Rothschild and B. M. (28). *Aulacodes brunvealis, sp. n.
9. Head and thorax dark brown ; abdomen with the basal half white, the distal half orange. Forewing dark red-brown, the inner margin white; a postmedial triangular white patch from costa to vein 3 , the costa above it fulvous; a marginal yellow band with waved inner edge, inside which is a series of silvery white lunules conjoined towards inner margin; a marginal series of black specks ; cilia grey with silvery line at base. Hindwing with the base brown; the basal half white bounded by a fuscous line slightly angled beyond lower angle of cell ; the outer half yellow with oblique silvery postmedial line between veins 2 and $1 a$; a curved silvery subapical mark ; a series of four black specks just inside medial part of margin ; cilia grey with silvery line at base.

Hab. Humboldt Bay, New Guinea (Doherty). Eup., 20 mm . Type in Coll. Rothschild.
(29). *Aulacodes cervinalis, sp. n.

Head and thorax fulvous brown; abdomen golden yellow, white at base. Forewing fulvous brown with a silvery white triangular patch on middle of inner margin extending to subcostal nervure aud juined by an oblique postmedial band from costa ; a marginal golden-yellow baud defined on inuer side by a fine black line with a white line inside it; a marginal series of black points. Hindwing with the base brown ; a broad antemedial white band with dark mark on middle of its outer edge; outer half of wing goldenyellow with two subapical silver spots and three pairs of black points just inside the medial part of margin with single points at each extremity of series; cilia of both wings grey.

Hab. Humboldt Bay, New Guinea. Exp., 22 mm . Types in Coll. Rothschild and B. M.

## (30). Aulacodes juvctiscriptalis, sp. u.

Head and thorax orange and white; palpi banded with fuscous; fore tibiæ and tarsi ringed with black; mid and hind coxæ with tufts of hair ; abdomen orange, the basal segment whitisb. Forewing orange; a silvery white fascia from base of inner margin
through the cell, giving off a fascia along vein 2 to join the curved submarginal band, which is defined on outer side by a black line; an oblique wedge-shaped postmedial patch from costa with its apex ou vein 3 ; a white streak on middle of inner margin ; a marginal series of black points ; cilia grey. Hiudwing orange with oblique silvery subbasal line; an oblique silvery mark across apex followed by a dentate submarginal line with an oblique mark beyond it towards anal angle ; a series of small black medial marginal spots arranged in pairs except at extremities of the series.

Hab. Fergusson Island, New Guinea. Exp., § 20, ㅇ 24 mm . Types in Coll. Rothschild and B. M.
$b^{2}$. Hind tibiæ of male with tufts of scales at mid and terminal spurs; forewing with the inner margin produced to an angle near base.
$a^{3}$. Hindwing with veins 4, 5 from cell.
(31). †Aulacodes argyropis, Meyr., Trans. Ent. Pulo Laut, Soc. Lond., 1894, p. 473. . . . Celebes.
$b^{3}$. Hindwing with veins 4,5 stalked.
(32). †Aulacodes baslisissa, Meyr., Trans. Ent. Sambawa, Soc. Lond., 1894, p. 474.

Timor.
(33). †Aulacodes gephyrotis, Meyr., Trans. Ent. Soc. Lond., 1897, p. 84 . . . Talaut.
Sect. II. Mid tibiæ of male without fold and tuft ; hindwing with the outer margin evenly curved.
A. (Aulacodes.) Fore coxæ and femora of male with fringes of hair, and a very long fringe on each side of inner medial spur of hind tibiæ.
(34). Aulacodes psyllalis, Guen., Delt. and W. Indies, Pyr, p. 259, pl. 6, fig. 11 . . . Venezuela,
Oligostigma scuthesalis, Wlk., xix., 950 Brazil.
Hydrocumpa tortalis, Led., Wien Ent. Mon., 1863, p. 452, pl. 18, fig. 3.
Type. 35). Aulacodes echmialis, Guen., Delt. and W. Indies, Pyr., p. 258 . . . . . . Venezuela, Parapoynx fragmentalis, Led., Wien Ent. Brazil. Mon., 1863, p. 453, pl. 18, fig. 6.
Parapoynx gothicalis, Feld., Reis. Nor., pl. 136, fig. 13.
Hydrocampa bosoralis, Druce, Biol. Centr. Am. Het., ii., p. 278, pl. 63, fig. 31.

# $\dagger$ Hydrophysa plumipedulis, Hmpsn., A.M.N.H. 

 (6), xvi., p. 343.(36). Aulacodes habitalis, Feld., Reis. Nov., pl. 139, fig. 12. . . . . . Brazil.
B. (Chnaura.) Legs without fringes of hair.
a. Forewing of male without costal fold; hindwing without tufts of scales below the cell.
(37). †Aulacodes convoluta, sp. n.
o. White irrorated with fuscous; abdomen ringed with brown. Forewing with the basal area mostly suffused with black and bounded by a dark-edged curved white line ; the medial area irrorated with black; a postmedial dark-edged white line from imer margin beyond middle to middle of costa, then curved round and almost completely enclosing a spot beyond the cell, then curved upwards to costa before apex and downwards as the submarginal line, its first curve filled in with a brown patch. Hindwing with ante- and postmedial sinuous black-edged white lines, the latter curving round from costa to form the submarginal line ; the outer area irrorated with fuscous.

Hab. R. Javary, Amazons (Trail). Exp., 14 mm .
(38). *\&́ulacodes hodevalis, Druce, Biol. Centr. Am. Het., ii., p. 278, pl. 63, fig. 30 . Guatemala.
(39). Aulacodes Citroxalis, Druce, Biol. Centr. . Mexico, Am. Het., ii., p. 277, pl. 63, fig. $28 . \quad$ Centr. Am.
(40). †Aulacodes semichiculahis, sp. n.

ㅇ. White ; palpi with the end of zud joint black ; abdomen ringed with fuscous. Forewing with ill-defined subbasal and two antemedial curved yellow bands; a large dark-edged semicircular yellow baud on outer half of costa conjoined by a yellow spot to inner margin and enclosing a smaller costal semicircular yellow band; a margiual yellow band with dark line on its inner edge. Hindwing with subbasal and antemedial dark-edged yellow bands; a postmedial dark-edged yellow patch not reaching costa or inner margin; a marginal yellow band with dark line on its inner edge.

Hab. Espiritu Santo, Amazons. Exp., 18 mm .
(41). †Aulacodes secutalis, WIk., xxxiv., 1291 Mysol, SoloChnaura octuvialis, Led., Wien Ent. Mon., 1863, p. 435 (nec Wlk.)
mons, New Hebrides.
b. Forewing of male with a large costal fold extending to apex a:d containing a tuft of hair; hindwing with tuft of long spatulate hairs below end of cell.
(42). †Aulacodes calistoalis, Wlk., xvii., 442 . S. America. (43). †Aulacodes thetyshis, Wlk.. xvii., 440 . Brazil.

## Auctorum.

Botys dilucidulis, Guér., Régn. Anim. Ic. Ins., pl. 90, fig. 17 . . . . . . . Java.
$=$ Oligostigma nectalis, Snell, Tijd. v. Ent., xix., p. 206, pl. 9, fig. 10.

## Genus Parthenodes.

Partlienodes, Guen., Delt. and Pyr., p. 252 (1854). Paracymoriza, Warr., A. M. N. H. (6), vi., p. 479 (1890).

Gethosyne, Warr., A. M. N. H. (6), xviii., p. 221.
Palpi porrect,straight and projecting about the length of head, the 2nd joint fringed with hair below, the 3rd short and naked; maxillary palpi large and triangularly scaled ; frons rounded ; antenuæ of male thickened and flattened ; legs naked, the outer spurs about


Parthenodes vagalis, ti, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
two-thirds length of inner. Forewing with veins $3,4,5$ from angle of cell ; 7 straight and well separated from $8,9,10$. Hindwing with vein 3 from angle of cell, which is about half the length of wing ; 4,5 approximated for a short distance ; 6, 7 from upper angle.

Sect. I. (Paracymoriza.) Mid tibiæ of male dilated with a fold containing a fringe of hair' tufts of hair from hind coxæ; wings with the outer marorin somewhat excurved at middle.
(1). Parthenodes inextricata, Moore, Lep.

Atk., p. 210, pl. 7, fig. 7 . . Sikhim.
(2). †Parthenodes vagalis, Wlk., xxxiv. Punjab, Nil1390
(3). $\dagger$ Parthenodes aurantialis, Swinh., A. M. N. H. (6), xvi., p. 304

Assam.
(4). $\dagger$ Parthenodes oxygona, Meyr., Trans. Ent. Soc. Lond., 1894, p. 470

Sambawa.
(5). Parthenodes egtargyralis, sp. n.
¡. Head, thorax, and abdomen white mixed with brown; fore tarsi with the 1 st joint fringed with scales. Forewing white, suffused and irrorated with brown ; a small yellow spot on median nervure near base ; an obscure yellow antemedial sinuous line defined by brown ; a large oblique eliptical fuscous patch beyond end of cell defined by a fuscous line; the apical area white with an oblique sinuous yellow band defined by brown between it and the brown area from costa beyond middle to near outer margin at vein 2 , then running as a sinuous dark line to inner margin beyond middle; the apical area also crossed by an oblique curved brown-edged yellow band ; a marginal yellow band defined by brown from apex expanding below the upper oblique band into an irregular patch; two yellow marks on a fuscous patch above outer angle. Hindwing white with a large brown-edged yellow eliptical white-centred medial mark, sometimes contracted at middle and 8 -shaped, and with some fuscous between it and inner margin ; a marginal orange baud with fuscous suffusion on its inner side from costa to vein 2 , and with five conjoined white-centred rather disintegrated black ocelli between apex and vein 2 and with silver beyond them on margin.

Hab. . Fergusson Island, New Guinea (Meek). Erep , 24 mm . Types in Coll. Rothschild and B. M.
(6). Parthevodes loricatalis, Led., Wien Ent. Mon., 1863, p. 435 ( $q$ ). . . Amboina.

Sect. II. (Parthenodes.) Mid tibiæ of male with no fold or fringe of hair ; hind coxæ without tufts ; wings with the outer margin evenly rounded.
A. Forewing with vein 11 free.
(7). $\dagger$ Parthenodes olivalis, Hmpsn., Ill. Het., viii., p. 140, pl. 155, fig. 8 (す) . . Nilgiris. $\dagger$ Paracymoriza dentifascialis, Hmpsn., Ill. Het., viii., p. 140, pl. 155, fig. 21 ( f ).
(8). Parthenodes exsolvalis, Snell., Midd. Sikhim, AsSum., p. 76; and Tijd. v. Ent., xxxvi., sam,Burma, pl. 6, fig. 13 Sumatra.

Cymoriza rivularis, Moore, Lep. Atk., p. 210 , pl. 7 , fig. 8.
(9). $\dagger$ Parthenodes mediocinctalis, sp. n.

ㅇ. Head and thorax rufous and white ; abdomen rufous ringed with white. Forewing with the basal area rufous with irregularly sinuous subbasal and antemedial white lines, the latter defined by a few black scales; a broad medial orange-yellow band; the outer area rufous; a discocellular white lunule ; a postmedial white line defined by black, sharply angled below costa where there is some orange beyond it, then inwardly oblique and irregularly wared and met by two white streaks from beyond cell ; irregular white submarginal patches below apex and above outer angle; cilia yellow in places. Hindwing with the basal area rufous, defined by white and black lines ; a medial white band; apical area rufous; a postmedial irregularly sinuous black-edged white line, interrupted at middle by an orange patch; a submarginal white line on apical area and a white band from middle to near anal angle interrupted by the orange patch ; cilia pale with dark bases, and dark at apex and above middle.

Hab. Rio Janeiro. Exp., 30 mm .
(10). Parthenodes cefiosalis, Wlk., xix., 949 Brazil.
(11). Parthenodes stellata, Warr., A. M.
N. H. (6), xvii., p. 203 . . . . Assam.
(12). Parthenodes latifascialis, Warr.,
A. M. N. H. (6), xviii., p. 220 . . Khásis.
(13). +Parthenodes albifascialis, Hmpsn., Ill. Assam, Nil-

Het., viii., p. 140, pl. 156, figs. 1 and 9 . giris, Java.
IIydrocampa phlegetonalis, Snell., Tijd. v.
Ent., xxxviii., p. 155, pl. 6, figs. 9 and 10 .
Paracymoriza semialbalis, Warr., A.M.N.H. (6), xvii., 1, 203.
(14). +Parthexodes nigriplaga, Swinh., A. M. N. H. (6), xiv., p. 209 . . . . Assam.
(15). Parthenodes equivocalis, Warr., A. M. N. H. (6), xviii., p. 221 . . . . Khásis.
(16). Parthenodes prodigalis, Leech, Entom., 1889, p. 70, pl. 4, fig. 16 . . . Japan.
(17). Parthenodes distinctalis,Leech,Entom., xxii., p. 67, pl. 4, fig. 5 . . . . China.

Type. (18). Parthenodes hydrocampalis, Guen., Cayenne, Delt. and Pyr., p. 253, pl. 9, fig. 5 Brazil.

## B. Forewing with vein 11 anastomosing with 12.

 (19). $\dagger$ Partienodes angulatis, sp. n.む. Rufous. Forewing with antemedial white line, obsolescent towards costa, angled on medial nerrure, then strongly marked and oblique ; an oblique stigma at middle of costa and oblique white discocellular mark; a slightly sinuous postmedial white line from costa to near middle of outer margin, then interrupted, recurved along vein 2 nearly to cell and down to middle of inner margin. Hindwing with the basal area suffused with rufous; a medial white band, broad from costa to near middle of outcr margin, where it is strongly angled, then recurved and narrow to inner margin.

Hab. Madagascar. Exp., 28 mm .

## Auctorum.

Parapmynx ganyeticalis, Led., Wien Ent. Mou., 1863, p. 453, pl. 18, fig. 5 (nec 4) . . . India.
C'ynoriza upupulis, Guen., Maillard's Réunion, p. 63 . . . . . . . . Réunion.

## Genus Daulia.

Daulia, Wlk., xix... 975 (18.59).
Girtexta, Swinh., 'Trans. Ent. Soc. Lond., 1890, p. 285.
Palpi porrect, about twice the length of head, triangularly scaled, and the 3rd joint hidden by hair ; maxillary palpi dilated with scales; frons rounded ; anteunæ minutely annulated; mid tibia of male with a tuft of hair in a fold; hind tibia with the outer medial spur minute. Forewing with vein 3 from angle of


Daulia afralis, ${ }^{+}$, $\frac{\mathrm{r}}{\mathrm{I}}$. (from Moths Ind., vol. iv.).
cell ; 4,5 approximated for a short distance in male, which has slight foveal depressions in the membrane in end of cell and beyond discocellulars above and below vein $6 ; 7$ straight and well separated from $8,9,10$. Hindwing with veins 4,5 closely approximated for some distance, 3 also approximated to them in male ; the cell short ; 6, 7 from upper angle.

Type. (1). Daudil afralis, Wlk., xix., 975 . . Bhutín, Nil$\dagger$ Girtexta argentuosalis, Swinh., Trans. Ent. giris,Burma, Soc. Lond., 1890, p. $28 \overline{5}$. . . Borneo.
(2). Dadlia aurantialis, Hmpsn., Moths Ind., iv., p. 221 . . . . . Assam.
(3). †Daluil subaunealis, Wlk., xxxiv., 1343 . S. Africa.

## Genus Margalochrona.

Margarochroma, Warr., A. M. N. H. (6), xviii., p. 164 (1896).

Palpi porrect, extending about one and a-balf times length of head, the 2nd joint fringed with hair below, the 3rd well developed, naked, and downcurved; maxillary palpi filiform; frons with a conical prominence; antennæ of male ciliated; tibia with the


Margarochroma pictulis, ${ }^{\star}, \frac{\div}{1} \cdot$
outer spurs about two-thirds length of inner. Forewing with veins $3,4,5$ from angle of cell; 7 strongly approximated to $8,9,10$ near base. Hindwing with veins $3,4,5$ from angle of cell, which is about half the length of wing ; 6, 7 from upper angle, 7 anastomosing with 8.
Type. Margarochroma pictalis, Warr., A. M. N. H. (6), xviii, p. 165

Assam.

## Genus Tatanga.

## Talanga, Moore, Lep. Ceyl., iii., p. 300 (18§5).

Palpi short, porrect, and fringed with long hair below, the 3rd joint prominent ; maxiliary palpi filiform and nearly as long as the


Telenge sexpunctulis, $\widehat{0}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
labial ; frons rounded; antennæ nearly simple ; tibiæ with the outer spurs less than half the length of inver. Forewing with
veins $3,4,5$ from angle of cell, 7 straight and well separated from $8,9,10$. Hindwing with the cell short; veins $3,4,5$ from angle of cell ; 6, 7 shortly stalked.
Type. (1). †Talanga sexpuxctalis, Moore, P. Z. S., India,Ceylnn, 1877, p. 616, pl. 60, fig. 12 . . . Malayan
Glyphodes lomaspilalis, Snell., Tijd. v. Eint., subregion xxiii., p. 223.
†Cataclysta nympha, Butl., P. Z. S., 1880, brides. p. 683.
(2). †Talavga tolumnialis, Wlk., xvii., 492 . Australia.

## Genus Luifa.

Luma, Wlk., xxvii., 121 (1863).
Pelina, Moore, Lep. Cey!., iii., p. 386 (1886).
Lococorys, Meyr., 'Trans. Ent. Soc. Lond., 1894, p. 6.
Palpi upturned, the 2nd joint reaching above vertex of head, aud slightly scaled in front, the 3rd well developed and acuminate; maxillary palpi filiform; frons oblique; vertex of head with rough hair ; antennæ of male thickened and flattened; tibiæ with the


Lumu sericen, ot, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
outer spurs about half the length of inner. Forewing broad ; the apex rounded; veins $3,4,5$ well separated at origin; 7 remote from $8,9,10$. Hindwing with the cell about half the length of wing ; veins $3,4,5$ from near angle ; 6,7 from upper angle.
Sect. I. Forewing of male with a small tooth on middle of costa, which is thickened below for some distance; the base of veins $8,9,10$ thickened; 11 almost obsolete.
${ }^{\text {Eg2 }}$ ype. (1.) †Luma anticalis, Wlk., xxvii., 121 . . Borneo.
Sect. II.-Forewing of male normal.
(2). Luma trilinealis, Wlk., xxxiv., 1351 . Ceram.
(3). Luma macropsalis, sp. n.

Head, thorax, and abdomen white, tinged with fuscous. Forewing white, suffused with fuscous; a large fuscous discocellular
spot with whitish centre ; an obscure diffused submarginal fuscous band wide towards costa, and a marginal line. Hindwing white; the apical area suffused with fuscous.

Hab. Fergusson Island, New Guinea (Meek). Eap., 22 mm . Types in Coll. Rothschild and B. M.
(4). †Luma flavalis, Hmpsn., Ill. Het., ix., p. 171, pl. 173, fig. 14 . . . . Ceylon.
(5). Luma monomma, Warr., A. M. N. H. (6), xviii., p. 173 . . . . . Assam.
(6). †Luma unicolor, Moore, Lep. Ceyl., iii., p. 386, pl. 184, fig. 16 . . . . Ceylon.
$\dagger$ Lygropia uniformis, Hmpsn., Ill. Het., ix., p. 171, pl. 173, fig. 7.
(7). Luma ornatalis, Leech, Entom., xxii., p. 71, pl. iv., fig. 12

China,Assam.
(8). †Luma sericea, Butl., A. M. N. H. (5), iv., Japau,Assam, p. 451
(9). †Luma obscuralis, Swinh., A. M. N. H. (6), xvi., p. 300

Assam.
(10). †Luma albifasclalis, sp. n.
§. Head and thorax reddish-brown ; frons and basal joint of antennæ white; patagia fringed with white. Forewing reddishbrown ; the costa ochreous; a broad dark-edged medial white band; an ill-defined curved submarginal white line expanding into a spot at costa; some white on margin ; cilia yellow. Hindwing white ; some dark scales on inner area; the outer area fuscous towards apex, yellow towards anal angle ; cilia yellow.

Hab. Jamaica. Exp., 20 mm .

## (11). †Luma trimaculata, sp. n.

§. Golden yellow. Forewing with black discocellular lunule; a postmedial black spot on costa and another on veins 3, 4. Hindwing with submarginal black spot on veins 3,4 ; a fine marginal klack line expanding into a spot at apex.

Hab. Pulo Laut (Doherty). 16 mm .
(12). †Luma tyranthes, Meyr., Trans. Ent. Soc.

Lond., 1897, p. 89 . . . . Sangir.
Genus Orphnophanes.
Orplnophanes, Led., Wien Ent. Mon., 1863, p. 428.
Syntomodora, Meyr., Trans. Ent. Soc. Lond., 1894, p. 467 .

Palpi upturned, the 2nd joint hardly reaching vertex of head, and broadly scaled in frout ; the 3rd well developed and acuminate; maxillary palpi filiform; frons rounded; antennæ of male


Orphnophunts eucerasulis, ${ }^{\frac{1}{3}, \frac{1}{2} \text { (from Moths Ind., vol. ir.). }}$
thickened and flattened ; tibix with the outer spurs about half the length of inner. Forewing with veius $3,4,5$ well separated at origin ; 7 remote from $8,9,10$. Hindwing with the cell about half the length of wing; veins $3,4,5$ from near angle ; 6, 7 from upper angle.

Sect. I. Forewing with the apex not produced; hindwing with the outer margin nearly straight.
A. (Orphnophanes.) Hindwing with the inner margin slightly lobed and fringed with hair in male.
Type. (1). Orpinopilanes eucerdshis, Wlk., xix., Sikhim, Bor1002 . . . . . . . neo,Amboina. Orplnophunes productulis, Led., Wien Ent. Mon., 1863, p. 428, pl. 16, fig. 7.
(2). *Orphnophlines levalis, Warr., A.M.N.H. (6), xvii., p. 206 . . . . . Assam.
B. (Syntomodor(c.) Hindwing with the inner margin normal.
(3). †Orpinophanes thoasalis, Wik., xviii., Sikhim,Anda692 . . . . . . . mans,Borneo.
Sect. II. Forewing with the apex produced ; hindwing with the outer margin rounded.
(4). Orphinophanes albisignalis, Hmpsn., Sikhim, Moths Ind., iv., p. 231 . . . . Assam, Java.
(5). Orimnophanes inconsequess, Warr., N.E. India, A. M. N. H. (6), xvii., p. $20 t$. . Pulo Laut.

## Auctorum.

Orphunphunes turbatalis, Christ., Bull. Mose., Ivi.,
p. 31 . . . . . . . . Amur.

## Genus Niphostola.

Niphostola, Hmpsn., Moths Ind., iv., p. 222 (1896).
Palpi upturned, the 2nd joint thickly scaled and reaching vertex of head, the 3 rd minute and blunt; maxillary palpi well developed and slightly dilated with scales; frons rounded; antemme of male somewhat thickened and flattened; tibix with the spurs long and equal. Forewing with the apex rounded; vein ;


Niphostole micans, ot, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
from before angle ; 7 straight and well separated from 8, 9, 10 ; the inner margin slightly lobed at base. Hindwing with the costa lobed at base ; veins $3,4,5$ from angle of cell ; 6, 7 from upper angle, 7 anastomosing with 8 almost to apex or becoming coincident with it.
Type. Niphostola micans, Hmpsn., Moths. Ind., iv., p. 222 . . . . . . Assam.

## Genus Perisyntrocha.

Perisyntrocha, Meyr., Trans. Ent. Soc. Lond., 1894, p. 469.

Palpi upturned and reaching vertex of head, the 2nd joint slightly scaled in front, the 3rd naked and obtuse ; maxillary palpi filiform ; frons rounded ; autennæ amnulated with rings at the


Perisyntroche ossealis, ơ, $\frac{1}{1}$ (from Moths Ind., vol, iv.).
joints ; legs long and slender, the spurs long. Forewing long and narrow, vein 3 from angle of cell ; 4,5 on a long stalk; 7 straight and well separated from $8,9,10$. Hindwing with vein 3 from angle of cell ; 4,5 on a long stalk; 6, 7 from upper angle.

Type. (1). Perisyntrocha anialis, Wik., xviii, 710 Borńeo, CeleZebronia alienalis, Wlk., xxxiv., $1351 . \quad$ bes, New Botys circumelatalis, Wlk., xxxiv., 1435. Parapoynx cuneolalis, Snell., Tijd. v. Ent. xxiii., p. 243, \& xxvii., pl. 5, fig. 2.
$\dagger$ Stegothyris picata, Butl., A. M. N. H. (5), x., p. 235.
(2). Perisyntrocha ossealis, Hmpsn., Moths N. E. HimaInd., iv., p. 22 . . . . . layas, Assam.

## Genus Strepsinoma.

Strepsinoma, Meyr., Trans. Ent. Soc. Lond., 1897, p. 85.

Palpi upturned, hardly reaching vertex of head, the 3rd joint short and naked ; maxillary palpi filiform ; frons flat and oblique; antennæ with the shaft smooth ; tibiæ with the outer spurs twothirds length of imner. Forewing long and narrow ; vein 2 from


Strepsinoma amaurce, ot, $\frac{3}{2}$.
angle of cell 3,4 stalked ; 5 from angle ; 8, 9, 10, 11 stalked; both wings with a fovea in end of cell. Hindwing with vein 3 from close to angle of cell ; 4, 5 from angle; 6, 7 stalked, 7 anastomosing with 8 to three-fourths of wing.
Type. (1). $\dagger$ Strepsinoma amaura, Meyr., Trans. Ent. Soc. Lond., 1897, p. 85 . . . . Sambawa.
(2). †Streepsinoma sphenactis, Meyr., Trans. Ent. Soc. Lond., 1897, p. 86 . . : Sangir.
(3). Strepsinoma ectopalis, sp. n.

Pale grey-brown. Forewing with a whitish mark in end of cell and fascia in submedian fold ; an oblique white band from costa beyond middle which is either short and somewhat triangular or produced and almost joining the submedian streak and submarginal line ; a submarginal white line expanding towards costa and above
vein 1 and not quite reaching inner margin ; an orange marginal band edged by minutely waved black lines. Hindwing with fuscous medial line with traces of a white band before it and orange band beyond it ; an orange band on medial part of margin with a minutely waved black line on its inner edge and four black spots on its outer.

Hab. Fergusson Island, New Guinea. Exp., 14-18 mm . Types in Coll. Rothschild and B. M.

> (4). Strepsinoma Crasusalis, Wik., xxxiv., Assam, 449 . $\cdot$ Borneo.
> †Cutaclyste trigoniulis, Swinh., A. M. N. H. (6), xvi., p. 304 .

## Genus Duponchelia.

Duponchelia, Zell., Isis, 1847, p. 588.
Palpi upturned, the 2nd joint broadly rounded with scales in front and reaching vertex of head, the 3rd short and blunt ; maxillary palpi filiform; frons rounded ; antennæ of male laminate; tibiæ with the outer spurs about half the length of inner; abdomen of male very long and slender, the anal tuft very long.


Duponchelia fovealis, ${ }^{t}, \frac{1}{1}$.
Forewing with vein 2 from angle of cell ; 3, 4 on a long stalk; 5 from augle ; 6 from well below upper angle ; 7 straight and well separated from $8,9,10$. Male with a large fovea in cell. Hindwing with veins $3,4,5$ from angle of cell, 3,4 rarely stalked; 6,7 from upper angle.
Type. Duponchelia fovealis, Zell., Isis, 1847, p. 588. S. Europe, Stenia camuisalis, Mili. Ann. Soc. Linn. Lyon, Syria, Aden, xvii., p. 16, pl. 95, figs. 5-7.

Natal.
†Hymenia griseata, Butl., A. M. N. H. (4), xvi., p. 415.

## Auctorum.

Duponchelia caidalis, Oberth. Et. Ent., xii., p. 36, p. 6, fig. 39

Algeria

## Genus Stegothyris.

Stegothyris, Led., Wien Ent. Mon. 1863, p. 427.
Palpi upturned and hardly reaching vertex of head, the "ud joint broadly fringed in front, the 3rd short and obtuse ; maxillary palp ${ }^{\mathrm{i}}$ filiform ; frons rounded ; antenne nearly as long as the forewing and annulated with rings at the joints; legs long, the outer spurs


Stegothyris diagonulis, t, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
half the length of inner. Forewing long and narrow ; vein 2 from near angle of cell ; 3, 4 stalked ; 5 from angle ; 7 straight and well separated from $8,9,10$; male with a fan of scales in upper angle of cell below. Hiudwing with veins $3,4,5$ from angle of cell ; 6 , 7 from upper angle.
Type. (1). +Stegothyris rasciculalis, Zell., Lep.
Caffr., p. 63 . . . . . S. Africa.
(2). Stegothyris diagoxalis, Guen., Delt. and Himalayas, Pyr., p. 201 . . . . . . Burma, SuStegothynis trunsversalis, Led., Wien Ent.

Mon., 1863, p. 427, pl. 16, fig. 5.
+Botys plagalis, Moore, P. Z. S., 1867, p. 96.

## Genus Dracenura.

Dracænura, Meyr., Trans. Ent. Soc. Lond., 1886, p. 297.
Palpi upturned and reaching vertex of head, the 2nd joint fringed with hair in front, the 3rd short with a small triangular


Dracenura stenosoma, © , $\frac{1}{1}$.
tuft ; maxillary palpi filiform ; frons rounded ; antennæ almost as long as forewing; legs very long and slender, the outer spurs
about half the length of inner ; abdomeu extremely long especially in male which has the anal segment long. Forewing long and narrow ; veius $3,4,5$ from angle of cell; 7 straight and well separated from $8,9,10$. Hindwing with veins $3,4,5$ from angle of cell ; 6 , 7 shortly stalked, 7 in male connected with 8 at a point or by an oblique bar, male with the costal area more or less enlarged.

## Sect. I. Antennæ annulated.

A. Forewing of male with the apex produced, and the outer margin very oblique.
a. Hindwing of male with the costal and inner areas greatly enlarged, the latter with longitudinal folds; vein 7 connected with 8 by an oblique bar.
Type. (1). Dracenura stenosoma, Feld., Reis. Nov., pl. 134, fig. 16

Fiji.
$b$. Hindwing of male with the inner area not enlarged or folded ; vein 7 connected with 8 at a point.

## (2). Dracenura prosthenialis, sp. n.

${ }^{1}$. Fuscous with a cupreous tinge ; metathorax and basal part of abdomen white, distal part of abdomen black ringed with white. Forewing with the inner medial area suffused with whitish; an indistinct fine dark subbasal line ; a discoidal point; an oblique postmedial line slightly curved below costa and with a dark spot on costa ; cilia white at tips. Hindwing whitish becoming cupreous fuscous towards outer margin; a fine dark postmedial line on medial area ; cilia white at tips.

> Hal. Humboldt Bay, New Guinea (Doherty). Exp., 30 mm . Types in Coll. Rothschild and B. M.

$B$. Foresing of male with the apex not produced; hindwing with slight enlargements of the costal and inner areas; vein 7 connected with 8 at a point.
(3). †Dracenura leucoprocta, sp. n.
J. Head, thorax, and abdomen fuscous, the last black towards the anal segment which is pure white; wings uniform fuscous suffused with silvery grey; the outer margin of hindwing blackish.

Hab. New Hebrides (Matthew). Exp., 28 mm. trans. ent. soc. lond. 1897.—part il. (july.) 13
(4). †Draceevura myota, Meyr., Trans. Ent. Soc. Lond., 1886, p. 230

New Hebrides, Fiji.
(5). †Dracenura agramaa, Meyr., Trans. Ent. Soc. Lond., 1886, p. 229

Samoa.
(6). †Dracenura horochroa, Meyr., Trans. Ent. Soc. Lond., 1886, p. 229

New Guinea.
(7). †Dracenura pelochra, Meyr., Trans. Ent. Soc. Lond., 1886, p. 228

Fiji.
+Botys argyrogaster, Butl., Trans. Ent. Soc. Lond., 1886, p. 431.
(8). †Dracenura asthenota, Meyr., Trams. Ent. Soc. Lond., 1886, p. 229 ( ( ) .
Fiji.
(9). Dracenura cincticorpus, sp. n.
d. White; head and collar marked with black; abdomen with two dorsal black bands before the anal segment. Forewing with the costal area blackish; a slightly sinuous antemedial line ; a large reniform spot in cell and discocellular band; a curved postmedial band angled inwards on vein 2 ; the apicai area and margin blackish. Hindwing with postmedial band not reaching the costa, slightly angled inwards on vein 2 , and interrupted below vein 2 ; a marginal band narrowing to aual angle.

Hab. Loyalty Islands. Exp., 26 mm .
Sect. II. Anvennæ with long cilia and not annulated; hindwing with the costal and inner areas not enlarged ; vein 7 anastomosing with 8.
(10). Dracenura tagladialis, sp. n.

Head, thorax, and abdomen black with a few white scales. Forewing greyish black with a narrow medial white band from costa, on which it expands, to median nervure, where it almost meets au irregular triangular band from inner margin; a small triangular white mark on costa before apex ; a submarginal series of white points, one subapical and larger. Hindwing with the basal area black with irregular edge; the apical area black irrorated with white, and with two angles on its inner edge ; the rest of wing pure white.

Hab. Fergusson Island, New Guinea (Meek). Exp., 16 mm . Types in Coll. Rothschild and B. M.
(11). Dracenura albonigralis, sp. n.
©. Head and thorax black; patagia white; abdomen black ringed with white towards extremity ; anal tuft black and white. Forewing black ; the area from near base to middle white with
the costa and a spot in cell black; a white postmedial band from costa to vein 6 and a submarginal patch above outer angle ; a fine white line at base of cilia. Hindwing white, the base black running along inner margin to middle; the outer area black, broad at costa, tapering to a point at anal angle ; a fine white line at base of cilia.

Hab. Humboldt Bay, New Guinea (Doherty). Eap., 14 mm . Type in Coll. Rothschild.

## Genus Hymenoptychis.

Hymenoptychis, Zell., Lep. Caffr., p. 64 (1852). Syrbatis, Wlk., xxvii., 119 (1863).
Palpi upturned, reaching vertex of head, the 3rd joint short with a small triangular tuft in front ; maxillary palpi minute and filiform; frons rounded; antennæ of male thickened and flattened ; legs long and slender; abdomen very long, especially in male, which has the terminal segment long and pointed. Forewing long and narrow ; the apex rounded ; cell less than half the length of


IIymenoptychis sordicle, $\begin{gathered}\text { t, } \\ \frac{1}{1} \\ \text { (from Moths Ind., vol. iv.). }\end{gathered}$
wing; vein 3 from close to angle of cell; 4,5 approximated for some distance ; 6 from below upper angle; 7 straight; in male the cell very short, 6 bent down and approximated to 4,$5 ; 7$ bent down at middle ; a fringe of hair ou subcostals below from augle of cell half way to apex. Hindwing with the cell about one-fourth length of wing, vein 3 from angle ; 4, 5 approximated for some distance ; 6, 7 stalked.
Type. Hymenoptychis somdin, Zell., Lep. Caffr., S.Africa, Benp. 65 ; Led., Wien Ent. Mon., 1863, pl. 16, gal, Ceylon, fig. 2. . . . . . . . . Burma, Ma$\dagger$ Syrbatis tipuliformis, Wlk., xxvii., 120. lacea, Borneo, Marshall $\dagger$ Botys pterophorulis, Wlk, xxiv., 1+13. and Ellice Islands.

Auctorum.
Mymenoptychis dentilineulis, Snell., Med. Sum., iv. (1), 8, p. 74 .

Sumatra.

Genus Tatobotys.
Tatobotys, Butl., P. Z. S., 1880, p. 686.
Decticogaster, Snell., Tijd. v. Ent., 1880, p. 230.
Cometura, Meyr., Trans. Ent. Soc. Lond., 1886, p. 226.

Palpi upturned and not reaching vertex of head, the 2nd joint moderately fringed in front, the 3rd short and blunt ; maxillary palpi extremely minute; frons rounded; antennæ rather longer than the forewing and somewhat thickened; legs long and slender, the outer spurs about half the length of inner; abdomen ex-


Tatolotys janapalis, ${ }^{\dagger}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
tremely long. Forewing with the costa arched towards apex ; the outer margin very oblique; veins $3,4,5$ from angle of cell ; 7 straight and well separated from $8,9,10$. Hindwing with the cell about half the length of wing ; veins $3,4,5$ from angle; 6, 7 from upper angle.

Sect. I. (Tatobotys.) Abdomen of male with extremely long pointed anal segment.
Type. (1). Tatobotys Jaxapalis, Wlk., xviii., 676 . Fcrmosa, CeyBotys lirisalis, Wlk., xix., 1003. Botys bistrigulalis, Wlk., xxxiv., 1415. lon, Burma, Solomons.
Botys cunealis, Wlk., xxxiv., 1420.
$\dagger$ Tatobotys argillacea, Butl., P. Z. S., 1880, p. 686.
$\dagger$ Hedylepta gemella, Moore, Lep. Atk., p. 208.

Lonchodes ceramochra, Meyr., Trans. Ent. Soc. Lond., 1887, p. 217.
(2). Tatobotys varanesalis, Wlk., xviii., 719. Burma, Decticogaster zonulalis, Snell., Tijd. v. Ent., Borneo. xxiii., p. 231, and xxvii., pl. 3, fig. 11.

Sec. II. (Cometura.) Abdomen of male with the anal segment short.
(3). Tatobotys bhayxulalis, Wlk.; xxxiv., Borneo, Sula, 1439 . . . . . . . New Hebri-
$\dagger$ Cometura picrogramma, Meyr., Trans. Ent. des, Fiji. Soc. Lond., 1886, p. 226.
(4). $\dagger$ Tatobotys albivenalis, sp. n.
f. Fuscous ; palpi white below. Forewing with all the veins whitish; a dark sinuous antemedial line defined by whitish on inner edge and interrupted by the reins, a pale streak beyond it below cell ; a pale streak in cell, a speck in end of cell and discocellular lunule ; the postmedial dark line defined by whitish on outer side, interrupted by the veins, excurved below costa, then nearly straight to vein 2 , where it is retracted to below end of cell. Hindwing with postmedial dark line slightly defined by whitish excurved between veins 5 and 2 , then retracted to lower angle of cell, the veins beyond which are whitish.

Hab. Bonin Island, Perey's Group. Exp., 28 mm .
(5). Tatobotys aurantlalis, sp. n.

む. Orange; head and thorax slightly marked with brown; abdomen ringed with brown. Forewing with some black markings at base ; an antemedial line conjoined to a quadrate patch below the cell; a large round discocellular mark connected with the costa by a semicircular mark and with inner margin by a line ; a postmedial line angled outwards on veiu 6 and sharply dentate inwards on vein 5 , then excurved and conjoined to the dark marginal area, which is broad at costa, narrowing to near margin at vein 2 , then expanding again. Hindwing with sinuous ante- and postmedial lines, the latter conjoined towards inner margin to the dark marginal area, which is broad towards costa, narrows at vein 2, then expands again.

Hab. Batchian (Doherty); Solomons (Webster). Exp., 16 mm .

## Genus Almonia.

## Almonia, Wlk., xxxiv., 1495 (1865). <br> Dodanga, Moore, Lep. Ceyl., iii., p. 331 (1886).

Palpi upturned, the 2nd joint broadly and roundly scaled in front, the 3rd minute and naked ; frons rounded ; antennæ annulated with rings at the joints; abdomen of male with the terminal segments flattened, the last segment long and with the anal tuft large ; tibiæ with the outer spurs considerably less than half the length of inner. Forewing with veins $3,4,5$ from angle of cell; 6 from well below upper angle ; 7 well separated from 8, 9, 10.

Hindwing with the outer margin excisel at middle, and the anal area produced into a large lobe ; veins 3,4 , from angle of cell, and


Almonia truncatulis, ot, $\frac{1}{1}$ (from Moths Ind., vol, iv.).
approximated for a short distance; 5 from above angle ; 6, 7 stalked; male with a tuft of long hair from base of inner margin.
Sect. I. (Almonir.) Hind tibiæ of male with immensely developed tufts of hair from medial spurs to extremity on both inner and outer sides.
Type. (1). †Amaonia truxcatalis, Wlk., xxxiv., 1441. Ceylon, Java Almonia onustalis, Wlk., xxxiv., 1495 . . Sula.

Sect. II. (Dodanga.) Hind tibiæ of male without tufts of hair.
A. Hindwing of male with a large patch of rough brown scales on anal lobe below.
(2). †Amionia horipexvis, Moore, Lep. Ceyl., iii., p. 332, pl. 182, fig. 3 . . . Ceylon.
B. Hindwing of male with no sexual patch below.
(3). †Almonia cristata, Hmpsn., Ill. Het., viii, Gangam, p. 136, pl. 156, fig. 7 . . . Nilgiris.

Genus Bradina.
Bralina, Led., Wien Ent. Mon., 1863, p. 424.
Erilita, Led., Wien Ent. Mon. 1863, p. 426.
Pleonectusa, Led., Wien Ent. Mon., 1863, p. 426.
Physematia, Led., Wien Ent. Mon., 1863, p. 447.
Trematarcha, Meyr., Trans. Ent. Soc. Lond., 1886, p. 233.

Epichromistis, Meyr., Trans. Ent. Soc. Lond., 1886, p. 260.

Palpi upturned, the 2nd joint broadly fringed with scales in front, the 3rd short, blunt, and naked; maxillary palpi filiform,
and as long as the labial; frons rounded; antennæ annulated; legs long and slender, the outer spurs half the length of inner; abdomen of male long and slender ; wings narrow. Forewing


Bradina translinealis, $\delta, \frac{1}{1}$ (from Moths Ind., vol. iv.).
with veins $3,4,5$ from angle of cell ; 7 straight and well separated from $8,9,10$. Hindwing with the cell short; veins $3,4,5$ from angle ; 6, 7 from upper angle.

Sect. I. Forewing: of male with the area near outer angle clothed with rough hair below, also the whole apical area of hindwing ; hind tarsi very long, with the 4th and 5th joints fringed with hair; abdomen with a pair of large lateral tufts towards extremity.
(1). †Bradina remipes, sp. n.

む. Very dark brown, with a slight ferruginous tinge ; palpi white below at base; abdomen white below; hindwing with the costal half pale, with a patch of ochreous scales at upper angle of cell ; underside of hindwing with the costal and inner areas dark, the medial area pale.

Hab. Pulo Laut (Doherty). Exp., 28. mm.
Sect. II. (Trematarcha.) Forewing of male with a very large fovea in and beyond end of cell, and a thick subcostal fringe of long scales from near base to beyond cell.
(2). †Bradina semnopa, Meyr., Trans. Ent. Soc.

$$
\text { Lond., 1886, p. } 234 \text {. . . . Fiji. }
$$

(3). Bradina rectiferalis, Wlk., Trans. Ent. New Cale-

Soc. Lond. (3), i, p. 126 . . . donia, New Marasmia erilitalis,Feld., Reis. Nov.,pl. 135, Hebrides, fig. 26. Fiji.

Sect. III. Forewing of male with a foveal depression occupying the whole cell; antennæ with long cilia; mid tibiæ with a fold containing a tuft of long hair.
(4). Bradina agraphalis, Guen., Delt. and Pyr., p. 244 . . . . . Brazil.
Sect. IV. (Bradina.) Forewing of male with a large fovea beyond the cell.
(5). Bradina impressalis, Led., Wien Ent. Amboina, Mon., 1863, p. 425, pl. 15, fig. 16 . . Mysol.
(6). Bradina selectalis, Leed., Wien Ent. 1863, p. 425, pl. 16, fig. 1

Amboina.
Sect. V. (Physematia.) Forewing of male with a small fovea in upper angle of cell.
(7). Bradina concordalis, Led., Wien Ent. Mon., 1863,.p. 447, pl. ii., fig. 27, and xviii., fig. 14 . . . . . Nicobars.
(8). †Bradiva atopalis, Wlk., xviii., 644 . . Japan, Chima. $\dagger$ Botys dumasalis, Wlk., xviii., 668.
Sect. VI. (Erilita.) Forewing of male normal.
A. Antenne of male almost simple.
(9). $\dagger$ Bradina adhestils, Wlk., xviii., 664 ; S. India, CeyMoore, Lep. Ceyl., iii., pl. 180, fig. 14 . lon, Borneo
Botys ceclusalis, Wlk., xviii., 687. Botys teutalis, Wlk., xviii., 690.
(10). †Bradina leucura, sp. n.

Cupreous brown; palpi pure white below ; abdomen with the distal segments riuged with white, the anal segment white. Forewing with indistinct curved ante- and postmedial dark lines; a speck in cell and discocellular lunule. Hindwing with obliquely curved postmedial line ; cilia of both wings pale.

Hab. Fiji (Matthew). Eap., 20-24 mm.
(11). †Bradina translinealis, Hmpsn., Moths. N. W. HimaInd., iv., p. 228
layas.
(12). $\dagger$ Bradina megesalis, Wlk., xviii., 663 . N. China.
(13). Bradina bicoloralis, Hmpsn., Moths Ind., iv., p. 228

Burma.
(14). Bradina melanoperas, Hmpsn., Moths Ind., iv., p. 227

Burma.
(15). Bradina subpurpurescens, Warr., A. M.

$$
\text { N. H. (6), xvii., p. } 147
$$

N. E. India.
(16). †Bradina mannusalis, Wlk., xviii., 726 . Australia.
(17). †Bradina nacaralis, Wlk., xviii., 709 . Perak,Borneo, Java, Amboina, Solomons.
(18). †Bradina admixtalis, Wlk., xviii., 665 ; Natal, Japan, Moore, Lep. Ceyl., iii., pl. 180, fig. 13 India,Ceylon,
$\dagger$ Botys panœusalis, Wlk., xix., 998.
Pleonectusu tabidulis, Led., Wien Ent. Mon., 1863, p. 426.
Pleonectusa sodalis, Led., Wien Ent. Mon., 1863, p. 426.
Pieonectusa pallidulis, Warr., A. M. N. H. (6), xvii., p. 147.
(19). $\dagger$ Bradina chloroscra, Meyr., Trans. Ent. Soc. Lond., 1886, p. 232

Tonga.
(20). Bradina acrosplla, Meyr., Trans. Ent. Mauritius, Soc. Lond., 1886, p. 261 . . . Fiji, Tonga.
(21). Bradina extenuatalis, Wlk., xxxiv., Sula, Am1424 . . . . . . boina, Mysol,
Botys leptomeralis, Wlk., xxxiv., $1429 . \quad$ Ceram.
(22). †Bradina angusta, Butl., A. M. N. H. Duke of York (5), x., p. 234 . Is., Friendly Is.
(23). $\dagger$ Bradina parillela, Meyr., Trans. Ent. Soc. Lond., 1886, p. 231 . . . Fiji.
$\dagger$ Botys horatius, Butl., Trans. Ent. Soc. Lond., 1886, p. 430.
(24). $\dagger$ Bradina aulata, Butl., A. M. N. H. (5), xx., p. 124 . . . . . . Solomons.
(25). Bradina metaleucalis, Wlk., xxxiv., 1372

Fiji.
(26). Bradina melesalis, Wlk., xviii., 705 . Borneo, Sam-
$\dagger$ Pleonectusa sagittalis, Swiuh., A. M. N. H. bawa, W. (6), xvi., p. 301 . . . Africa, Sind, Ceylon.
(27). $\dagger$ Bradina argentata, Butl., A. M. N. H. (5), xx., p. 124

Solomons.
(28). $\dagger$ Bradina antisema, Meyr., Trans. Ent. Soc. New Lond., 1886, p. 263 ( $\ddagger$ ) .

Hebrides.

## (29). $\dagger$ Bradina perlucidalis, sp. n.

ㅇ. White; abdomen ringed with brown. Forewing with the basal half of costal area brownish ; a dark streak on base of subcostal nervure ; traces of an antemedial brown line; a spot in cell and oblique discocellular band dilated at lower angle of cell
and sending streaks along the nervules to the postmedial band which is nearly straight from costa to about outer angle, then is bent round above inner margin to the subbasal line; a marginal brown line running round the apex almost to the postmedial line. Hindwing with angled brown mark on discocellulars; oblique postmedial band ending above anal angle; a marginal brown band.

Hab. Taou-ata Island, Marquesas (J. J. Walker). Exp., 16 mm.
(30). Biadina monestalis, Led., Wien Ent. Java,
Mon., 1863, p. 426, pl. 16, fig. 3
Pleomectusa chalinotu, Meyr., Trans. Ent.
Amboina,
Soc. Lond., 1886, p. 233.
B. Antennæ of male with long cilia.
(31). $\dagger$ Bradixa liodesalis, Wlk., xix., 960 . . Brazil.
(32). †Bradina desumptalis, $\ddagger$ Wlk., xxxiv., 1532 . . . . . . . Brazil.
(33). Bradina aytenoralis, Wlk., xix., 893 . Brazil. Pypalis externalis, Wlk., Trans. Ent. Soc. Loud. (3), i., 119.

## Auctorum.

Pleonectusa trispila, Meyr., Trans. Ent. Soc. Lond., 1886, p. 232 . . . . . . Fiji.

## Genus Coptobasis.

Coptobasis, Led., Wien Ent. Mon., 1863, p. 429.
Palpi upturned, the 2nd joint moderately scaled in front, the 3rd short with a small triangular tuft in front; maxillary palpi


Coptobasis sulcialis, ${ }^{*}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
minute and filiform, frons rounded; antennæ of male with large tuft of hair from upperside of basal joint, the base of shaft
excised; tibiæ with the outer spurs half the length of inner; abdomen long and slender. Forewing long and narrow ; reins 3 , 4,5 from angle of cell; 7 curved and approximated to $8,9,10$. Hindwing with veins $3,4,5$ from angle of cell ; 6,7 from upper angle.

Sect. I. Antennæ of male with the medial part $\mid$ serrate.
Type. (1). $\dagger$ Coptobasis mesopsectralis, sp. n.
o. Dark brown with a cupreous tinge; abdomen whitish towards extremity. Forewing with obscure dark spot in cell and another on discocellulars and traces of a postmedial line slightly bent inwards at vein 2.

Hab. Pulo Laut; Amboina (Doherty); Natuna Island (Hose). Exp., 36 mm. Type in B. M.
Sect. II. Antennæ of male ciliated throughout.
Type. (2). Coptobasis sulclalis, Wlk., xviii., 684 . Assam, Pachynna megapteralis, Wlk., xxxiv., 1407 Borneo. (part).
(3). Coptobasis monochromalis, Wlk., xxxit., 1419 . . . . . . . Sula, Celebes.

## Genus Diathraustodes.

Diathraustodes, Hmpsn., Moths Ind., iv., p. 233 (1896).

Palpi upturned and reaching vertex of head, the 3rd joint short and naked; maxillary palpi filiform, frons rounded; antenuæ annulate ; tibie with the spurs nearly equal. Forewing with vein


Diathraustodes leucotrigona; ${ }^{t}$, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
3 from below angle of cell; 7 straight and well separated from $8,9,10$. Hindwing with the cell short ; vein 3 from angle; 4.5 on a long stalk; 6,7 from upper angle, 7 anastomosing with 8 to two-thirds of wing.
Type. (1). $\dagger$ Diathraustodes leucotrigona, Hmpsn.,
Moths Ind., iv., p. $233: \quad . \quad$ Nilgiris

$$
\text { Moths Ind., iv., p. } 233 \text { : . : . Nilgiris }
$$

(2). Diathraustodes hemileucalis, sp. n.

む. White, patagia with patches of metallic blue-grey ; abdomen tinged with ochreous and fuscous. Forewing with basal streaks of metallic blue-grey below costa and in cell, and pale orange streaks on costa and subcostal nervure; a wedge-shaped fuscous patch from origin of vein 2 to outer margin from above middle to near outer angle. Hindwing fuscous; cilia white.

Hab. Cedar Bay, Cooktown, Queensland. Erp., 18 mm. Type in Coll. Rothschild.

## Genus Celorhyncidia.

Coelorhyncidia, Hmpsn., Moths Ind., iv., p. 232 (1896).

Palpi obliquely upturned and not reaching vertex of head, the ?nd and 3rd joints conically scaled; maxillary palpi filiform ; frons produced to two slight lateral angles ; antennæ of male


Celorhyncidia ovulalis, ${ }^{\text {T}}, \frac{1}{\frac{1}{2}}$ (from Moths Ind., vol. iv.).
thickened and annulated with rings at the joints; tibiæ with the outer spurs half the length of inner ; veins $3,4,5$ from close to angle of cell; 7 straight and well separated from $8,9,10$. Hindwing with the cell short; 4,5 well separated.

Sect. I. Hindwing with veins 3,4 coincident.

Type. (1). $\dagger$ Cglorhyncidia ovulalis, Hmpsn., Moths N. W. Hima-
Ind., iv., p. 232 . . . . . layas.
Sect. II. Hindwing with veins 3 , 4 separate.
(2). Celorhyncidia elathealis, Wlk., xviii., 615

Brazil.
(3). *Celorhyncidia pandaralis, Wlk., xviii., 618

Brazil.

## (4). Celorhyncidia trifidalis, sp. n.

Fuscous, with a slight purple gloss ; palpi white below. Forewing with indistinct oblique whitish antemedial line; a speck in cell and discoidal quadrate white spot ; the postmedial line represented by a whitish speck on costa, followed by three conjoined specks and a spot nearer the base below vein 2, and sometimes by traces of an excurved portion between veins 5 and 2. Hindwing with white spots in and at end of cell; a white line from below end of cell to inner margin ; a postmedial white spot above vein 5.

Hab. Amboina (Doherty). Exp., 18 mm . Types in Coll. Rothschild and B. M.

## Genus Diathrausta.

Diathrausta, Led., Wien Ent. Mon., 1863, p. 438.
Palpi porrect, triangularly scaled, the 3rd joint hidden by hair ; maxillary palpi dilated with scales; frons rounded; antennæ annulated and ciliated; tibiæ with the outer spurs two-thirds


Diathrausta profundalis, ${ }^{\top}, \frac{1}{3}$ (from Moths Ind., vol. iv.).
length of inner. Forewing with veins $3,4,5$ from angle of cell; 7 well separated from $8,9,10$. Hindwing with the cell about half the length of wing ; vein 4 absent; 6, 7 from upper angle.
Type. (1). Diathrausta phofundalis, Led., Wien Ent. Mon., 1863, p. 438, pl. 17, fig. 7 . India,Ceylon, vars. conicalis and obliturata, Warr., Sambawa,

$$
\text { A. M. N. H. (6), xvii., p. } 143 \text {. Amboina. }
$$

(2). †Diathrausta picata, Butl., Ill. Het., vii., N. W. Himap. 94 , pl. 134, fig. 17
layas.
(3). Diathrausta nerinalis, Wlk., xix., 928 . W. Indies,
(4). Diathrausta reconditalis, Wlk., xix., 943

Brazil.
U. S. A.
$\dagger$ Ediodes minualis, Wlk., xxxiv., 1297.
$\dagger$ Diathrausta octomaculalis, Fern. Ent. Am., iii., p. 127.
(5). Diathrausta plumbealis, Warr., A. M.
N. H. (6), xviii., p. 174 . . . Assam.
(6). Diathrausta delicata, Warr., A. M.N.H. (6), xviii., p. 218

Cayenne.

## Genus Dedteropiysa.

Deuterophysa, Warr., Trans. Ent. Soc. Lond., 1889, p. 272.

Palpi porrect, extending about the length of head, triangularly scaled, the 3rd joint hidden by hair ; muxillary palpi dilated with scales; frons rounded; antenuæ laminate; hind tibiæ with the outer spurs half the length of inner. Forewing with the apex


Deuterophysa costimuculalis, $\widehat{o}, \frac{1}{1} \cdot$
produced and acute; vein 3 from augle of cell; 4, 5 stalked; 7 straight, well separated from $8,9,10$, and with a large fovea on underside above its base. Hindwing with vein 3 from near angle of cell ; 4,5 on a long stalk; 6, 7 from upper angle, 7 anastomosing with 8 .

Type. †Deuteropirsa costrinaculalis, Warr., Traus.
Ent. Soc. Lond., 1889, p. 273 . . . . Amazons.

## Genus Stenia.

Stenia, Guen., Dup. Cat. Meth., p. 201 (1844). Arnia, Guen., Delt. and Pyr., p. 240 (1854). Amaurophines, Led., Wien Ent. Mon., 1863, p. 422. Sozoa, Wlk., xxxiv., 1373 (1865).
Steniodes, Snell., Tijd. v. Ent., xviii., p. 244.
Symmoracma, Meyr., Trans. Ent. Soc. Lond., 1894, p. 469.

Palpi porrect, triangularly scaled, the 3rd joint hidden by hair ; maxillary palpi dilated at extremity; frons rounded; antenne as
long as the forewing and annulated; legs long and slender, the outer spurs half the length of inner ; abdomen long. Forewing long and narrow; vein 3 from before angle of cell; 4 , 5 from


Stenia spondinopa, ${ }^{\dagger}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
angle ; 7 straight and well separated from 8, 9, 10. Hindwing narrow : the cell about half the length of wing; vein 3 from before angle ; 4, 5 approximated for a short distance ; 6,7 from upper angle.
Sect. I. (Steniodes.) Antennæ of male thickened, and bearing a tuft of hair at one-fourth from base.
(1). Stenia gelliasalis, Wlk., xix., 988.

Steniodes lutealis, Snell., Tijd. v. Ent., xviii., W. Indies, p. 245 , pl. 13, figs. 17 and 18 . . . Brazil.

Sect. II. (Stenia.) Antennie of male without thickening and tuft of hair.
(2). Stenia bruguieralis, Dup., Lep. Fr., S. Europe, p. 320, pl. 232, fig. 3 Syria.
Type. (3). Stenia punctalis, Schiff., Wien Verz., Europe,Syria, p. 123
N.W.India.

Asopia cetncealis, Dup., Lep. Fr., viii., p. 199, p. 223 , fig. 4.

Margaritia longipedalis, Curt. Brit. Ent., 312.
(4). †Stenia spodinopa, Meyr., Traus. Ent. Soc. Ceylon, BorLond., 1894, p. 469
(5). †Stenia obscura, Warr., Trans. Ent. Soc.

Lond., 1889, p. 291 . . . . Brazil.
(6). Stenia stigmosalis', H. S., iv., p. 14, S.-E. Europe, fig. 20 . . . . . . . W. Asia.
(7). Stenia lanthealis, Wlk., xviii., 523 . Venezuela, $\dagger$ Sozoa costalis, Wlk., xxxiv., 1373. Bogota.
Ercta adustalis, Feld., Reis. Nov., pl. 135, fig. 32.
(8). "Stexia saurialis, Guen., Delt. and Pyr., p. 242 . . . . . . . Cayemne


## Auctorum.

Stenia intervacatalis, Christ., Rom. Mem., iii., pl. ii., fig. 11; and Hor. Ent. Ross., xii., p. 276, pl. xvii., fig. 47.

Scharud.
Stenia fuscocilialis, Rag., Ent. Mo. Mag., xvii., p. 230

Portugal.
Stenict baltealis, Mab., C.R. Ent. Belg., xxv., Madagascar.
p. lxii. . . . . . . . . Men
Stenia modestalis, Saalm., Ber. Senck. Ges., 1879, p. 299

Madagascar.
Stenia sibirialis, Mill., Le Nat., 1, p. 139 . . Siberia.
Stenic uniflectalis, Mab., Ann. Soc. Ent. Fr. (5), ix., p. 336 . . . . . . . . Madagascar.

Stenia pulchellatis, Mab., Ann. Soc. Ent. Fr. (5), ix., p. 337.

Madagascar.
Amaurophanes ameenialis, Christ., Bull. Mosc., lvi. (1), p. 30 . . . . . . . Amur.

Stenia tenellatis, Snell., Tijd. v. Ent., xxxviii., p. 148.

Java.

## Genus Eurytorna.

Eurytorna, Meyr., Trans. Ent. Soc. Lond., 1886, p. 251.

Palpi upturned, the 2nd joint moderately scaled in front and reaching vertex of head, the 3 rd short and blunt; maxillary palpi minute; frons rounded; antennæ of male thickened and serrate, abruptly bent at middle with a broad bifid tuft at back of bend, a small tuft above it and a sinuation at three-fourths containing another small tuft, the basal joint dilated; abdomen dilated at extremity, hind tibie with the outer spurs one-third length of inner. Forewing with veins $3,4,5$ from angle of cell ; 7 well separated from $8,9,10,11$, which are stalked. Hindwing broad; veins $3,4,5$ from angle of cell ; 6, 7 from upper angle.

[^11]Genus Piletocera.
Piletocera, Led., Wien Ent. Mon., 1863, p. 431.
Rinecera, Butl., Mem. Nat. Acad. Sci., 1884, p. 95
Danaya, Moore, Lep. Ceyl., iii., p. 272 (1885).
P'tilæola, Meyr., 'Trans. Ent. Soc. Lond., 1886, p. 244.
Erebangela, Meyr., 'Trans. Ent. Soc. Lond., 1836, p. 245.

Diplotyla, Meyr., Trans. Ent. Soc. Lond., 1886, p. 246.
Strepsimela, Meyr., Trans. Ent. Soc. Lond., 1886, p. 249.

Graphicopoda, Butl., Trans. Ent. Soc. Lond., 1886, p. 421.

Hormatholepis, Butl., Trans. Ent. Soc. Lond., 1886, p. 425.

Palpi upturned, the 2nd joint moderately fringed with scales in front, and reaching vertex of head, the 3rd obtuse ; maxillary palpi extremely minute ; frons rounded; antennæ of male with the shaft thickened, usually with sinuations and tufts and fasciculate before the tufts, serrate after them, or serrate throughout;


Piletocera agimiusalis, す, $\frac{1}{1}$ (from Moths Ind., vol. iv.).
tibiæ with the outer spurs two-thirds length of inner. Forewing with veins $3,4,5$ from angle of cell ; 7 well separated from 8,9 , 10. Hindwing narrow, with the onter margin somewhat excised towards anal angle, the inner margin short ; the cell short ; veins $3,4,5$ from angle, 6, 7 from upper angle.
Sect. I. (Diplotyla.) Antennæ of male with the shaft sinuate and bearing large tufts of hair at onethird and two-thirds, the basal joint, and the extremity of abdomen dilated.
(1). †Prletocera ochrosema, Meyr., Trans. New Hebri-

Ent. Soc. Lond., 1886, p. 247. . . des, Fiji.
(2). Piletocera chloronota, Meyr., Trans.

Ent. Soc. Lond., 1889, p. 514. . . New Guinea.
(3). $\dagger$ Piletocera cyclosplla, Meyr., Trans.

Ent. Soc. Lond., 1886, p. 248. . . Samoa.
trans. ent. soc. lond. 1897.-PAPt if. (JUly.) 14

Sect. II. Antennæ of male with the shaft sinuate at middle and with tufts of hair before and after the sinus, the base of shaft and basal joint dilated; abdomen dilated at extremity.
A. Fore femora dilated with a terminal process and tufts of hair.
a. (Rinecera.) Forewing of male with the costa angled at one-third, vein 11 bent up to the costa, the cell short.
(4). Piletocera sigilferalis, Wallgrn., Wien Natal, Fiji,TaEnt. Mon., 1860, p. 175. . . . hiti, Ellice, Ceratoclasis barbicornis, Feld., Reis. Nov., Caroline,and pl. 136, fig. 1.

Marquesas
$\dagger$ Rinecera mirabilis, Butl., Mem. Nat. Acad. Islands. Sci., 1884, p. 95.
$\dagger$ Rinecera nigrescens, Butl., Trans. Eut. Soc. Lond., 1886, p. 424.
b. (Strepsimela.) Forewing of male with the costa and vein 11 not distorted.
(5). †Piletocera xantiosoma, Meyr., Trans. Ent. Soc. Lond., 1886, p. 249. . . Samoa.
(6). PPiletocera pseudadelpia, Meyr., Trans. Ent. Soc. Lond., 1887, p. 223. . . Fiji.
$B$. Fore femora normal.
(7). Piletocera vestigialis, Warr., Queensland, Fergusson A. M. N. H. (6), xvii., p. 144 Isl., Solomons.
(8). Piletocera epiperclalis, sp. n.

む. Head and thorax olive brown; antennæ white except at middle and extremity of shaft ; abdomen and wings blackish with slight purple shot. Forewing brownish at base with traces of ante- and postmedial lines and discocellular spot, the postmedial line with a white speck on costa, then sinuous and beut inwards on vein 2 almost to the cell. Hindwing with traces of postmedial line bent inwards on vein 2 almost to the cell. Underside of head, thorax, and abdomen yellowish white.

Hab. Fergusson Island, New Guinea (Doherty). Exp., 28 mm . Types in Coll. Rothschild and B. M.

Sect. III. (Hormatholepis.) Antennæ of male with a very large tuft of scales at two-third, the basal joint and the extramity of abdomsn dilated; palpi with tufts of hair on 2nd joint. Forewing with the costa distorted at middle and vein 11 bent up to it, a tuft of hair on middle of inner area below.
(9). †Piletocera erebina, Butl., Trans. Ent.

$$
\text { Soc. Lond., 1886, p. 425, pl. 10, fig. } 7 \text {. Fiji. }
$$

Sect. IV. Antennæ of male with very much less developed tuft and distortion at middle, the end of abdomen hardly dilated.
A. (Erebangela.) Antennæ of male with the basal joint dilated.
a. Fore femora with a tuft of scales at extremity; mid tibie with the spurs very long, the outer spur fringed with scales.
(10). †Preetocera melanauges, Meyr., Trans.

Eut. Soc. Lond., 188G, p. 246 . . Fiji. $\dagger$ Graphiocopoda hecate, Butl., Trans. Ent. Soe. Lond., 1886, p. 431.
$b$. The femora and mid tibial spur not tufted with scales.

## (11). Piletocera megaspilalis, sp. n.

t. Black-brown. Forewing with a white speck in cell and large white patch beyond discocellulars between veins 7 and 2 ; a postmedial white speck on costa at origin of the faint postmedial line, which is beut inwards along vein 2 ; cilia white towards outer angle. Hindwing with very faint traces of a postmedial line bent inwards on vein 2 ; cilia usually white towards anal angle. Underside of forewing with the inner area irregularly white.
o. With a white discccellular patch on hindwing ; the postmedial line whitish towards inner margin.

Hab. Batchian (Doherty). Exp., 26 mm . Types in Coll. Rothschild and B. M.
$B$. Antennæ of male with the basal joint not dilated, fore femora and mid tibial spur not tufted.
a. (Piletocera.) Forewing of male with a small postmedial lobe on costa, the membrane distorted; vein 10 very shortly stalked with 8,9 in male; legs naked.
(12). Piletocera torsicostalis, sp. n.

Ochreous; head, thorax, and abdomen clouded with black, the last with the bacal segment blackish, the 2nd white. Forewing with three black annuli on costa, a small annulus in cell, and reniform discocellular stigma; the basal half below the cell clouded with fuscous ; a postmedial slightly waved fuscous line, straight from costa to vein 5, then slightly excurved and retracted on vein 2, defined on outer side by an ochreous line with the area beyond it fuscous ; cilia ochreous, with a series of black specks. Hindwing with the base black: a black discocellular spot; a postmedial line strongly excurved between veins 5 and 2 defined by ochreous on outer side ; apical area fuscous, and some fuscous marks towards anal angle ; a marginal series of black specks.

Hab. Amboina (Doherty). Exp., 16 mm . Types in Coll. Rothschild and B. M.
b. Forewing of male with the costa normal, vein 10 distinctly stalked with 8,9 .
$a^{1}$. The tarsi of male fringed with curled hair.
(13). Piletocera violalis, Led., Wien Ent. Mon., 1863, p. 431, pl. 16, fig. 15 ; pl. 5 , figs. 14-35
(14). Piletocera egrmiusalis, Wik., xix., 929 Amboina.

Danaga collaris, Wlk., xxxiv., $1293 . \quad$ Andamans,
Desmia cincta, Wlk., xxxiv., 1293.
Desmia mysolalis, Wlk., xxxiv., 1294.
Eliodes mysolalis, Wlk., xxxiv., 1299.
†Danaga pullatalis, Swinh., P, Z. S., 1889,
Danaga collaris, Wlk,, xxxiv., 1293. p. 420.

> Piletocera favomaculata, Pag., J. B. Nass. Ver., xxxvi., 279 , pl. vii., fig. 8.
b. (Danaga.) Fore tarsi of male naked.
(15). Piletocera reducta, Wik., xxxif., 1296 Ceram,Mysol. (16). †Piletocera albicinctata, sp. n.
3. Fuscous brown; head, antennæ after the tuft, collar, legs, and anal tuft whitish. Forewing with white spot in cell and quadrate white discocellular spot; a submarginal white band broadest at costa, narrowing to outer angle. Hindwing with traces of a whitish band ending in a spot on the cilia below middle, the band prominent on underside.

ㅇ. Without the white spot in cell, and with the submarginal band incomplete.

Hal. Batchian, Shortland Island. Exp, 20 mm .
(17). *Piletocera ofrosemalis, Hmpsn., Moths Ind., iv., p. 236

## Burma.

(18). Piletocera orientalis, Snell., Tijd. v. Ent., xxiii., p. 233, and xxvii., pl. 4, fig. 3

Celebes.
(19). *Piletocera albllunata, Warr., A. M. N. H. (6), xvii., p. 143 ( $\ddagger$ ) . . . Assam.
(20). Piletocera flexiguttalis, Warr., A. If.
N. H. (6), xvii., p. 144

Assam.
(21). Piletocera sodalis, Leech, Entom., 1889, p. 71, pl. 4, fig. 6 .

Japan, China.
(22). Phetocera costipunctata, Warr., A. M.
N. H. (6), xviii., p. 217 . . .
†Desmia illectalis, Wlk., xix., 931 (preoce.)
(23). Piletocera concisalis, Wlk., xvii., 345;

Moore, Lep. Ceyl., iii., pl. 179, fig. 3 .
(24). +Piletocera illectalis, Wlk., xvii., 362

Desmia aceoalis, Wlk., xix., 929.
(25). Piletocera zebinalis, Wlk., xix., 932 . Borneo.
(26). *Piletocera latalis, Wlk., xxxiv, 1294 Sula.

Desmia basalis, Wlk., xxxiv., 1295 (var.).
(27). Piletycera tellestlis, Wlk., xix., 933 Borneo, Sula.

Ediodes purralis, Wlk., xxxiv., 1300.
(28). Piletocera lycopusalis, Wlk., 930 . Borneo.
(29). †Piletocera viola, Butl., A. M. N. H. Banda, Amboina, (5), x., p. 234 . . . Duke of York Island.
(30). +Piletocera contingens, Moore, Lep. India, Ceyion,

$$
\text { Ceyl., iii., p. 273, pl. 179, fig. } 8 \text {. Burma,Borneo. }
$$

(31). Piletocera chrysorycta, Meyr., Tranc.

Ent. Soc. Lond., 1884, p. 320 . . Australia.
(32). Piletocera dactyloptila, Meyr., Trans. Ent. Soc. Lond., 1886, p. 243 . . Fiji.
(33). †Piletocera elongalis, Warr., A. M. N.H.

$$
\text { (6), xvii., p. } 145 \text {. . . . . Assam. }
$$

(34). Piletocera lanceolalis, Guen., Delt.
and Pyr., p. 246 ( $\ddagger$ ) . . . . S. Africa.
+Botys eanesalis, Wlk., zviii., 640.
Sect. V. (Ptilxola.) Antennæ of male with a sinus at one-third fringed with scales at back; basal joint dilated; abdomen not dilated.

> (35). $\dagger$ Piletacera ulopilanes, Meyr., Trans. Eat. Soc. Lond., 1886, p. $245 \cdot$. Fiji.

Sect. VI. Antennæ of male bent at one-third from base and fringed with hair at back. Forewing with the apical area dilated, rounded, thickly cluthed with piliform scales.
(36). Piletocera macroperalis, sp. n.

Fuscous brown. Forewing with indistinct waved antimedial line and discocellular anuulus ; a more distinct minutely dentate postmedial line, slightly bent outward between veins 5 and 2, then retracted almost to the cell ; apical area clothed with leadencoloured scales. Hindwing with traces of postmedial liue retracted along vein 2 almost to the cell.

Hah. Cedar Bay, Cooktown, Queensland (Meek). Exp., 20 mm . Types in Coll. Rothschild and B. M.

Sect. VII. Antennæ of male laminate and without tufts; forewing with the membrane distorted in and below end of cell and vein 2 from the angle; a fringe of scales below costa on underside.
(37). $\dagger$ Piletocera conchylia, Meyr., Trans. Ent. Soc. Lond., 1894, p. 468 . . . Pulo Laut.

Sect. VIII. Antennæ of male normal and ciliated.
A. Forewing of male with a fovea in cell.
(38). Piletocera bufalis, Guen., Dilt. and W. Indies, S. Pyr., p. 245 . . . . . . America.
$\dagger$ Botys plebeialis, Wlk., xxxiv., 385 (nec Led.). Botys stercoralis, Müschl., Verh. z.-b. Wien, xxxi., p. 419, fig. 29
$B$. Forewing of male with no fovea in cell.
(39). Piletocera equalis, Wlk., xxxiv., 1299 . New Guinea. (40). Piletocera nudicornis, sp. n.
đ. Head, thorax, and abdomen yellowish white ; palpi black, white below; wings silky yellowish white, the outer half tinged with pale rufous, on forewing tinged with fuscous towards margin ; obscure white discocellular spots; a dark postmedial line well marked on forewing, arising from a black speck on costa, angled on vein 6, then oblique, on hindwing indistinct, angled
on rein 6 and ending at anal angle ; cilia dark at middle of forewing

Hab. Khásis. Exp., 20mm. Type in Coll. Rothschild.

Auctorum.
Diplotyla argopis. Meyr., Trans. Ent. Soc. Lond., 1886, p. 248

Fiji.
Strepsimela microcentra, Meyr., Trans. Ent. Soc. Lond., 1886, p. 249 . . . . . . Fiji.
Stenia grammalis, Guen., Delt. and Pyr., p. 249 . Cayenne.
Diplotyla meekie, Lucas, P. Linn. Soc. N. S. W., viii., p. 159 . . . . . . . W. Australia.

## Genus Camptomastyx.

Camptomastyx, Hmpsn., Moths Ind., iv., p. 238 (1896).
Palpi porrect long and straight, the 2nd joint about twice the length of head, and fringed with hair below at extremity, the 3rd long ; maxillary palpi extremely minute; frous rounded ; antennæ of male ciliated, thickened, bent downwards and clothed above with long hair at about one-third from base ; tibiæ with the outer spurs


Camptomastyx hisbonalis, ${ }^{t}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
about two-thirds length of inner; abdomen of male dilated at extremity, the claspers covered by a large tuft of hair. Forewing with veins $3,4,5$ well separated at origin ; vein 7 straight and well separated from 8, 9, 10. Hindwing narrow ; the cell short ; veins 3,4 , 5 radiating from the angle ; 6,7 stalked.

Sect. I. Antennæ of male with an elongate thickening at about one-third from base.
Type. (1). Camptomastyx hisbonalis, Wik., xviii.,707 China, HimaBotys pacalis, Leech, Entom., 1889, p. 69, layas, Aspl. 4, fig. 15.
$\dagger$ Diplotyla longipalpis, Butl., Ill. Het., vii. sam, Borиео. p. 95, pl. 135, fig. 4.

Sect. II. Antennæ of male with the thickening and bend at two-thirds from base and short.
(2). "Camptomastyx exuvialis, Snell., Trans. Sikhim, As Ent. Soc. Lond., 1890, p. 627 sam.

## Genus Zagiridia, nov.

Palpi porrect, downcarved, extending about two and a half times length of head, the 3rd joint hidden by hair ; maxillary palpi dilated with scales ; frons rounded; antennæ of male serrate and with tufts of very long setæ; hind tibie with the outer spurs two-


Zagividia noctualis, ${ }^{\text {on }}, \frac{1}{1}$.
thirds length of inner. Forewing with vein 3 from near angle of cell ; 4, 5 from angle ; 7 straight and well separated from $8,9,10$, which are given off before end of cell ; 11 absent. Hindwing with veins $3,4,5$ from angle of cell ; 6,7 from upper angle, 7 anastomosing with 8.
Type. +Zagiridia noctualis, sp. n.
Dull grey brown with a slight rufous tinge. Forewing with faint traces of antemedial line angled on median nervure; both wings with a black speck at each angle of cell ; a very indistinct pale postmedial line with a series of obscure dark specks on its inner edge, retracted at vein 2 to below end of cell; an obscure pale waved submarginal line with series of dark specks inside it and slightly angled inwards on vein 5; a marginal series of black specks.

Hal. S.E. Borneo, Pulo Laut (Doherty). Exp., 20 mm .

## Genus Clupfosona.

Clupeosoma, Snell., Tijd. v. Ent., xxiii., p. 203 (1880). Hydrorybina, Hmpsn., Moths Ind., iv., p. 239 (1896).
Palpi porrect, extending about three times the length of head and downcurved at extremity ; maxillary palpi about half the length of labial with a pointed tuft in front; frons flat and
oblique ; antennæ of male ciliated ; tiliæ with the outer spurs about two-thirds length of inner. Forewing long and narrow ; vein 3 from before angle of cell ; 4, 5 from angle; 7 straight and


Clupeosoma polusale, of, $\frac{1}{1}$ (from Moths Ind. vol. iv.).
well separated from $8,9,10$. Hindwing with the cell short; vein 3 from angle ; 4,5 approximated for a short distance ; 6, 7 from upper angle.
Sect. I. Forewing with the outer margin evenly curved.
(1). Clupeosona polesale, Wlk., xviii., Sikhim, Burma, Bor703 . . . . . . neo, Queensland.
(2). +Clupeosoma iryert, Butl., Trans. Eit. Soc. Lond., 1881, p. 588 . . . . Japan.
(3). +Clupeosoma bicolor, Moore, Lep. Atk., Assam, Benp. 207 gal, Ceylon.

$$
\begin{aligned}
& \text { Pionea rubralis, Warr., A. M. N. H. (6), xvii., } \\
& \text { p. } 97 .
\end{aligned}
$$

Type. (4). Clupeosoma pellucidale, Snell., Celebes, Sambawa, Tijd. v. Ent., xxiii., p. 203, and Tenimber, Dili, xxvi., pl. 6, fig. 9 . . . . Fergusson Island.

Sect. II. Forewing with the outer margin excised below apex and towards outer angle.
(5). Clupeosona melliculale, Led.,Wien Ent. Mexico, Centr. Mon., 1863, p. 414, pl. 15, fig. 6 . . \& S. America.
(6). Clupeosoma dentatum, Druce, Biol.Centr. Centr. Am. Het., ii., p. 203, pl. 60, fig. 13 . America.
(7). Cluupeosoma rusinum, Druce, Biol. Centr. Am. Het., ii., p. 203, pl. 60, fig. 14 . Mexico.
(8). †Clupeosoma basale, sp. n.
f. White, slightly tinged with fuscous. Forewing with the basal area fuscous with diffused white beyond it, the rest of the wing tinged with yellowish fuscous; two white spots on costa beyond middle; traces of a postmedial line incurved below vein 3; a marginal series of black specks interrupted at middle ; a fuscous patch at outer angle ; cilia white, fuscous at middle and
outer angle. Hindwing white, with curved postmedial line and marginal series of black specks.

Hab. Barbados (Frampton). Exp., 16 mm .
(9). Cluppeosoma metacuryson, sp. n.

む. Head and thorax orange and rufous ; palpi blackish ; abdomen orange tinged with black to wards extremity. Fore wing orange suffused with fiery red scales and irrorated with black; the cell suffused with black; an orange antemedial line oblique towards costa, and obtusely angled at middle ; an ill-defined postmedial orange line expanding towards costa and highly excurved at middle; cilia black, with a series of whitish points on them. Hindwing orange, with broad black marginal band tapering to anal angle.

Hab. Fergusson Island, New Guinea. Exp., 20 mm . Type in Coll. Rothschild.

## Genus Zebronia.

Zebronia, Hübn., Verz., p. 361 (1827).
Palpi porrect, extending about the length of head, triangulatly scaled, and the third joint hidden by hair; maxillary palpi filiform; frons rounded ; antennæ ciliated; fore femora and tibiæ of male thickly fringed with hair on both sides ; the outer spurs about half


Zebronia phenice, of, $\frac{\mathrm{I}}{1}$.
the length of inner ; abdomen of male long and slender. Forewing with the costa highly arched towards apex, which is slightly produced; veins $3,4,5$ from angle of cell ; 7 curved and approsimated to $8,9,10$. Hindwing with the cell rather short; vein 3 from angle ; 4, 5 approximated for a short distance ; 6, 7 shortly stalked, 7 anastomosing with 8 .

Type. Zebronta phexice, Cram., Pap. Exot., iv., W. and Cenp. 185, pl. 382, fig. G.
tral Africa, Mauritius, Abyssinia.
Zebronia feederalis, Hübn., Verz., p. 361. Spilomela podalivialis, Guen., Delt. and Pyr. p. 281.
$\dagger$ Zebronia lathurusulis, Wlk., xix., 069.

## Genus Hyaloplaga.

```
Hyaloplaga, Warr., A. M. N. H. (6), ix.,
    p. 432 (1892).
```

Palpi porrect, triangularly scaled, the 3rd joint hidden by hair; maxillary palpi somewhat dilated at extremity ; frons rounded ; antennæ of male ciliated; tibiæ with the outer spurs about half


Hyaloplaga pulchralis, ơ, $\frac{1}{\frac{1}{1}}$ (from Moths Ind., vol. iv.).
the length of inner. Forewing of male with a large fovea below base of median nervure; veins $3,4,5$ from angle of cell ; 7 straight and well separated from $8,9,10$. Hindwing of male with the costa much lobed near base ; veins 3, 4, 5 from angle of cell; 6, 7 from upper angle.
Type. †Hyaloplaga pulcur.lis, Moore, P. Z. S., 1867,
p. 90 . . . . . . . . Sikhim.

## Genus Psammotrs.

Psammotis, Hübn., Verz., p. 350 (18:27).
Perinephila, Hubn., Verz., p. 356.
Palpi porrect, triangularly scaled, extending about one and a-


Psammotis lancealis, す, $\frac{1}{1}$.
half times length of head, the 3rd joint hidden by hair ; m: xil-
lary palpi dilated with scales; frons rounded; antennæ of male ciliated, and about three-fourths length of forewing. Forewing with veins $3,4,5$ well separated at origin ; 7 straight and well separated from $8,9,10$. Hindwing with veins $3,4,5$ from angle of cell ; 6, 7 stalked, 7 anastomosing with 8 .
Sect. I. (Perineplila.) Hind tibiæ of male with the outer medial spur minute; forewing narrow, the apex produced.
(1). Psammotis lancealis, Schiff., Wien Verz, Europe, p. 121

Japan.
Pyralis glabralis, Hübn., Pyr., figs. 65, 117. Pyralis longalis, Haw., Lep. Brit., p. 379.

Sect. II. (Psammotis.) Hind tibia of male with the outer medial spur half the length of inner ; forewing short and broad.
Type.
(2). Psammotis pulveralis, Hübn., Verz., Europe,
p. 350 W. Asia.
Var. grisealis, Staud., Hor. Ent.
Ross., 1870 , p. 193, pl. 2, fig. 10.

## Auctorum.

Perinephile doerriesi, Staud., Deutsch. Ent. Zeit.
Lep., v., pl. iii , fig. 23, and vi., p. 81 . . Amur.

## Genus Euranypara.

Eurrhypara, Hübn., Verz., p. 360 (1827).
Palpi porrect, triangularly scaled, the 3rd joint hidden by hair ; maxillary palpi filiform ; frons oblique ; antenne of male almost


Eumhypara urticata, ô, 1.
simple ; hind tibiæ with the outer medial spur one-sixth length of inner in male, one-half in female. Forewing with veins 3, 4, 5
from angle of cell ; 8, 9, 10 stalked; male with a sexual brand below apical part of costa. Hindwing with veins 3, 4, 5 from angle of cell ; 6, 7 from upper angle.
Type. Eurrhypari urticata, Linu., Faun. Suec., 1297. Europe.

## Genus Mabra.

Mabra, Moore, Lep. Ceyl., iii., p. 280 (188j).
Neophruda, Warr., A. M. N. H. (6), xvii., p. 463 (1896).

Palpi porrect and triangularly scaled, the 3rd joint hidden by hair; maxillary palpi filiform; frons rounded; tibiæ with the spurs long and nearly equal. Forewing with veins $3,4,5$ from


Mabra eryxalis, ${ }^{\text {t }}, \frac{1}{\frac{1}{2}}$ (from Moths Ind., vol. iv.)
close to angle of cell ; 7 well separated from 8, 9,10 . Hindwing with veins 3 and 5 from close to angle of cell; 6, 7 from upper angle, 7 anastomosing strongly with 8 .
Sect. I. Antennæ of male with long cilia.
(1). *Mabra garzellalis, Feld., Reis. Nov., pl. 135̆, fig. 1 . . . . . Brazil.
Type. (2.). †Mabra eryxalis, Wlk., xvii., 371 ; Moore, India, Ceylon, Lep. Ceyl., iii., pl. 179, fig. 4 . . Burma, Botys velatalis, Snell., Mid. Sum., p. 63, pl. $5, \quad$ Sumatra. fig. 4.
Sect. II. Antennæ of male with the shaft annulate and longer.
(3). †Mabra charonialis, Wlk., xvii., 372 . . Japan, China.

Stenia dissiputalis, Christ., Bull. Mosc., 1881, i., p. 28.
( 4 ). $\dagger$ Mabra nigriscripta, Swinh., A. M. N. H. (6), xii., p. 302

Assam.
(5). Mabra fauculalis, Wlk., xix., 962 . . Borneo.
(6). Mabra fuscipennalis, sp. n.
\%. Fuscous; vertex of head greyish ; antennæ with black and white rings ; wings irrorated with grey. Forewing with in-
distinct dark antemedial line and discocellular lunule ; the dark postmedial line arising from a wedge-shaped white mark on costa; excurved to vein 2, then retracied to below angle of cell. Hindwing with indistinct discocellular speck and diffused oblique medial line; both wings with fine marginal dark line. Underside pale.

Hab. Khásis. Exp., 14 mm . Type in Coll. Ruthschild.
(7). Mabra metallescens, Feld., Reis. Nov.,
pl. 138 , fig. 58 . . . . . . Bogota.

Sest. III. Antennæ of male with the shaft laminate.
(8). Mabra daulialis, Warr., A. M. N. H. (6), xvii., p. 464 . . . . . . Assam.

## Genus Cenoloba.

Cenoluba, Wlsm., Ent. Mo. Mag., xxi., p. 175 (1885).
Palpi porrect extending about three times length of head, straight, 2nd joint with dense roughly projecting scales, 3rd joint moderate and naked; maxillary palpi about half the length of labial palpi and triangularly dilated with rough scales; frons rounded; anteunæ three-fourths of forewing serrate and moderately ciliated. Forewing elongate, narrow ; the outer margin


Cenoloba obliterata, む,
deeply cleft to one-half, the segments lanceolate ; vein 1 simple; 2 and 3 stalked ; 4 from angle of cell ; 5, 6 ohsolete ; 7 from upper angle $; 8,9,10,11$ stalked. Hindwings elongate and gradually dilated ; the outer margin deeply cleft, the segments lanceolate; vein 2 from before angle ; 3 and 4 stalked from angle ; 5 to base of cleft; 6, 7 shortly stalked, 7 anastomosing with 8 to threefourths of wing.
Type. †Cenoloba obliteralis, Wlk., xxx., $9 \nmid 5$. . Australia.

## Genera Auctorum.

Heringia mentica, Hedemann, Ent. Zeit. Stett., l., p. 294.
W. Indies.

Eudorina aurantiacalis, Snell., Tijd. v. Ent., xxxviii., p. 117 . . . . . .. . Java.

Eudorina brunnealis, Snell., Tijd. v. Ent., xxxviii., p. 118 . . . . . . . Java.

Eutorina incrustalis, Snell., Tijd. v. Ent., Java, xxxviii., p. 119 . . . . . . Celebes.

Nicaria latisquamalis, Snell., Tijd. v. Ent., xxiii., p. 230, and xxvii., pl. iii., fig. $10 a, b$. . . Celebes.

Haploscopa astrapias, Meyr., Trans. Ent. Soc. Lond., 1887, p. 268
Agrammia mutronalis, Guen., Delt. and Pyr., p. 405 . . . . . . . . Brazil.

Agrammia iridalis, Guen., Delt. and Pyr., p. 406. Cayenne.

## Species omitted.

Hydrocampa meropalis, Wlk., xvii., 462. Type lost.
Hydrocampa actoralis, Wlk., xix., 962 . Type lost.
Hydrocampa nitidalis, Maasen in Stübel's Reise, p. 171, pl. ix., fig. 25. Ecuador. Is a Lithosid.
Hydrocempa decetialis, Druce, Biol Centr. Am. Het., ii., p. 275, pl. 63, fig. $22=$ P'atissa xantholeucalis, Guen., belongs to the Schanobiince.
Hydrocampa dematrialis, Druce, Biol. Centr. Am. Het., ii., p. 276 , pl. 63 , fig. $25=$ Sufetula dirutaiis, Wlk., belongs to the $P_{\text {yraustince }}$.

## Subfamily Scoparine.

Proboscis present ; palpi porrect and hairy, the maxillary palpi triangularly dilated with loug hair (in Micraglossa the palpi are upturned and the maxillary palpi slightly dilated). Forewing with more or less developed tufts of raised scales in the cell ; vein 7 from cell; 10 from cell. Hindwing with the median nerrure nonpectinate (except in Eclipsiodes).

Pifllozexy of the Scoparinet.
Eclipsiodes.
Micraglossa. Xeroscopa. Tetraprosopus. Mestolobes.
Scoparia.
Dasyscopa.

## Key to the Genera.

| 1. Palpi upturned <br> B. Palpi porrect. |  |  |
| :---: | :---: | :---: |
|  |  |  |
| a Hindwing with the median nervure pectinated |  |  |
| Hindwing with the median nervure non-pectinate. |  |  |
| $a^{1}$ Palpi with a tuft of long porrect hair on 3rd |  |  |
| $b^{1}$ Palpi with no tuft of hair on 3 rd joint. |  |  |
| $a^{2}$ Hindwing with some long hairs in end of |  |  |
| $b^{2}$ Hindwing with the cell smothly scale ${ }^{\circ}$ |  |  |
| $a^{3}$ Hindwing with vein 3 absent . . . 5. Mestolobe |  |  |
| $b^{3}$ Hindwing with vein 3 present . : |  |  |
| at Hindwing with vein 5 from a point or stalked with 4 . . . . 6. Scoparia. |  |  |
|  |  |  |
|  | indwing with vein 5 from well above | 7. Dasysiconat. |

## Genus Micraglossa.

Micraglossa, Warr., A. M. N. H. (6), viii., p. 6 כ (1891).

Palpi upturned, the 2 nd joint reaching vertex of head and slightly fringed with hair in front, the 3rd well developed and acuminate ; maxillary palpi long and slightly dilated with scales at extremity ; frons rounded ; antennæ somewhat annulate; tibix


Micraglossu scoparialis, ${ }^{\text {t }}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
nearly naked with the spurs almost equal. Forewing with vein 3 from before angle of cell; 4,5 from angle; 7 straight and well separated from 8, 9. Hindwing with vein 3 from near angle of cell ; 4, 5 from angle ; 6, 7 from upper angle.
(1). + Mifraglossa scopablalis, Warr., Sikhim, A. M. N. H. (6), viii., p. 66 . . . Assam.
(2). Mifraglossa (exealis, sp. n.

Head, thorax, and abdomen brassy yellow, 3rd joint of palpi ringed with black; thorax spotted with black. Forewing brassy yellow irrorated with black scales ; an irregular black patch from near base of costa; an irregularly sinuous antemedial black band conjoined to a spot below the cell ; the discocellular patch figure-of-eight-shaped with broad black outline extending up to the costa; traces of a postmedial line with an inward curve from
costa to vein 2, then erect; large submarginal black patches on costa and inner margin and a smaller marginal patch below apex. Hindwing whitish suffused with fuscous towards margin.

Hab. Khásis. Exp., 16 mm . Type in Coll. Rothschild.

## Genus Eclipsiodes.

Eclipsiodes, Meyr., Trans. Ent. Soc. Lond., 1881, p. 343.

Palpi porrect, extending about the length of head, the 2nd joint with long hair below towards extremity, the 3rd joint naked; maxillary palpi triangularly scaled; frons flat; antenne of male ciliated; tibiæ with the outer spurs about half the length of inner.


Eclipsiodes crypsixantha, đ̊, $\frac{1}{1}$.
Forewing with vein 3 from before angle of cell; 4,5 from angle; 7 well separated from 8,$9 ; 10$ oblique ; 11 curved and approximated to 12. Hindwing with the median nervure pectinated towards base; vein 3 from near angle of cell ; 4, 5 from angle; 6, 7 from upper angle.

Type. (1). Eclipsiodes crypsixantha, Meyr., Trans.
Ent. Soc. Lond., 1884, p. 343 . . . Australia.
(2). Eclipsiodes drosera, Meyr., Trans. Ent.

Soc. Lond., 1887, p. 245. . . . Australia.

Genus Xeroscopa.
Xeroscopa, Meyr., Trans. Ent. Soc Lond., 1884, p. 349.
Palpi porrect, extending about twice the length of head, the 2nd joint with tuft of porrect hair bolow, almost hiding the 3rd joint ; maxillary palpi triangularly scaled ; frons somewhat prominent ; antennæ of male minutely ciliated; tibiæ with the outer spurs half the length of inner. Forewing with vein 3 from before trans. ent. soc. lond. 1897-part if. (juli.) 15
angle of cell ; 4, 5 from angle ; 7 straight and well separated from 8,$9 ; 11$ oblique. _Hindwing with some long hairs in end of cell ;


Xeroscopa ejuncilla, ô, $\frac{1}{1}$.
vein 3 from before angle of cell; 4,5 shortly stalked; 6,7 shortly stalked.
(1). + Xeroscopa indistinctalis, Wik., xxvii, 48 . . . . . . . . N. Zealand.
(2). Xeroscopa favilliferefiat, Wlk., xxxv., Tasmania, 1719

Australia.
Xeroscopa encausta, Meyr., Tr. N. Z. Inst., $\mathrm{xvii} ., 111$.
(3). Xeroscopa philonephes, Meyr., Tr. N. Z. Inst., xvii., p. 110 .
(4). Meroscopa petrina, Meyr., Tr. N. Z. Inst., xvii., p. 111 . . . . . . N. Zealand.

Australia.
(j). Xeroscopa cyameuta, Meyr., Tr. N. Z. Iust., xvii., 112 . . . . . N. Zealand.
(6). Xeroscopa astragalota, Meyr., Tr. N. Z.

Inst., xvii., p. 118 . . . . . N. Zealand.
(7). Xeroscopa rotuella, Feld., Reis. Nov., pl. 137, fig. 30
N. Zealand.
(8). Meroscopa harpalea, Meyr., Tr. N. Z. Inst, xvii., p. 114 .
N. Zealand.

Type. (9). †Xeroscopa ejuxcida, Knaggs, E. M. M., iv., p. 80
N. Zealand.
(10). Xeroscopa niphospora, Meyr, Tr. N. Z.

Inst., xvii., p. 115 . . . . . N. Zealand.
(11). Xeroscopa apheles, Meyr., Tr. N. Z.

Inst, xvii., p. 115 . . . . . N. Zealand.
(12). Xeroscopa aspidota, Meyr., Tr. N. Z.

Iust., xvii., p. 115 . . . . . N. Zealand.
(13). Xeroscopa ehichemia, Meyr., Tr. N. Z.

Inst., xvii., p. 117
N. Zealand.
(14). ${ }^{\circ}$ Xeroscopa melanopis, Meyr., Trans. Ent.

Soc. Lond., 1888, p. 233 . . . Hawaii.
(15). "Xeroscopa ombrodes, Meyr., Trans. Ent.

Soc. Lond., 1888, p. 234
(16). ${ }^{\text {Xeroscopa ischnias, Meyr., Trans. Ent. }}$

Soc. Lond., 1888, p. 235
(17). ©Xeroscopa demodes, Meyr., Trans. Eut.

Soc. Lond., 1888, p. 234
(18). ${ }^{\text {Xeroscopa Pachysema, Meyr., Trans. }}$ Eut. Soc. Lond., 1888, p. 236 . . Hawaii.
(19). ${ }^{\circ}$ Xeroscopa mesoleuca, Meyr., Trans. Ent.

Soc. Lond., 1888, p. 237 . . . Hawaii.
(20). ©Xeroscopa nomeutis, Meyr., Tr. N. Z.

Inst., xvii., p. 116 . . . . . N. Zealand.
(21). ${ }^{\circ}$ Xeroscopa legnota, Meyr., Tr. N. Z. Inst., xvii., p. 117
(22). Xeroscopa octophora, Meyr., Tr. N. Z.

Inst., xvii., p. 118
(23). ${ }^{\text {Xeroscopa asterica, Meyr., Tr. N. Z. }}$

Inst., xvii., p. 118
N. Zealand.
(24). "Xeroscopa leucogramma, Meyr., Tr. N. Z.

Iust., xvii., p. 119 . . . .
N. Zealand.
(25). ${ }^{\text {Xeroscopa nephelitis, Meyr., Trans. Ent. }}$

Soc. Lond., 1887, p. 247
Australia.
(26). +Xeroscopa venoza, Butl., A. M. N. H. (5), vii., i., p. 332

Hawaii.
(27). + Xeroscopa hawaiensis, Butl., A.M. N. H. (5), vii., 1, p. 330 .

Hawaii.
(28). +Xeroscopa jucunda, Butl., A. M.N. H. (5),
vii., 1, p. 331 (古) . . . . Hawaii.
+Scrparia formosce, Butl., A.M. N. H.(5), vii., 1, p. 331 ( $\mathrm{d}^{*}$ ).

Hawaii.

> Hawaii.

> Hawaii.
N. Zealand.
N. Zealand.
rearad
angle of cell ; 4, 5 from augle ; 7 straight and well separated from 8,9 , to which 10 is approximated; 11 oblique. Hindwing with the


Tetraprosopus meyricki, ơ, $\frac{1}{1}$.
discal area above vein 2 clothed with long hair; the cell long; vein 3 from before angle; 4,5 from angle; 6, 7 stalked.
Type. †Tetraprosopus meyricki, Butl., A. M. N. H. (5), ix., 97 . . . . . . . Australia.

## Genus Mestolobes.

Mestolobes, Butl., Trans. Ent. Scc. Lond., 1882, p. 38.
Palpi obliquely porrect, the 2nd joint clothed with rough hair, the 3rd partially hidden ; maxillary palpi triangularly dilated with hair at extremity ; frons rounded ; antennæ laminate; tibiæ with the spurs nearly equal. Forewing with an antemedial tuft of


Mestolobes abnormis, すै, $\frac{\mathrm{x}}{1}$.
scales on inner margin; veins $3,4,5$ well separated at origin ; 7 straight and well separated from 8, 9. Hindwing with vein 3 absent ; 4,5 stalked; 6, 7 stalked, 7 anastomosing with 8.
Sect. I. Hindwing of male with fringes of long hair on and luelow costa above.
A. Hindwing of male with elongate lobe on inner margin ending in a tult of large black scales; hind tibie with a tuft of large black scales on outer side at extremity.

Type. (1). +Mestolobes abnormis, Butl., Trans. Ent. Soc. Lond., 1882, p. 35 . . . . Hawaii.
$\dagger$ Mestolobes cenone, Butl., Trans. Eat. Soc. Lond., 1882, p. 37.
B. Hindwing of male without lobe ; hind tibia without tuft of scales.
(2). +Mestolobes minuscula, Butl., A. M. N. H.
(5), vii., 1, p. 325 . . . . . Hawaii.
$\dagger$ Mestolobes simethina, Butl., Truns. Ent. Soc. Lond., 1882, p. 38.

Sect. II. Hindwing of male without costal fringes of hair ; hind tibire with large tuft of black scales on outer side near base.
(3). †Mestolobes semiochrea, Butl., Trans. Ent.

Lond., 1882, p. 39
Hawaii.

## Genus Scoparia.

Scoparia, Haw., Lep. Brit., p. 491 (1803).
Eudorea, Curt., Brit. Eint., vi., 170 (1825).
Lissophane; Warr., A. M. N. H. (6), viii., p. 67.
Palpi porrect, extending about twice to three times length of head, the 2nd joint with long projecting hair below, the 3rd naked, sometimes partially concealed by the hair on 2nd joint ; maxillary palpi triangularly scaied; frons flat; antennæ minutely ciliated and somewhat annulate ; tibiæ with the outer spurs about two-


Scoparia murificalis, ${ }^{\top}$, $\frac{3}{2}$ (from Moths Ind., vol. iv.).
thirds lengih of inner. Forewing with more or less developed tufts of raised scales at middle and end of cell ; vein 3 from before angle of cell ; 4,5 from angle ; 7 straight and well separated from 8,9 , to which 10 is approximated towards origin. Hindwing with vein 3 from before angle of cell ; 4, 5 from angle or stalked; 6, 7 shortly stalked.

## Sect. I. Wings of male normal.

(1). Scoparia trivirgata, Feld., Reis. Nov., pl. 137, fig. 29
N. Zealand.
(?). ${ }^{\text {Scoparia panopla, Meyr., Tr. N. Z. Inst., }}$ xvii., p. 107
N. Zealand.
(3). +Scoparia sabulosella, Wlk., xxvii., 178 N. Zealand.
(4). Scopara deltophora, Meyr., Tr. N. Z. Inst., xvii., p. 106 .
N. Zealand.
(5). Scoparla paltomacha, Meyr., Tr. N. Z. Inst., xvii., p. 105 .
N. Zealand.
(6). Scoparta flapilra, Meyr., Tr. N. Z. Inst., xvii., p. 105
N. Zealand.
(7). +Scoparia exilis, Kuaggs, E. M. M., 1867, p. 81
N. Zealand.
(8). Scoparla steroplea, Meyr., Tr. N. Z. Inst., xvii., p. 103
N. Zealand.
(9). Scoparia axeva, Meyr., T'r. N. Z. Inst., xvii., p. 103
N. Zealand.
(10). ©Scoparia crypsinoa, Meyr., Tr. N. Z. Inst., xvii., p. 102 .
N. Zealand.
(11). Scoparia manganeutis, Meyr., Tr. N. Z. Inst., xvii., p. 102 .
N. Zealand.
(12). +Scoparla cleodoralis, Wlk., xviii., 793

Australia, Tasmania.
(13). Scoparia achopola, Meyr., Tr. N. Z. Inst., xvii., p. 101 .
N. Zealand.
(14). ${ }^{\text {OScoparla acompa, Meyr., Tr. N. Z. Inst., }}$ xvii., p. 100
N. Zealand.
(15). +Scoparia feredayt, Knaggs, E. M. M., 1867, p. 80
Scoparia moanalis, Feld., Reis. Nov., pl. 137, fig. 34.
(16). Scoparia epicomia, Meyr., Tr. N. Z. Inst., xvii., p. 99
N. Zealand.
(17). Scoparla psammitis, Meyr., Tr. N. Z. Inst., xvii., p. 99
N. Zealand.
(18). Scoparia leptalea, Meyr., Tr. N. Z. Inst., xvii., p. 98
N. Zealand.
(19). ${ }^{\text {Scoparia plagiotis, Meyr., Trans. Ent. }}$ Soc. Lond., 1887, p. 247

Tasmania.
(20). ©Scoparia threnodes, Meyr., Trans. Ent. Soc. Lond., 1887, p. 246
(21). Scoparia chalicodes, Meyr., Tr. N. Z.

Inst., xvii., p. 98 . . . . . N. Zealand.
(22). +Scoparia rakatensis, Knaggs, E. M. M., 1867, p. 80
N. Zealand.
(23). *Scoparla tetracycla, Meyr., Tr. N. Z. Inst., xvii., p. 97
N. Zealand.
(24). Scoparla cataxesta, Meyr., Tr. N. Z. Inst., xvii., p. 96
N. Zealand.
(25). Scoparla evcapaa, Meyr., Tr. N. Z. Inst., xx., p. 65
N. Zealand.
(26). +Scoparia submarainalis, Wik., xxvii., 48
N. Zealand.
$+V_{e_{f}} h h_{p} t_{t r y s}$ maoriella, Wlik., xxxv., 1720.
(27). Scoparla hemiplaca, Meyr., Tr. N. Z. Inst., xxi., p. 155 . . . . .
(28). +Sceparladiphitheralis, Wlk., xxxiv., 1501
N. Zealand.
(29). "Scoparia periphanes, Meyr., Tr. N. Z.

Inst., xvii., p. 94
N. Zealand.
(30). "Scoparia colpota, Meyr., Tr. N. Z. Inst., xx., p. 65
N. Zealand.
(31). "Scoparia philetera, Meyr., Tr. N. Z. Inst., xvii., p. 93
N. Zealand.
(32). Scoparla trapezophora, Meyr., Tr. N. Z. Inst., xvii., p. 93
N. Zealand.
(33). Scoparla melanegis, Meyr., Tr. N. Z.

Inst., xvii., p. 92
N. Zealand.
(34). "Scoparia poxgalis, Feld., Reis. Nov., pl. 137, fig. 33
N. Zealand.
(35). Scoparia cstmacula, Feld., Reis. Nov., pl. 135, fig. 17
N. Zealand.
+Scoparia conifera, Butl., Cist. Ent., ii., p. 493.
(36). "Scoparia characta, Meyr., Tr. N. Z. Inst., xvii., p. 90
N. Zealand.
(37). Scoparia speleea, Meyr., Tr. N. Z. Inst., xvii., p. 89

Australia.
+Scoparia pusillu, Rosenst., Ann. N. H., 1885, ii., p. 427.
(38). Scoparia anaplecta, Meyr., Tr. N. Z. Inst., xvii., p. 89

Tasmania.
(39). Scoparia critica, Meyr., Tr. N. Z. Inst., xvii., p. 88
N. Zealand.
(40). ${ }^{\text {Scoparla ergatis, Meyr., Tr. N. Z. Inst., }}$ xvii., p. 88
(41). Scoparia hemicycla, Meyr., Tr. N. Z. Inst., xvii., p. 87
N. Zealand.
(42). Scoparia microphthalma, Meyr., Tr. N. Z. Inst., xvii., p. 87
N. Zealand.
(43). Scoparia cmatias, Meyr., Tr. N. Z. Inst., xvii., p. 86
N. Zealand.
(44). Scoparta acharis, Meyr., Tr. N. Z. Inst., xvii., p. 85
N. Zealand.
(45). Scoparia dinodes, Meyr. Tr. N. Z. Inst., xvii., p. 8 厄ै
N. Zealand.
(46). Scoparia chimeria, Meyr., Tr. N. Z. Inst., xvii., p. $8 t$
N. Zealand.
(47). +Scoparia minualis, Wlk., xxxiv., 1504 . N. Zealand.
(48). +Scoparia minusculalis, Wlk., xxxiv., 1503 N. Zealand.
(49). Scoparia chlamydota, Meyr., Tr. N. Z. Iust., xvii., p. 82
N. Zealand.
(50). Scoparia philerga, Meyr., Tr. N. Z. Inst., xvii., p. 81
N. Zealand.
(51). "Scoparia oreas, Meyr., Tr. N. Z. Inst., xvii., p. 81
N. Zealand.
(52). +Scoparia linellis, Wlk., xxxiv., 1503 . N. Zealand.
(53). +Scoparia subditella, Wlk., xxxy., 1720 N. Zealand.
(54). Scoparla gomphota, Meyr., Tr. N. Z. Iust., xvii., p. 80

Tasmania.
(55). ${ }^{\text {Stoparia periferga, Meyr., Tr. N. Z. }}$ Iust., xvii., p. 80

Tasmania.
(56). Scoparia eremitis, Meyr., Tr. N. Z. Inst., xvii., p. 79
S. Australia.
(57). Scoparta homala, Meyr., Tr. N. Z. Inst., xvii., p. 79
S. Australia.
(58). Scoparia symapta, Meyr, Tr. N. Z. Inst., x xii., p. 78

Tasmania.
(59). Scoparla symtaracta, Meyr., Tr. N. Z. Australia, Inst., xvii., 77

Tasmania.
(60). †Scoparta exhibitalis, Wlk., xxxiv., 1500 Australia.
(61). Scoparia epicryma, Meyr., Tr. N. Z. Inst., xvii., p. 76

Australia.
(62). Scopalla apirodes, Meyr., Tr. N. Z. Inst., xvii., p. 76

Australia.
(63). Scoparia protorthra, Meyr, Trans. Ent. Soc. Lond., 1885, p. 450.

Australia.
(64). Scoparia eumeles, Meyr., Tr. N. Z. Inst, xvii., p. 75

Australia.
(65). Scoparia chasta, Meyr., Tr. N. Z. Inst., xvii., p. 74 . . . . . Australia.
(66). Scoparia anthraclas, Mejr., Tr. N. Z. Inst., xvii., p. $7 t$. . . . . Tasmania.
(67). $\dagger$ Scoparia frigid., Butl., A. M. N. H. (5), vii., p. 331

Hawaii.
(68). $\dagger$ Scoparia montina, Butl., Trans. Ent. Suc. Lond, 1882, p. 41

Hawaii.
Scoparia macrophanes, Meyr., Trans. Ent. Soc. Lond., 1888, p. 231.
(69). Scoparia chordactis, Meyr., Trans. Ent.

Soc. Lond., 1887, p. 272 . . . . Patagonia.
(70). †Scoparla ragoxoti, Butl., Trans. Eut. Peru, Chili, Soc. Lond., 1883, p. 59 . . . Juan Fernandez.
(71). †Scoparia glatculalis, sp. n.

む. Olive-grey. Forewing of glossy silky texture; traces of yellowish marks at middle and end of cell ; the outer area slightly darker.

Hab. Falkland Islands. Exp., 20 mm .
(72). $\dagger$ Scoparla biscutella, Zell., S. E. Z., 187ㄹ, p. 474, pł. 2, fig. 8 .

Bogotí.
(73). †Scoparia albifrons, Zell., S. E. Z , 1872, p. 476

Bogotá, Peru.
Argentina.
(74). †Scoparia rongipenvis, Zell., S. E. Z., 1872, p. 479, pl. 2, fig, 11

Bogotí.
(75). $\dagger$ Scoparia tersella, Zell., S. E. Z., 1872, p. 476, pl. थ, fig. 9

Bogotí.
(76). †Scoparia cermmica, Warr., A. M. N. H. (6), viii., p. 67

Callao.
(77). $\dagger$ Scoparla dispersa, Butl., Trans. Ent. Soc. Lond., 1883, p. 58

Chili.
(78). $\dagger$ Scoparia thicolor, Zell., S. E. Z., 1872, p. 478 , pl. 2, fig. 10

Bogotá.
(79). $\dagger$ Scoparia lugubralis, Wlk., xxxiv., 1498. Camada.
(80). Scoparia nominatalis, Hulst, Tr. Am. Vancouver, Ent. Soc., xiii., p. 148 E. States.
(81). $\dagger$ Scoparia atropicta, Zell., MS.
©. Head and thorax variegated black and white; abdomen fuscous ringed with white. Forewing black variegated with white; numerous white patches on basal area; a sinuous antemedial white line with a white patch beyond it at middle; a large
postmedial white patch from costa to vein 2 with two discocellular black spots on it and $L$-shaped reniform spot ; a minutely dentate postmedial black line outwardly edged by white, angled inwards below costa, then excurved to vein 2 where it is bent inwards; submarginal white spots below apex and above outer angle ; cilia white with black patches. Hindwing yellowish suffused with fuscous.

Hab. United States. Exp., 23 mm.
(82). †Scoparia basalis, Wlk., xxxiv., 1497 U.S.A., E.States.
(83). $\dagger$ Scoparla biplafialis, Wlk., xxxiv., 1499. Canada, $\dagger$ Scoparia libella, Grote, U. S. Geol. Surv., Vancouver, iv., p. 675.
E. States.
(84). †Scoparia rectidinea, Zell., Verh. Z. B. Vancouver, Ver., xxix., p. 427, pl. 12, fig. 3 . . E. \& W.
Scoparia refugalis, Hulst, Tr. Am. Ent. States. Soc., xiii., p. 148.
(85). Scoparla delphesa, Druce, Biol. Centr. W. States, Am., ii., p. 279, pl. 64, fig. 1 . . . Mexico.
(86). Scoparla smithi, Druce, Biol. Centr. Am., ii., p. 279, pl. 64, fig. 3 . . . . Mexico.
(87). Scoparia centuriella, Suhif., Wien Europe, Verz., p. 319

Labrador,
Eudorea borealis, Lef., Ann. Soc. Ent. Fr., E. States. 1835, p. 400, pl. 10, fig. 9.
Eudorea muneralis, Zett., p. 970.
Phycis quadratella, Zett., p. 997.
$\dagger$ Hypena cecalis. Wlk., xvi., p. 36.
$\dagger$ Scopula caliginosalis, Wlk., xxxiv., 1460.
Scoparia frigidellu, Pack., Labr., xi., 53.
Scoparia albisinuatella, Pack., Labr., xi., 53.

Scoparia ninguidalis, Hulst, Tr. Am. Ent. Soc., xiii., p. 147.
(88). Scoparia staudingeralis, Mab., Ann. Spain, Soc. Ent. Fr., 1869, p. 58, pl. 2, fig. 6 . Corsica.
(89). Scoparia perplexella, Zell., Isis, 1839, p. 6 . . . . . . . . S. E. Europa.
(90). Scoparia ambigualis, Tr., Schmett. Eur., vii., p. 184

Europe.
Eudorea mercurel'a, Lab., Py •., No. 76.
Eulorea conicella, Lah., Pyr., No. 76.b.
Eudorea ancipitella, Lah., Pyr., No. 86.
Eudorea basistrigalis, Kuaggs, E. M. M., iii., p. 1 (var.).
Eudorea octavianella, Maun, W. E. Mr., 1859, p. 164 (var.).
Scoparia atomalis, Doubl., List (var.).
Eudorea ulmella, Knaggs, E. M. M., iii., p. 217.
Eudorea conspicualis, Hodgk., E. M. M., xviii., p. 134.
Scoparia signella, Teich., Arb. Ver. Riga, vi., p. 72.
Scoparia teniatella, Teich., Arb. Ver. Riga, vi., p. 73.
Scoparia incertalis, Dup., Lep. Fr., viii., p. 286, pl. 229, fig. 4.
(91). Scoparla dubitalis, Hüba., Pyr., p. 49 . Europe.
Tinea pyralella, Hübn., Tin., fig. 167
(92). Scoparia ingratella, Zell., L. E., i., S. Europ? p. 283, fig. 5 . . . . . . Armenia.
(93). Scoparia zelleri, Wocke, Vat. Ber., 1854, p. 18
Europe.
Type. (94). Scoparla cembre, Haw., Lep. Brit., p. 498
Europe.
Eudorea cembrella, Steph., Ill., iv., p. 299.
Eudorea subfusca, Steph., Ill., iv., p. 209.
Eudorea asphodeliella, Lab., Pyr., No. 74.
Scoparia erralis, Guen., Delt. and Pyr., p. 421.
Scoparia scotica, White.
(95). Scoparia pallida, Steph., IIl., iv., p. 300. Europe.
Eudorea artzenielle, H. 太.., iv., p. 49, fig. 97.
(96). Scoparla sibirict, Led., Verh. Z.-B. Wien, 1853 , p. 34, pl. 7
Siberia.
(97). Scoparia manifestella, H. S., iv., p. 46, fig. 104
Alps.
(98). Scoparia gallica, Peyer, Pet. Nouv., 1873, p. 332, and Milliere's Icones, iii., p. 338, pl. cxlii., figs. 3 \& 4 . . . France.
(99). Scoparia valestalis, Dup., Lep. Fr., viii., p. 284, pl. 229, fig. 3
C. Europe.
Eudorea parellu, Zell., Isis., 1839, p. 165.
(100). Scoparia truxcicolella, Stn. Man., 2, p. 161 . . . . . . Europe.
Eudorea murcurella, Zell., L. E., i., p. 293.
(101). Scoparia crategella, Hübn., Tin., fig. 231

Europe.
(102). Scoparia frequentella, Stn. Man., 2, p. 162

## Europe.

Eulorea portlundica, Dale, E. M. M., xxi., p. 275.
(103). Scopahia murava, Curt., B.E., iv., p. 170.

Europe.
Scoparia tuoniunc, Hoffm., Stett. Ent. Zeit., 1893, p. 130
(104). Scoparla sldetica, Zell., Isis, 1839, Alps and Arcp. 175
tic Regions.
Scopurizu luzialis, Guen., Delt. and Pyr., p. 427.
(105). Scoparia petrophla, Stdfe., S. E. Z., 1848, p. 312

Alps.
(106). Scoparia alpina, Stu. Man., 2, p. 163 . Scotland.

Eudorea gracilutis, Dbl., Stn. Man., 2, p. 163.
(107). Scoparla bohealis, Tgstr., Bidr., p. 102 . Lapland.
(108). Scoparia ingeste., Steph., Ill., iv., Europe, p. 302

Syria.
Eudorea coarctata, Zell., L. E., i., p. 308.
Scoparia amissella, Mill., Icon., i., p. 401, pl. 50, fig. 1.
(109). †Scoparia acuminatella, Stu., A. M. N. H. (3), iii., p. 210

Madeira.
(110). †Scofaria stevota, Wlstn., A. M. N. H. (3), i., p. 119

Madeira.
$\dagger$ Eudorea decorella, Stn., A. M. N. H. (3), iii., p. 210.
(111). $\dagger$ Scopara scoriella, Wlsta., A. M. N. H. (3), i., p. 119 . . . . Madeira.
(112). Scoparla lineola, Curt., B. E., iv., p. 170. Europe.
(113). Scoparla resinea, Haw., Lep. Brit., Europe, p. 499

Siberia.
Eudorea vandaliella, H. S., vi., p. 143, fig. 157.
Scoparia resinea, var. orientulis, Alph., Troudy. Ent. Ross., x., p. 26.
(114). Scoparia lemelea, Zell., L. E., i., p. 298, fig. 8

Europe.
(115). †Scoparia nigritalis, Wlk., Melis's St.

Helena, p. 190 . . . . . . St. Helena.
(116). $\dagger$ Scoparia litididalis, Wlk., Melis's St.

Helena, p. 190 . . . . . St. Helena.
(117). †Scoparia smmils, Wlsta., A. M. N. H. (5), iii., p. 333.

St. Helena.
(118). $\dagger$ Scoparia helenexsis, Wistn., A. M. N. H. (5), iii., p. 334

St. Helena.
(119). $\dagger$ Scoparla scintillulalis, Wlstn., A. M. N. H. (5), iii., p. 335 St. Helena
(120). †Scoparia transvefsalis, Wlstn., A. M. N. H. (5), iii., p. 336 St. Helena.
(121). $\dagger$ Scoparla contemptalis, Wlk., xxxiv., 1499
S. Africa.
(122). "Scoparia volalis, Feld., Reis. Nov., pl. 134, fig. 41
S. Africa.
(123). eScoparla pulveralis, Snell., Trans. Ent. Soc. Lond., 1890, p. 570 .

Sikhim.
(124). Scoparil medinella, Snell., Trans. Ent. Soc. Lond., 1890, p. 571 .

Sikhim.
(125). †Scoparla olivaris, Hmpsn., Ill. Het., viii., p. 131, pl. 154, fig. 11

Nilgiris.
(126). †Scoparla delicatalis, Wlk., xxxiv., p. 1500
N. E. India, Nilgiris.
(127). †Scoparla rufostigma, Hmpsa., Ill. Het., viii., p. 131, pl. 154, fig. 4

Nilgiris.
(128). $\dagger$ Scoparla mediorufalis, Hmpsn., Moths Ind., iv., p. 243

Himalayas.
(129). †Scoparla murificalis, Wlk., xix., 826 ;

Hmpsn., Ill. Het., ix., pl. 17t, fig. 10
N. W. Hima-
$\dagger$ Scopariu conyestalis, Wlk., xix., 826; Hmpsn., Iil. Het., ix., pl. 17t, fig. 2. layas, Ceylon.
(130). †Scoparla vinotinctalis, Hmpsn., Moths

Ind., iv., p. 244
Nilgiris.
(131). $\dagger$ Scoparia canicostalis, Hmpsn., Moths

Ind., iv., p. 244
Nilgiris
(132). Scoparia ocirealis, Schiff., Wien Verz., p. 123

Europe.
Tïnea silacella, Hübn., Tin., fig. 23 .
Tineet simplicelle, Lah., Bull. Soc. Vaud., vi., p. 160.

Sect. II. Forewing of male with elongate fovea in cell ; hindwing with very large tuit of dark hair below
the cell on underside and fringes of hair on inner area, the wing membrane and neuration much distorted.
(133). Scoparia barbipennis, sp. n.

Head and thorax mottled brown and grey ; abdomen yellowish white. Forewing ferruginous brown thickly irrorated with grey and white scales; a curved white antemedial line with black marks on its outer edge in and below the cell; a discocellular black spot with some white scales round it ; a postmedial line of white scales excurved at vein 6 , a submarginal diffused line of white scales bent inwards at middle and connected with the postmedial line; cilia grey with a serics of fuscous spots. Hindwing yellowish white with the tufts of hair showing as a dark mark in male.

Hab. Gunong Ijau, Malay Peninsula. Exp., 17 mm . Types in Coll. Rothschild and B. M.

Auctorum.
Scoparia mandschurica, Christ., Bull Mose., Ivi.,
(1), p. 8 . . . . . . . . Central Asia.

Scoparia pheolenca, Zell., L.E., i., p. 306, fig. 13. Europe.
S. vesuntialis, Guen., Delt. and Pyr., p. 424.
S. sciuphilelle, Lah., Pyr., p. 35.

Scoparia delphinialis, Guen., Delt. and Pyr., p. 425 . . . . . . . . S. France.

Scoparia wollastonii, Bethune-Baker, Trans. Ent. Soc. Lond., 1894, p. 583 . . . . Madeira.
Scoparia absconditulis, Christ., Rom. Mem., iii., p. 17, pl. 1, fig. 8 . . . . . . Syria.

Scoparia obsoleta, Staud., Hor. Ent. Ross., xv., p. 163 . . . . . . . . Syria.

Scoparia fulvosignalis, Snell., Tijd. v. Ent., xxiii., p. 20t, and xxvi., pl. 6, fig. 10 . . . Celebes.

Scoparic nugulis, Snell, Tijd. v. Ent., xxiii., p. 205, and xxvi., pl. 6, fig. 11.

Celebes.
Scoparia seriziatalis, Oberth., Et. Ent., i., p. 69, pl. iv., fig. 10 . . . . . . . Algeria.
Scoparia lencomela, Lower, Tr. R. Soc. S. Austral., xvii., p. 165
S. Australia.

## Genus Dasyscopa.

Dasyscopa, Meyr., Trans. Ent. Soc. Lond., 1894, p. 464 .

Palpi porrect, extending about twice the length of head, the 2nd joint with long projecting hair below, the 3rd naked ; maxillary palpi triangularly scaled; frons flat; antennæ minutely ciliated ; tibire with the outer spurs about two-thirds length of


Dasyscopa homogenes, ${ }^{\circ}, \frac{1}{1}$ (from Moths Ind., vol. iv.).
inner. Forewing with tufts of scales at middle and end of cell ; vein 3 from before angle of cell; 4, 5 from angle; 7 straight and well separated from 8,9 , to which 10 is approximated towards origin. Hindwing with vein 3 from before angle of cell; 4 from angle ; 5 from well above angle ; 6,7 shortly stalked.

Sect. I. Hindwing of male with a groove on inner area, hairy above and with tufts of hair arising from it below.
Type. (1). †Dasyscopa homogenes, Meyr., Trans. Ent. Assam, Malay Soc. Lond., 189t, p. 464 . . Pen., Sambawa. Scoparia planilinealis, Warr., A. M. N. H. (6), xvii., p. 207.

Sect. II. Forewing of male with a large fringe of hair on basal half of costa above and a patch of scales on inner area below ; hindwing with the costa lobed towards apex, which is produced; some large scales below costa above and a small round subapical patch; a large tuft of scales on end of median uervure; fore femora and tibize fringed with hair.
(2). DASYSCOPA POLYSEMLILIS, sp. n.

む. Grey mottled with black. Forewing with the costal tuft black; a black mark at base of inner margin; a black discocellular stigma; diffused black below and beyond end of cell; a pastmedial line dentate below costa and excurved between veins 5 and 2 ; apical area suffused with black ; a marginal series of black
points. Hindwing with the tuft tipped with brown; a diffused black line from it to inner margin; outer area mottled with black.

Hab. Lifu, Loyalty Islands. Erp., 20 mm. Type in Coll. Rothschild.

ADDENDUM (June 10th, 1897).
Genus Osphrantis.
Osphrantis, Meyr., Trans. Ent. Soc. Lond., 1897, p. 87.

Palpi upturned, the 2nd joint moderately scaled in front, the 3rd with small triangular tuft ; maxillary palpi filiform ; antennæ of male with long fasciculate cilia. Forewing with the cell more than half the length of wing ; veins $3,4,5$ from angle, 7 straight and well separated from $8,9,10$. Hindwing with the cell onethird length of wing ; veins $3,4,5$ from angle, 6, 7 from upper angle, 7 anastomosing with 8 to two-thirds of wing.

Differs from Draccunura in the fasciculate antennæ and the strong anastomosis of vein 7 of hindwing with 8.
Type. †Ospirantis parapiefa, Meyr., Trans. Ent. Soc. Lond., 1897, p. 88 . . . . Talaut.

## VIII. Descriptions of New Species of Central and South American Rhopalocera. By F. Du Cane Godman, F.R.S., F.L.S., and Osbert Salvin, M.A., F.R.S.

> [Read April 7th, 1897.]

The following descriptions are taken partly from specimens in our own collection, partly from others sent us by Dr. Staudinger for determination. Some of them we hope to figure in the Supplement to the Rhopalocera of our 'Biologia Centrali-Americana,' now in course of publication.

Danais nivosus, sp. n.
Danais hermippus, Druce, P.Z.S., 1876, p. 206 (nec Felder).
D. gilippo (Cr.), ex Brasilia affinis sed alis multo pallidioribus, maculis omnibus albis multo majoribus presertim iis ad cellulæ posticarum finem, maculis submarginalibus albis in seriebus duabus distinctis positis. Exp. al., $3 \cdot 2$ in.

Hab. Peruvia septentrionalis (Krause), Viña (O.T. Baron) ; Cormillo (Pearce).

We have nine specimens of this Danais (five males and four females) all agreeing with one another in the above characters whereby the insect may be distinguisbed from the common $D$. gilippus of the northern and eastern portions of the South American continent.

## Danais erginus, sp. n.

D. eresimo (Cr.), affinis sed alis saturatioribus, maculis omnibu albis magis distinctis punctis submarginalibus albis in seriebus duabus distinctis positis; anticarum apicibus fere nigris ; posticis area discali distincte pallida. Exp. al., 3.2 in .

Hab. Perutla septentrionalis, Payta (A. H. Markham) ; Viña (O. T. Baron).

## 242 Mr. F. Du Cane Godman and Mr. Osbert Salvin's

We have two males and three females of this strongly marked form of $D$. eresimus: the white subapical and discal spots of the primaries are large and distinct, and the double subapical row of white spots on the secondaries clearly shown.

## Ituna lanassa, sp. n .

I. lamiro (Latr.), similis et certe forma meridionalis; anticis maculis semihyalinis omnibus multo majoribus iis ad angulum analem confluentibus, macula magna ad basin cellulæ ultra venam subcostalem et venam medianam extendente ; posticis plerumque medialiter magis hyalinis colore fulvo ad angulum analem restricto, venis discocellularibus late nigris ut in $I$. phenarete. Exp. al., $4 \cdot 3$ in.

Hab. Peruvia orientalis, Huayabamba (Garlepp); Pozzuzo (Pearce).

We have three male specimens of this species agreeing fairly in the above characters, though the spots of the primaries in one of the Huayabamba examples are more confluent than in the others, and in the other the hyaline spot at the base of the cell does not pass the subcostal nervure. The transverse bands, one of which crosses the apex of the secondaries and the other covers the end of the cell, are both strongly marked in I. phænarete.

## Olyras præstans, sp. n.

O. insigni similis sed posticis margine externo unicolore haud introrsum rufo marginato ; subtus posticis margine nigro costali maculis duabus albis notatis. Exp. al., $4 \cdot 1 \mathrm{in}$.

Hab. Colomeıa, San Martin, Llanos of R. Meta. (Mus. nostr.); Colombia (Mus. Staudinger).
We have seen two specimens of this Olyras which resembles the Central-American O. insignis, Salv. (Biol. Centr.-Am. Rhop., i., p. 8, t. 1, fig. 1), but has no rufous inner border to the dark outer margin of the secondaries, and is thus readily distinguished.

Olyras staudingeri, sp. n.
Olyras montagui, Godm. and Salv., Biol. Centr.-Am. Rhop., i., p. 7 (nec Butler).
O. montagui similis sed anticis vena mediana fulva, posticis medialiter fere omnino fulva ad angulum apicalem vix pallidioribus, fascia lata mediana semihyalina haud notata; subtus macula exteriori costali alba majore et triangulari maculis submarginalibus anticarum albis haud interruptis. Exp. al., 4.0 in.

The receipt of additional specimens of the true $O$. montagui from the Cauca Valley, in Colombia, shows that the Central-American insect referred by us to that species is really distinct. This is Dr. Staudinger's view, and we call the species of Central America after him.

## Tithorea monosticta, sp. n.

T. duemur similis sed posticis fascia transversa integra nigra nulla, macula ad angulum apicalem tantum notatis : subtus posticis fascia maculosa et macula flavida ad angulum apicalem. Exp. al., $3 \cdot 95$ in.

## Hab. Panama, Chiriqui (Mus. Staudinger).

A female specimen sent us by Dr. Staudinger differs in the above poinis from T. duenna, of Guatemala. It also differs from $T$. pinthias of Panama in having a narrower dark border round the apical angle of the secondaries and a single isolated black spot.

## Plyciodes faustus, sp. n.

$P$. ptolyce affinis, alis anticis aliter punctatis, maculis duabus medianis (inferiore majore fere rotundata), duabus subapicalibus (inferiore parva superiore elongata) fascia mediana posticarum integra, lineola submarginali evanescenti. Exp. al., $1 \cdot 2 \overline{\mathrm{j}} \mathrm{in}$.

Hab. Panama, Chiriqui (Mus. Staudinger).
Though compared with $P$. ptolyca this species has only a general resemblance to that insect. The spots on the primaries are much fewer in number and differently placed, only a small one standing in the end of the cell with a larger one below it. J'he wings are narrower.

## Phyciodes anomalus, sp. n.

Alis fusco-nigris, ciliis albo interruptis; anticis dimidio distali punctis albis notato; posticis fascia mediana fulva intra cam punctis quibusdam ejusdem coloris et extra eam punctisalbis: subtus

## 241 Mr. F. Uu Cane Godman and Mr. Osbert Salvin's

pallidioribus, anticis punctis albis majoribus lunulis submarginalibus saturate fulvis; posticis fascia mediana cervina extra eam lunulis nigris et punctis albis seriatim positis, lunulis fulvis submarginalibus nigro limbatis et intra eas lunulis allis, ad basin fulvo et albido maculatis, maculis omnibus late nigro marginatis; palpis fuscis subtus albis; abdomine subtus albido supra fusco, lateribas albido punctatis. Exp. al., $1 \cdot 3$ in.

Hab. Mexico, Colima (Mus. Standinger).
A remarkable species with no near allies that we know of.

> Anæa elara, sp. n.
© Alis ecaudatis cyaneo-nigris ; anticis fascia subapicali arcuata venis quadripartita viridi-cyanea; posticis unicoloribus ad marginem exteruum squamis viridi-cyaneis atomatis: subtus læte castaneis albo irroratis marginibus externis immaculatis, posticis macula parva ad medium marginis costalis. Exp.al., $3 \cdot 0 \mathrm{in}$.
of major, alis ad basiu viridi-cyanoo lavatis, anticis fascia subapicali latiore et fere ad angulum analem extensa, posticis caudatis.

Hab. Custa Rica (Mus. Ŝtaudinger).
This Anæa is allied to A. proserpina, Salv., and $A$. ambrosia, Druce, having the underside of the former and the upper somewhat like that of the latter.

Dr. Staudinger has sent us a male and female, the former in good condition, but the latter has lost the tail to the hindwings found in all the allied species.

Lemonias eudocia, sp. n.
Alis saturate fuscis undique nigro maculatis, maculis singulis saturate ochraceo indistincte limbatis, ciliis fuscis irregulariter albo interruptis: subtus omnino pallidioribus maculis omnibus nigris albido cinctis. Exp. al., 0.96 in .

Hab. Mexico occidentalis, Colima (Mus. Staulinger).
A small insect belonging to the section represented in Centarl America by L. glauca and L. densimaculata. From the furmer it differs in the colour of the wings,
which are dark fuscous and not bluish-grey, and from the latter in the darker colour of the wings, the black spots being less apparent.

The single specimen sent us by Dr. Staudinger is probably, from the shape of the wings, a female, but the front legs are injured or wanting.

## Thcope speciosu, sp. n.

of Alis anticis nıgris, area interna cærulea, reliqua (parte discali et margine externo exceptis) dense squamis cyaneis notatis ; posticis cæruleis, costa et margine externo anguste nigris : subtus pallide murinis maculis tribus parvis ad angulum analem nigris albido circumcinctis, fronte inter oculos cinnamomea, corpore subtus alis conco.or?. Exp. al., $1 \cdot 2 \mathrm{in}$.

Hab. Colonibia occinentalis, Rio San Juan (Mus. Staudinger).

A beantiful species, of which Dr. Staudinger has sent us a single male specimen for description. It belongs to the T. virgilius group, but differs in having the primaries, for the most part, black with a deep blue gloss over the greater portion, the inner edge alone being of the blue found in T. virgilius.

## Theope talna, sp. n.

ㅇ Alis nigris ad basin cæruleis, anticis macula subapicali tripartita quoque cærulea : subtus pallide cinnamomeis, posticis maculis duabus submarginalibus nigris cæruleo introrsum limbatis ad angulum analem maculis alteris evanesceutibus juxta eas una utrinque cæruleis; fronte inter oculos et corpore subtus cinnamomeis. Exp. al., $1 \cdot 5 \mathrm{in}$.

Hab. Honduras, Ruatan I. (G. F. Guumer).
A female specimen captured by Dr. Gaumer on Ruatan I. differs from all others in our collection in having a very restricted amount of blue at the base of the wings, the black outer portion very largely predominating. The underside of the wings is of a uniform cinnamon colour, with a fuw spots near the margin of the anal angle.

It is allied to T. virgilius, but is much darker both above and below, and has more rounded wings.

## 246 Mr . F. Du Cane Godman and Mr. Osbert Salvin's

## Theope matuta, sp. n.

Alis nigris, anticis ad basin (costa nigra excepta) nitide cæruleis venis divisis; posticis area interna usque ad basin nitide crerulea, costa late, margine externo angustiore, nigris: subtus fuscis costa ad basin rufa, maculis elongatis discalibus albidis transfasciatis, fascia maculosa submarginali ejusdem coloris ; posticis maculis sagittiformibus submarginalibus, aliisque elongatis discalibus indistincte notatis, fronte inter oculos nigra utrinque albido marginata, corpore fusco, palpis nigris antice albis, abdomine linea mediana alba. Exp. al., $1 \cdot 8 \mathrm{in}$.

Hab. Costa Rica, Santa Clara Valley (F. A. Zürchei').
This Theope is allied to T. thebais of the Amazon Valley, but the blue on the upper side of the wings is much brighter. Beneath the wings are darker and the pale markings more definite, and the rufous base of the costa of the primaries is more extended.

We have only seen a single female specimen of this distinct species, which was contained in a collection made in the Santa Clara Valley, Costa Rica, at an altitnde of 1,200 feet above the sea, by Mr. F. A. Zürcher.

## Theope diores, sp. n.

Alis fusco-nigris; anticis ad basin cæruleis costa omnino fusca ; posticis cæruleis, costa late, angulo apicali usque ad maculam magnam ad medium marginis externi nigro-fuscis; margine interno albido ; subtus rufescente griseis posticis punctis quibusdam nigris ad marginem externum subtrianguliformibus et introrsum pallide cæruleo limbatis, corpore supra cæruleo subtus alis concolore. Exp. al, $1 \cdot 5 \mathrm{in}$.

Hab. Mexico, Colima (Mus. Staudinger); Jalapa (H. Eduards).

We have seen two male specinens of this species, one of them lent us by Dr. Staudinger, and the other given us by the late Henry Edwards, who probably received it from Mr. Schaus in one of his earlier collections. The most nearly allied species is perhaps the common $T$. virgilius, from which it may at once be recogrized by the large dark spot which interrupts the blue hindwings near the middle of the outer margin.

Theope polimela, sp. n.
T. virgilio similis sed anticis colore cæruleo magis extenso angulum analem fere attingente, subtus vix differt. Exp. al., 1.75 in.

Hab. Colombia (Mus. Staudinger); Cauca Valley ('1. H. Wheeler).

Two male specimens of this Theope differ from all those of that sex in our collection from many localities in Central America. The greater extension of the blue of the primaries towards the anal angle seems sufficiently marked to justify the separation of this southern form.

## Theope mania, sp. n.

१. T. eleuthoni similis sed alis cærulescentioribus anticarum apice minus acuto; posticis (præter costam nigram) omnino cæruleis. angulo anali minus producto: subtus pallidioribus anticis ad basin vix rufescentibus, posticis maculis submarginalibus evanescentibus. Exp. al., $1 \cdot 9 \mathrm{in}$.

Hab. Mexico, San Blas (W. B. Richardson).
This is a species of Theope, having a dark line across the undersurface of both wings. We have as yet received only a single female which was taken by Mr. Richardson at San Blas, in Western Mexico, in May, 1889.

## Theope eleutho, sp. n.

Alis fusco-nigris; anticis ad basin viridescentj-cæruleis, costa omnino nigricante maculis tribus subapicalibus in linea obliqua viridescenti-cæruleis; posticis area interna et area discali virides-centi-cæruleis hac venis nigris intersecta, costa late nigricante, margine interno albicanti: subtus glauco-fuscescentibus linea communi ab angulo anticarum apicali ad medium marginis interni posticarum saturate fusca, anticis ad basin rufescentibus, maculis duabus in cellula albis, posticis maculis parvis septem submarginalibus nigris; altera alba ad cellulæ basin; corpore supra cæruleo subtus alis concolore. Exp. al., $2 \cdot 2$ in.

Hab. Panama, Chiriqui (Trötsch, in Mus. Staudinger).
Dr. Staudinger has sent us a single female specimen of this Theope, which differs from all others in our collection. It belongs to the section having a common line on the underside running from the apical angle of the primaries
to the middle of the inner border of the secondaries. The apical angle of the primaries is acute and salient owing to the outer maryin being slightly concave towards the point. The anal angle of the secondaries, tro, is acute.

## Papilio eracon, sp. n.

Alis saturate æneo-nigricantibus, ciliis inter venas ochraceis; anticis maculis sex submarginalibus, ad angulum apicalem evanescentibus, viridi-ochraceis; posticis paulo nitentioribus, maculis sex discalibus fere rotundis et punctis sex (horum duobns inter venam medianam et ramum ejussecundum) submarginalibus viridi-ochraceis: subtus fuscis; anticis ad basin nigricantibus, maculis tribus ad angulum aualem aliisque indistinctis cirear cellulæ finem ochraceis; posticis maculis septem transversim elongatis nigro limbatis rubidis et inter eas punctis glauco-albidis, extra eas punctis sex majoribus submarginalibus ochraceis; abdomine supra ochracea segmentis nigro marginatis, corpore toto subtus fulvo maculato. Exp. al., $5 \cdot 0$ in.

Hab. Mexico occidentalis, Colima (Mus. Staudinger).
A male of this distinct species differs from all forms of this section of Papilio found in Central America in having the spots of the secondaries in a submarginal series away from the cell and the costa, and beyond them are some small submarginal spots. Beneath the coloration of the margin of the secondaries is very marked; besides the usual black margined rufous spots there are whitish spots between them, as well as ochraceous ones next the margin.

## Papilio iopas, sp. n.

$P$. copance similis sed anticis supra omnino immaculatis posticis fascia maculosa angustiore a margine externo magis remota. Exp. al., 4.55 in .

Hab. Mexico occidentalis, Colima (Mus. Staudinger).
A single male specimen sent us by Dr. Staudinger seems sufficiently distinct from $P$. cipanæ to require a name. It is still more distinct from the Papilio from San Blas which we described and figured as $P$. procas (B.C.A. Rhop., ii., p. 203, t. 65, figs. 15 and 16), which has a few spots on the prima: ies near the anal angle, and a wider discal band to the secondaries, part of which enters the cell.

# IX. A List of the Phytophagous Coleoptera obtained by Mr. H. H. Smith at St. Vincent, Grenada, and the Grenadines, with Descriptions of New Species: Crioceridæ-Galerucidæ. By Martin Jacoby, F.E.S. 

[Read February 17th, 1897.]
This paper forms a continuation of others contributed to these Transactions by Messrs. Gahan and Champion and Professors Forel and Williston on the insects collected by Mr. H. H. Smith in the Islands of St. Vincent, Grenada, and the Grenadines, under the auspices of the West India Exploration Committee of the Royal Society and British Association. The Phytophagous Coleoptera are here dealt with, the families Crioceridæ to Galerucidæ inclusive having been worked out by myself, and the Hispidæ and Cassididæ by Mr. Champion. Of the first-mentioned families forty-six species are enumerated, twenty-one of which are described as new, several others remaining unidentified for want of sufficient material. Amongst the twenty-five known species of these groups six inhabit Central and South America, five South and Central America respectively, four are found in the Southern United States, two in North, South, and Central America, two in North and Central America, and one in the Island of Guadeloupe.

## List of the Species-Crioceride to Galerucide.

Lema dorsalis, Oliv.
:, sharpi, sp. n.
" obscura, Fabr. vittatipennis, Baly. marginata, Oliv. insularis, Jac.
Coscinoptera intermedia, sp. n.
Cryptocephalus tricostatus, Jac.
Pachybrachys scabripennis, sp.n.
Nodonota grenadensis, sp. n.
TRANS. ENT. SOC. LOND. 1897.-PART III. (SEPT.)17

## List of Species-continued.

Hermeophaga smithi, sp. n.
Haltica satellitia, Jac.
Disonycha glabrata, Fabr.
" lévigata, sp. n.
Systena s-littera, Linn. ,, bicolor, sp. n.
Pseudoepitrix suffiriani, sp. n.
Epitrix subfusca, sp. n.
" parvula, Fabr.
" fuscata, Jacq. Duval.
Glyptina nigrita, sp. n.
Aphthona maculipennis, Jac.
, grenadensis, sp. n.
Longitarsus horni, sp. n.

Chretocnema nana, sp. n.
, ? minuta, Melsh.
Homophyla unicolor, sp. n.
Homopheta cequinoctialis, Fabr.
Edionychis smithi, sp. n.
sharpi, sp. n.
Physimerus smithi, sp. n.
Hypolampsis annulicomis, sp.n.
Megistops granulatus, sp. n.
Schematiza livida, Oliv.
Diabrotica melanocephala, Oliv. bivittata, Fabr.
Cerotoma ruficornis, Oliv.

## Fam. CRIOCERIDÆ.

Lema, Fabr.
Lema dorsalis.
Crioceris dorsalis, Oliv., Encycl. Méth., vi., p. 201; Ent., vi., No. 94, p. 743, t. 2, fig. 27.
Lema dorsalis, Lacord., Mon., p. 499 ; Jacq. Duval, in Sagra's Hist. fis. polit. y nat. de Cuba, Ins., p. 119 ; Jac., Biol. Centr.-Am., Col., vi., 1, p. 12, and Suppl., p. 35 , t. 1, fig. 9.

Lema nigricornis, Fabr., Ent. Syst., Suppl., p. 91.
Hab. St. Vincent-Windward side ; Grenada-Balthazar (Windward side), Mount Gay Estate (Leeward side).

A Tropical-American species, extending as far north as the Mexican State of Vera Cruz, and also occurring in Cuba.

## Lema sharpi, sp. n.

Black, the upper part of the head and the thorax fulvous; elytra very deeply punctate-striate, fulvous, a sutural spot below the base, a spot on the shoulders, and another on the disc before the middle, as well as a large apical patch, metallic blue, the ninth row of punctures interrupted.

Var. a. Elytral markings more or less confluent.
Var. b. Elytra entirely dark blue.
Length, $1 \frac{1}{2}$ line.
Head impunctate, fulvous, the vertex with a shallow groove, the lateral sulci moderately deep, finely pubescent; lower portion of the face black, clothed with yellowish hairs; anteunæ scarcely extending to the middle of the elytra, black, the third and fourth joints equal; thorax about one-half broader than long, the sides but little constricted at the middle, the transverse sulcus moderately deep, the surface with some distinct rows of punctures at the middle and some others near the anterior angles, the latter rounded; scutellum truncate at the apex ; elytra without basal depression, very deeply and closely punctate-striate, the ninth row interrupted at the middle and the smooth space raised, as well as the following interstice, a spot on the shoulders, another near the middle, a rounded larger patch below the scutellum across the suture, and a still larger patch occupying the entire apical portion, dark blue ; underside and legs covered with silvery pubescence, the knees and the anterior tibiæ sometimes stained with fulvous.

Hab. Grenada-Balthazar (Windward side), Mount Gay Estate (Leeward side).

This is another of the small species resembling in its elytral pattern L. dorsalis (Oliv.), and several closely allied forms. It is, however, quite distinct from any of the described species of the genus on account of the much shorter antennæ and the shape of the thorax, the latter being so little constricted at the sides as to appear nearly subquadrate ; in L. dorsalis and others the thorax is very deeply constricted and shorter. In most of the specimens of $L$. sharpi the spots on the elytra are well separated, notably the two small lateral ones; but in some of them the basal and apical patches join at the suture, and are also connected with the spots on the disc, so that the pattern exactly resembles that of the other allied forms. I should have referred this species to $L$. intermedia, Suffr., from Cuba, had not the author described the thorax as deeply constricted at the middle. In the specimens of the variety $b$ the head has a small black spot on the vertex, and the elytra are entirely metallic blue; these agree, however, so entirely in structural characters -with the normal form that I cannot separate them, especially as in two of them there is a short fulvous stripe
at the base of the elytra, indicating the ground-colour of the type.

## Lema obscura.

Lema obscura, Fabr., Syst. Eleuth., i., p. 476 ; Lacord., Mon., p. 361.
Hab. St. Vincent ; Grenada-Bılthazar (Windward side).

Specimens from these localities agree entirely with others from Brazil in my collection. It is curious that Lacordaire, who gives a long description of this insect, does not mention the short pubescence which covers all the upper part of the body-a character of rare occurrence amongst the species of Lema. L. obscura is widely distributed in Tropical America, but is not known from so far north as the Isthmus of Panama.

## Lema vittatipennis.

Lema vittatipennis, Baly, Cist. Ent., ii., p. 315.
Hab. St. Vincent.
The types were from the Amazons.
Lema marginata.
Lema marginata, Oliv., Ent., vi., p. 748, t. 2, fig. 35 ; Lacord., Mon., p. 477.
Hab. Grenada-Mount Gay Estate (Leeward side). Inhabits the northern part of South America.

Lema insularis.
Lema insularis, Jac., Biol. Centr.-Am., Col., vi., 1, Suppl., p. 30, t. 35, fig. 20.

Var. Antennæ entirely black.
Hab. St. Vincent-Leeward and Windward sides.
The St. Vincent specimens agree so nearly with the type from Taboga I., Panama, that I refer them to that species: the only difference I can detect is the entirely black colour of the antennæ, the apical three joints being flavous in the type; the elytral band in the latter also
does not extend to the suture, but reaches it in the St. Vincent specimens.

## Fam. CLYTHRID $\mathbb{E}$.

Coscinoptera, Lacord.

## Coscinoptera intermedia, sp. n.

Hab. St. Vincent-Leeward side.
Dark æneous, the tibiæ more or less fulvous, the upper and under surfaces clothed with long, white pubescence; thorax closely punctured at the sides; elytra not more strongly punctured than the thorax.

Length, 2 lines.
Subcylindrical, scarcely narrowed posteriorly ; head very broad, æneous, not closely, but distinctly punctured, and covered with long, white pubescence ; labrum black, its anterior margin sometimes fulvous; antennæ very short, black, the second and third joints (and sometimes the fourth also) fulvous, the fourth and following joints strongly transverse ; thorax nearly twice as broad as long, the sides almost straight, the posterior angles obtuse, but not rounded, the surface very closely and finely punctured at the sides, more remotely at the middle, with a more or less distinct central smooth line, the sides closely covered with long white pubescence, the middle nearly glabrous; scutellum covered with white hairs ; elytra similarly punctured to the disc of the thorax and also pubescent, the hairs more numerous at the sides than on the disc; the underside and legs densely clothed with white pubescence, the femora more or less blackish, the tibiæ fulvous, the tarsi dark.

I cannot identify this species with any of the described members of the genus. There is only one specimen before me in which the legs and the antennæ are obscure dark fulvous; in all the others they are blackish, the tibiæ excepted. The general colour is distinctly bronze, in which the species differs from C. dominicana (Fabr.), the latter being also larger and differently sculptured. The pubescence in the present species is comparatively long: this and the differently sculptured upper surface separate C. intermediq from any of the species described by Lacordaire. The labrum in all the specimens is black.

Fam. CRYPTOCEPHALIDÆ.

## Cryptocephalus, Geoffr.

## Cryptocephalus tricostatus.

Cryptocephalus tricostatus, Jac., Biol. Centr.-Am., Col., vi., 1, Suppl., p. 16.

Hab. St. Vincent-South end, Leeward and Windward sides, and Kingstown, up to 3,000 feet ; Grenada-Mount Gay Estate and St. George's (Leeward side) ; Grenadines -Mustique I., Becquia I.

I cannot separate the numerous specimens from the above-mentioned localities from those described by me from Chiriqui under the above name, but the size and coloration of the insect is extremely variable. In wellmarked specimens the thorax is piceous with a slight metallic gloss, the margins and two oblique spots at the base. being flavous; the elytra are of the latter colour, with the suture broadly, and a more or less distinct transverse band near the apex, greenish-piceous, the punctures being of the same colour. Between these and nearly unicolorous flavous specimens there are numerous intermediate forms. The principal characters of distinction are:-The interruption below the shoulders of the fifth and sixth rows of punctures on the elytra by a transverse raised space ("Querfeld" of Suffrian), and the broad, convex interspaces at the sides (from which I named the insect tricostatus), as well as the smooth and raised apical portion. The species varies from $\frac{3}{4}$ to 1 line in length. It belongs, no doubt, to the group in which Suffrian placed his C. stercorator, from the W. Indies, to which it seems very closely allied; but neither the colour nor the description of the elytral sculpture agrees with the specimens before me. C. signatellus, Suffr., is also another allied form.

Pachybrachys, Suffr.
Pachybrachys scabripennis, sp. n.
Flavous, closely covered with brown punctures; the thorax with some more or less distinct dark bands ; elytra closely punctured in irregular rows, with raised interstices, with a small; smooth, raised, pale spot near the suture; femora with a brown spot.

Length, 2 lines.

Head closely and finely rugose-punctate, flavous, with a darker central line ; the eyes large and rather closely approximate in the male, the dividing space being narrower than their diameter ; antennæ long and slender, extending nearly to the middle of the elytra, pale flavous, the apex of the outer joints darker, the third joint nearly three times longer than the second, the terminal joints very slightly widened at the apex ; thorax twice as broad as long, the sides strongly deflexed, the lateral margins nearly straight, the surface closely covered with brown punctures, which are a little less crowded at the sides than at the middle, the interspaces forming small, flavous, raised, smonth spaces, the margins very narrowly flavous and raised, the middle with a broad and the sides with a narrow brownish band, these being sometimes entirely obsolete ; scutellum raised, its apex truncate, piceous; elytra somewhat similarly sculptured to the thorax, the punctures near the anterior part of the suture confused and closely placed, forming irregular rows at the sides, where they are less crowded, but extending quite to the apex, the interstices raised into narrow, very irregularly placed longitudinal smooth spaces, the shoulders and some small irregular spots on the dise dark brown, the dise usually with a small raised smooth flavous spot near the suture, about the middle; pygidium flavous, finely pubescent; the breast more or less darkened; abdomen and legs flavous, the femora with a rather large, the tibiæ with a smaller piceous spot.

Hab. St. Vincent; Grenada-Mount Gay Estate (Leeward side), Caliveny and Lake Antoine Estates (Windward side) ; Grenadines-Union I., Becquia I.

This Pachybrachys is very closely allied to $P$. conglomeratus, Suffr., P: costipennis, Suffr., and P. pumicatus, Suffr. (from Cuba), and P.punctatissimus, Jac. (from Mexico), but seems to differ in several, respects from all these species. The following are the principal points of distinction :-P. pumicatus is smaller, differently marked, and has smooth apices of the elytra, according to Suffrian ; P. costipennis has the disc of the thorax impunctate, the eyes of the male nearly contiguous, and the elytra differently sculptured; $P$. conglomeratus is larger, and has very regularly punctured elytral striæ, with a yellow transverse band, etc. ; lastly, P. punctatissimus has shorter and entirely black antennæ, with greatly widened terminal joints, and a more closely punctured thorax. The prosternum in the present species is rather long,
slightly narrowed between the coxæ, and distinctly punctured.

Fam. EUMOLPID E.

## Nodonota, Lefèvre.

Nodonota grenadensis, sp. n.
Piceous below, above metallic green or cupreous, the antennæ and legs flavous; thorax transverse, evenly and moderately closely punctured ; elytra with single rows of strong punctures, the latter widely placed.

Length, $\frac{3}{4}-1$ line.
Of oblong shape ; the head remotely and rather finely punctured, the vertex with a longitudinal groove ; clypeus distinctly separated at the sides by oblique grooves, nearly smooth ; labrum and palpi fulvous; antennæ extending beyond the middle of the elytra in the male, flavous, the terminal joints stained with fuscous at the apex and scarcely thicker than the basal joints, all of equal length, with the exception of the second ; thorax strongly transverse, the sides much rounded, the base scarcely produced at the middle and narrowly margined, the anterior portion somewhat strongly deflexed, the disc rather strongly but not closely punctured, the punctures of equal size and slightly oblong in shape ; scutellum not broader than long; elytra not wider in front than the thorax, with a very feeble depression below the base, the punctuation much stronger than that of the thorax and arranged in rather distantly placed rows, which show a tendency to run in pairs anteriorly, the humeral callus smooth and prominent ; underside entirely impunctate, piceous, the apex of the abdomen generally obscure fulvous; legs flavous.

Hab. St. Vincent ; Grenada-Mount Gay Estate, Mt. Maitland, and St. George's (Leeward side), Balthazar (Windward side).

In distinguishing this species from its many very closely allied congeners the following characters must be taken into account:-The piceous colour of the underside, the flavous antennæ and legs, and the strong and rather remote punctuation of the elytra. The sexes do not differ much; but in the female the antennæ are shorter, the thorax is less transverse, and the anterior tarsi are not widened.

Colaspis, Fabr.
Colaspis lebasi.
Colaspis lebasi, Lefèvre, Mittheil. Münch. ent. Ver., 1878, p. 121 ; Jac., Biol. Centr.-Am., Col., vi., 1, p. 139, and Suppl., p. 221.

Hab. Grenada-Balthazar, and Mirabeau and Chantilly Estates (Windward side), Windsor.

On the mainland this species ranges from Mexico to Colombia.

## Colaspis fastidiosa.

Colaspis fastidiosa, Lefèvre, Bull. Soc. Ent. Fr., 1885), p. cxci. ; Jac., Biol. Centr.-Am., Col., vi., 1, Suppl., p. 221.

Hab. St. Vincent-South end; Grenada-Mount Gay Estate and St. George's (Leeward side), Granville, Balthazar, Caliveny Estate (Windward side) ; Grenadines -Union I., Mustique I., Becquia I.

Inhabits Venezuela and Colombia, extending on to the Isthmus of Panama.

## Colaspis femoralis.

Colaspis femoralis, Lefèvre, Mittheil. Münch. ent. Ver., 1878, p. 122 ; Jac., Biol. Centr.-Am., Col., vi., 1, Suppl., p. 225.
$H a b$. St. Vincent-Kingstown, and Leeward and Windward sides.

Inhabits Colombia, including the State of Panama.

## Rhabdopterus, Lefèvre. <br> Rlabdopterus picipes.

Colaspis picipes, Oliv., Ent., vi., p. 886, t. 2, fig. 15.
Hab. St. Vincent-Summit of Soufrière ; GrenadaBalthazar (Windward side).

Inhabits the Southern United States.

## Myochrous, Erichs.

Myochrous denticollis.
Colaspis denticollis, Say, Journ. Acad. Phil., iii., p. 448 (1824) ; Complete Writings, ii., p. 215.

Hab. Grenada-Balthazar (Windward side), Mount Gay Estate (Windward side).

Inhabits the United States of North America.

Typophorus, Erichs. Typophorus viridicyaneus.
Paria viridicyanea, Crotch, Proc. Acad. Phil., 1873, p. 40.

Typophorus viridicyaneus, Jac., Biol. Centr.-Am., Col., vi., 1, p. 179, t. 7, fig. 21.

Typophorus sturmi, Lefèvre, Am. Soc. Ent. Fr., 1877, p. 317.

Hab. St. Vincent-Kingstown and Windward side; Grenada-Mount Gay, Vendôme, and Woodford Estates (Leeward side), Balthazar, Mirabeau and Lake Antoine Estates (Windward side) ; Grenadines-Becquia I.

Inhabits the United States of North America, extending southwards to Costa Rica.

## Fam. CHRYSOMELID风.

## Phedon, Latr.

 Phædon nigripes, $\mathrm{sp} . \mathrm{n}$.Black, the basal joints of the antennæ, the head, and the sides of the thorax rufous, the latter minutely punctured; elytra metallic dark blue, distinctly punctate-striate, the interstices impunctate.

Length, $1 \frac{3}{4}$ line.
Head with a few fine punctures, the clypeus separated by shallow oblique grooves from the face; palpi piceous; antennæ extending to the base of the elytra, black, the basal two joints more or less fulvous, the terminal five joints transverse, forming a club; thorax more than twice as broad as long, narrowed
in front, the sides nearly straight, the surface very finely and somewhat closely punctured, rufous, with a narrow bluishblack median band extending from the apex to the base ; scutellum black; elytra with ten rows of distinct punctures, the sutural one short, the submarginal row consisting of some finer and more irregularly-placed punctures, the interstices minutely granulate ; the underside and the legs black, the knees, tarsi, and the last two abdominal segments more or less fulvous; the sides of the breast strongly punctured, the rest of the under surface nearly impunctate ; penis short and broad, strongly curved, the apex broadly rounded.

Hab. Grenada-Mount Gay Estate (Leeward side), Balthazar (Windward side).

This species is very similarly coloured to many South American forms, but differs from all of them in the black underside and legs; in some specimens, however, the tibie are obscurely stained with fulvous below, but to a small extent. In nearly all the South- and CentralAmerican species of the genus the colour of the underside and legs is fulvous.

Fam. GALERUCID风.

> Subfam. HALTICIN $x$.
> Lactica, Erichs.
> Lactica tibialis.

Altica tibialis, Oliv., Ent., vi., p. 697, t. 3, fig. 52.
Monomacra religata, Jacq. Duval, in Sagr's Hist. fis. polit. y nat. de Cuba, Ins., p. 129.

Hab. St. Vincent; Grenada-Balthazar (Windward side).

Inhabits the Southern United States and Cuba.

## Lactica lævicollis, sp. n.

Fulvous, the antennæ (the basal joint excepted), the tibix, tarsi, and abdomen black; thorax without transverse sulcus, but with perpendicular grooves, impunctate ; elytra metallic violaceousblue, distinctly punctured.

Length, $1 \frac{3}{4}$ line.

Oblong, parallel ; the head impunctate, fulvous, the frontal tubercles small, oblique, the carina rather broad and short; palpi robust, piceous; antennæ not extending to the middle of the elytra, black, the basal joint fulvous, the third joint slightly longer than the fourth, this and the following joints rather robust, the terminal one elongate, slender ; thorax twice as broad as long, the sides nearly straight, the anterior angles oblique, thickeued, the posterior margin straight, the surface rather strongly convex, entirely impunctate, fulvous, the basal margin with a short but deep perpendicular groove on each side; scutellum fulvous; elytra not depressed below the base, metallic blue, erenly, finely, and regularly punctured in semi-regular distant rows, the punctures scarcely finer at the apex ; abdomen and legs black, the four anterior femora fulvous.

Hab. St. Vincent-LLeeward side.
One specimen. A nearly typical Lactica, but differing from almost all the species of the genus in the complete absence of a thoracic transverse sulcus; this latter in itself often shows modification, but scarcely ever entirely disappears, as in the present case. The species cannot be generically separated from Lactica.

Hermeophaga, Foudr.

## Hermæophaga smithi, sp. n.

Black, above metallic dark blue, the basal joints of the antennæ, tie four anterior legs, and the posterior tibiæ and tarsi flavous; thorax with a deep transverse sulcus, impunctate; elytra distinctly punctured in closely approached semi-regular rows.

Length, $1-1 \frac{1}{4}$ line.
Subcylindrical ; the head impunctate on the vertex, the frontal tubercles linear, the carina very acute, the clypeus longitudinally depressed on each side ; antennæ scarcely extending to the middle of the elytra, black, the lower four joints, and sometimes the fifth also, flavous; thorax about one-balf broader than long, the sides straight at the base, rather strongly rounded and also obsoletely angulate before the middle, the surface convex, entirely impunctate, and shining, the posterior margin broadly produced at the middle, the base with a very deep, slightly sinuate, transverse sulcus, which extends to the sides but is not bounded by a lateral groove; elytra with a slight depression below the base, strongly punctured in closely approached, semi-regular rows; underside black; the four

Coleoptera of St. Vincent, Grenada, and Grenadines. 261
anterior legs flavous, the posterior femora more or less bluish or black, the anterior femora sometimes stained with piceous, the first joint of the tarsi as long as the following two joints together ; penis slender, not thickened, the apical cavity short.

Hab. St. Vincent (Leeward side) ; Grenada-Caliveny Estate and Balthazar (Windward side), St. George's, Mt. Maitland, and Mount Gay Estate (Leeward side).

I am unable to indentify this species with $H$. cylindrica, Weise, from Puerto Rico, although it seems closely allied, the coloration being nearly similar. Weise describes his species as metallic green: in the present insect the underside is black; there is also no trace either of an oblique depression or punctuation on the thorax, and the head seems differently sculptured; the elytra, too, have a slight but distinct depression below the base, of which Weise says nothing. The antennæ in $H$. smithi have the second joint thickened, scarcely shorter than the third, and the terminal joints gradually becoming more elongate and slightly widened, but not suddenly thickened as in $H$. cylindrica. Found in abundance in Grenada.

Haltica, Geoffr.
Haltica satellitia.
Haltica satellitia, Jac., Biol. Centr.-Am., Col., vi., 1, Suppl., p. 267.
Hab. St. Vincent; Grenada-Balthazar and Mirabeau Estate (Windward side), Mt. Maitland (Leeward side), and South end.

Originally described from Mexico and Guatemala.

## Disonycha, Chevr.

## Disonycha glabrata.

Crioceris glabrata, Fabr., Spec. Ins. i., p. 156 (1781). Disonycha glabrata, Jac., Biol. Centr.-Am., Col., vi., 1, p. 311.
?Crioceris tomentosa, Fabr., Syst. Ent., p. 122.
Hab. Grenada-Mount Gay Estate (Leeward side).
A widely distributed American species, ranging from the United States to Peru, and also found in Jamaica.

## Disonycha. lævigata, sp. n.

Fulvous, the antennæ (the basal three joints excepted), the apex of the tibiæ, and the tarsi fuscous; head and thorax impunctate, the latter obscurely marked with piceous; elytra bright metallic green, microscopically punctured.

Length, 3 lines.
Head impunctate, with the exception of some deep punctures near the eyes; frontal tubercles scarcely indicated, broad and flat ; clypeus rather strongly raised and broad; labrum black; antennæ not extending much beyoud the base of the elytra, robust, black, the lower three joints fulvous beneath, the third joint one-half longer than the second and slightly sborter than the fourth, the following joints of nearly equal length and subquadrate in shape ; thorax twice as broad as long, the sides nearly straight, narrowed towards the apex, the anterior angles obliquely thickened, the posterior ones strongly oblique, the surface impunctate, with an obscure blackish transverse band towards the apex; scutellum broad, black ; elytra bright metallic green, with a narrow reflexed margin, the surface extremely finely"punctured (when seen under a very strong lens); underside and the femora fulvous.

Hab. Grenada-Lake Antoine and Telescope Estates (Windward side).

From those of its congeners with unicolorous metallic elytra, the present species may be distinguished by the fulvous head, thorax, underside, and femora, in which respect it differs from D. mellicollis (Say) and D. collata (Fabr.). The insect seems, however, more nearly allied (as far as coloration is concerned) to the Central-American D. mexicana, Jac.; but may be separated from it by the black labrum, the bright metallic green elytra, the differently sculptured head, and rather large size. Two specimens.

## Systena, Clark.

## Systena s-littera.

Crioceris s-littera, Linn., Syst. Nat., 10th edit., p. 373. Systena s-littera, Jac., Biol. Centr.-Am., Col., vi., 1, p. 331.

Systena sinuato-vittata, Clark, Journ. Ent., ii., p. 403.

Hab. St. Vincent-Windward and Leeward sides, Kingstown; Grenada-Balthazar and Mirabeau Estate (Windward side).

A widely distributed Tropical-American insect ranging from the Mexican State of Vera Cruz to Brazil. This species is subject, like many of its congeners, to great variation, almost entirely testaceous examples occurring, or with only a trace of darker bands on the elytra. In well-marked specimens the elytra are greenish-black, each with a curved testaceous stripe on the dise ending in a knob-like projection.

## Systena bicolor, sp. n.

Flavous or fulvous, the apical joints of the antennr fuscous; thorax with a narrow dark lateral stripe, impunctate ; elytra finely punctate-striate, dark æneous or blackish-green, with a larger or smaller flavous lateral spot.

Var. a. Elytra flavous, a triangular spot surrounding the scutellum, and the apex, greenish-black.

Var. b. Elytra entirely dark-coloured.
Length, $1-1 \frac{1}{4}$ line.
Head impunctate, flavous, the extreme base sometimes piceous; frontal tubercles small, transverse; palpi slender; antennæ extending beyond the middle of the elytra in the male, shorter in the female, the first joint thick and straight, the secoud one-half shorter, the third and fourth joints equal, the others slightly more elongate, all the joints furnished with rather long hairs, the lower four or five flavous, the remainder nearly black; thorax rather convex, about one-half broader than long, the lateral margins rounded in front, constricted at the base, the surface impunctate, flavous or fulvous, the sides with a very narrow piceous stripe (sometimes obsolete); elytra with a depression below the base, finely and rather closely punctate-striate, the greenish-black portion of variable size-in some specimens occupying the entire disc, leaving only a flavous spot at the sides, in others the latter colour prevails-the base with a triangular blackish spot surrounding the scutellum, the apex entirely of that colour ; the underside and legs flavous, the abdomen sometimes stained with piceous; posterior femora but moderately thickened, the metatarsus of the posterior legs as long as the following three joints united ; prosternum very narrow ; anterior coxal cavities closed.

Hab. St. Vincent-Kingstown, Leeward side ; Grenada —Balthazar (Windward side), Mount Gay Estate (Leeward side).

This Systena differs from most of its allies in the coloration of the elytra and their regular punctuation; the thorax also has no indication of a transverse groove; and the posterior femora are not strongly thickened. In many specimens the dark basal and apical portions of the elytra are connected by a similarly-coloured narrow sutural stripe, leaving an elongate flavous spot or band at the sides.

## Pseudoepitrix, Jac. $P_{\text {seudoepitrix suffriani, sp. n. }}$

Elongate, flavous ; antennæ long, joints $5-7$ black; thorax subquadrate, with a deep transverse sulcus, impunctate ; elytra with a sub-basal depression, strongly punctate-striate.

Length, $\frac{3}{4}$ line.
Head perpendicular, impunstate; the frontal tubercles strongly raised, subquadrate, nearly contiguous; lower portion of the face concave, formed of a single piece; antenna extending nearly to the apex of the elytra, flavous, the basal joint long, strongly thickened at the tip, the second short, thick, the third slightly shorter than the fourth, the fifth, sixth, and seventh joints black, these and the following joints slender, elongate, not thickened ; thorax one-half broader than long, narrowed at the base, the sides rounded anteriorly, the disc transversely convex, with a deep, sinuate, transverse sulcus near the base, extending nearly to the sides and punctured within, the basal margin slightly produced at the middle ; elytra much wider at the base than the thorax, with a distinct transverse depression, the basal portion rather raised, the shoulders prominent, closely and strongly punctate-striate, the punctures extending to the base and distinct nearly to the apex ; posterior tibie with a small spur; posterior metatarsus as long as the following two joints together; prosternum narrow, impunctate ; anterior coxal cavities closed.

Hab. St. Vincent.
This insect differs from the two species from Panama included by me under the generic name Pseudoepitrix (Biol. Centr.-Am., Col., vi., 1, p. 341) in having the first joint of the antennæ more elongate and the thoracic
groove deeper. Pseudoepitrix has most of the characters of Crepidodera, but differs from it in the thoracic sulcus not being limited laterally by a perpendicular groove, the thorax itself being nearly quadrate ; it closely resembles the Eastern genus Manobia, Jac., but may be at once distinguished by the closed, not open anterior coxal cavities.

Epitrix, Foudr. Epitrix subfusca, sp. n.

Broadly ovate, very convex, dark chestnut-brown, pubescent; antennæ and legs fulvous ; thorax finely and remotely punctured, with deep ante-basal groove ; elytra with round, strong, and closely-placed punctures, the interstices smooth, pubescent.

Length, $\frac{1}{2}$ line.
Of dark-brown colour, shining ; the head entirely impunctate, with the usua! oblique grooves at the sides; clypeus broad, impunctate; antennæ in the male long and slender, flavous or pale fulvous, the second joint thick and short, the third smaller than the fourth, the following joints gradually thickened; thorax onehalf broader than long, the sides nearly straight, forming a distinct oblique angle anteriorly, the surface convex, very finely and remotely punctured towards the apex, the punctures becoming larger near the base, the sulcus deep and but little sinuate, placed close to the basal margin, with a row of deep punctures within, the base itself not much produced in front of the scutellum aud rounded or slightly truncate ; elytra broader than the thorax and very convex, with a feeble depression below the base, the punctures rather strong and round, closely placed, scarcely smaller at the apex, the interstices impunctate and sparingly pubescent, the pubescence consisting of scattered, short, stiff, light-coloured hairs; legs fulvous ; prosternum rather strongly punctured.

Hab. Grenada-Mount Gay Estate (Leeward side), Balthazar and Chantilly (Windward side).

This small Epitrix, of which about a dozen specimens are before me, may be at once known from its many closely allied congeners by the dark chestnut-brown colour of the upper surface and the non-costate elytral interstices. There are but few species known of the same coloration, most of them being black, which is also the case with E. fuscata (Jacq. Duv.), from Cuba. From the brownish species described by me from Central trans. ent. soc. lond. 1897.-part iif. (sept.) 18

America the present insect may be separated by the very finely punctured thorax and other particulars.

## Epitrix parvula.

Crioceris parvula, Fabr., Syst. Eleuth., i., p. 468.
Epitrix parvula, Jac., Biol. Centr.-Am., Col., vi., 1, p. 355, and Suppl., p. 289.

Crepidodera hirtipennis, Melsh., Proc. Acad. Phil., iii., p. 165.

Hab. St. Vincent-Leeward side ; Grenada-Mount Gay Estate (Leeward side), Balthazar (Windward side).

Numerous examples. Extends over the whole of the United States, and through Central-America to Panama, and also inhabits Cuba.

## Epitria fuscata.

C'repidodera fuscata, Jacq. Duval, in Sagra's Hist. fis. polit. y nat. de Cuba, Ins., p. 130.
Epitrix fuscata, Jac., Biol. Centr.-Am., Col., vi., 1, p. 348.

ILab. Greuada-Mount Gay Estate (Leeward side).
Described originally from Cuba, and recorded by me somewhat doubtfully from Guatemala.

## Glyptina, Lec.

Glyptina (Batophila) nigrita, sp. n.
Apterous, black, the basal joints of the antennæ and the legs dark fulvous; thorax very minutely punctate; elytra finely punctate-striate ; posterior femora piceous.

Length, $\frac{1}{2}$ line.
Head impunctate, the frontal tubercles extremely small, limited at the sides by narrow oblique grooves; clypeus rather thick and broad, deflexed in front ; antennæ scarcely extending to the middle of the elytra, fulvous, the four or five terminal joints fuscons and gradually thickened, the second joint small but much thickened, the following four joints thinner but not longer than the second; thorax nearly twiee as broad as long, the sides straight, the anterior
angles oblique, the disc rather convex, very minutely and rather distantly punctured, the punctures evenly distributed, the base not margined; elytra strongly convex, pointed at the apex, black, without metallic gloss, very regularly, finely, and distinctly punc-tate-striate to the apex, the two outer interstices slightly costate; legs dark fulvous; posterior tibie straight, with a spur at the apex ; posterior metatarsus as long as the following joints together; claws simple; prosternum longer than broad, nearly smooth ; anterior coxal cavities open.

Hab. Grenada-Mount Gay Estate (Leeward side), Balthazar (Windward side).

Like its European congeners, this little species is apterous. The entirely black upper surface will separate it from any of the North-American forms. According to Dr. Horn, the genu's Glyptina, Lec. (1859) = Batophila, Foudr. (1860), and therefore has priority.

Aphthona, Chevr.
Aphthona maculipennis.
Aphthona maculipennis, Jac., Biol. Centr.-Am., Col., vi., 1, p. 365, and Suppl., p. 293.
Hab. St. Vincent-South end, and Windward and Leeward sides; Grenada-Balthazar (Windward side), St. George's, Vendôme and Mount Gay Estates (Leeward side).

Found in plenty in Grenada.
Inhabits Central America, from Mexico to Panama.

## Aphthona grenadensis, sp. n.

Testaceous, the apical joints of the antennæ black; thorax extremely minutely punctured; elytra finely punctate-striate, shining, the suture very narrowly fuscous.

Length, 1 line.
Head entirely impunctate ; the frontal tubercles indistinct, bounded at the sides by oblique grooves; clypeus not separated from the face; antennæ not extending much beyond the base of the elytra, blackish, the lower joints more or less flavous, the second joint scarcely shorter than the following ones, the terminal joints
slightly and gradually thickened, the apical one more elongate thar those preceding ; thorax transversely subquadrate, the sides perfectly straight, the anterior angles oblique, forming a slight tooth posteriorly, the surface microscopically punctured; elytra wider at the base than the thorax, with rows of fine, regularly placed punctures, which become indistinct towards the apex; underside and legs testaceous, the posterior femora slightly darker ; posterior tibiæ straight; the first joint of the posterior tarsi as long as the following joints together ; prosternum narrow, constricted between the coxæ.

Hab. St. Vincent (Leeward side) ; Grenada-Mount Gay Estate (Leeward side), Balthazar and Lake Antoine Estate (Windward side).

This Aphthona seems to be closely allied to $A$. fulvipennis, Jac., from Guatemala; but differs from it in the nearly obsolete frontal tubercles and the indistinctly punctured apex of the elytra. The punctate-striate elytra will help to distinguish the species from most of its allies.

## Longitarsus, Latr.

## Longitarsus horni, sp. n.

Apterous, strongly convex, fulvous, the intermediate joints of the antennæ black; thorax subquadrate, impunctate; elytra extremely minutely and closely punctured.

Length, $\frac{1}{4}$ line.
Head impunctate, the clypeus triangularly raised; antennæ extending to the middle of the elytra, the basal four and the apical three joints flavous, the others black, joints $2-4$ short, equal, the terminal joints slightly thickened; thorax scarcely broader than long, couvex, and subcylindrical, the disc impunctate and shining, the lateral margins straight, the anterior angles thickened, very slightly oblique; elytra strongly convex and ovate, pointed at the apex, dark fulvous, closely and scarcely perceptibly punctured; underside and legs pale fulvous or flavous, the metatarsus of the posterior legs one-third the length of the tibiæ.

Hab. St. Vincent-Leeward side; Grenada-St. John's River and Mount Gay Estate (Leeward side), Balthazar (Windward side).

A very small species, resembling in its ovate shape $L$. oopterus, Har., from Colombia, L. ovipennis, Jac., from

Mexico, and others. L. varicomis, Suffr., from Cuba, has a punctured thorax, with rounded sides, and prominent shoulders to the elytra; L. subcinctus, Har., from Colombia and Central America, is much larger, and has long antennæ (no mention is made in the description of the absence or presence of wings) ; L. intermedius, Jac., from Chiriqui, has differently coloured antennæ.

## Сhetocnema, Steph.

## Chætocnema nana, sp. n.

Below black, above obssure greenish-æneous, the basal joints of the antennæ and the tibix and tarsi flavous; thorax nearly impunctate, without oblique augles; elytra strongly punctate-striate, the interstices impunctate.

Leugth, $\frac{1}{4}$ line.
Head impunctate, opaque, greenish-wneous, sometimes with oue or two punctures above the eyes; antenne piceous, the lower three or four joints flavous, the second joint slightly smaller than the third and following joints, the last joint elongate, pointed; thorax nearly twice as broad as long, the sides feebly rounded, without distinct oblique anterior angles, the basal margin with a scarcely visible impressed line and without punctures, the surface minutely granulate and microscopically punctured; elytra nearly black, with the sutural and other strix regular, the interstices impunctate ; legs dark fulvous, the posterior femora piceous.

Hab. Grenada-Balthazar (Windward side), Mount Gay Estate (Leeward side).

This is one of the smallest species of the genus known to me. I cannot identify it with any of those described from North or Central America. It seems most nearly allied to C. obesula, Lec., and C. ectypa, Horn, on account of its small size and nearly impunctate thorax; but both these are described as having punctured elytral interstices. C. nana belongs to the division in which the thorax is not distinctly angulate anteriorly and shows no trace of a row of punctures along the basal margin.

## Chrtocnema minuta?

Chætocnema minuta, Melsh., Proc. Acad. Phil., iii., p. 167 ; Horn, Trans. Am. Ent. Soc., xvi., p. 262.

Hab. St. Vincent; Greuada-Mount Gay Estate (Leeward side).
The specimens which I provisionally refer to C. minuta, Melsh., are about $\frac{1}{2}$ to $\frac{2}{3}$ of a line in length, of the usual dark bronze coloration. They have the head impunctate and minutely granulate; the antennæ with the lower four or five joints fulvous, the rest black, the terminal joints distinctly thickened and the apical one more elongate than those preceding; the thorax transverse, slightly wider at the middle, the sides very feebly rounded, the anterior angles scarcely obliquely truncate, the surface minutely and not closely punctured, with the interspaces finely granulate, the base with a row of distinct punctures at the sides ; the elytra with closely placed distinct punctures, the striæ rather widely separated, the interstices impunctate, and, as usual, convex at the sides and apex ; the underside and the femora piceous, the tibiæ and tarsi fulvous.
C. minuta is widely distributed in the Southern States of North America.

## Homophyla; Har.

## Homophyla unicolor, sp. n.

Darker or lighter brown, the hasal and apical joints of the antennæ pale, the others black; thorax microscopically, the elytra as finely but more remotely, punctured.

Length, 1-1 $\frac{1}{4}$ line.
Head impunctate, the eyes very large, the clypeus broad and impunctate ; antennæ extending to the middle of the elytra, black, the three basal and the three apical joints flavous; thorax about two and a-half times broader than long, the sides straight, narrowed towards the apex, tho anterior angles thickened, the surface extremely minutely and closely punctured (when seen under a strong lens); scutellum broadly trigonate ; elytra with the shoulders slightly prominent, nearly impunctate (when examined under a strong lens minute, distantly placed punctures are visible) ; posterior tibiæ broadly channelled, emarginate near the apex, the latter with a strong spur; the first joint of the posterior tarsi longer than the following joints together ; abdomen paler than the breast and legs.

Hab. St. Vincent-Leeward side ; Grenada-St. George's (Leeward side), Granville (Windward side).

This insect cannot be identified with Homophyla krugi,

Weise, from Puerto Rico, which differs, according to the description, in having the thorax distantly punctured and the elytra more strongly punctulate, neither of which is the case here. The other described representatives of the genus differ either in the colour of the antenne or elytra, or in the more strongly sculptured upper surface.

## Номорнета, Erichs.

## Homophæeta æquinoctialis.

Galleruca æquinoctialis, Fabr., Syst. Eleuth., i., p. 493. Homoplıeta rquinoctialis, Jac., Biol. Centr.-Am., Col., vi., 1, p. 406 * ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 478.
Hab. St. Vincent; Grenada-Balthazar, Lake Antoine and Chantilly Estates (Windward side), Mount Gay Estate (Leeward side).

A common insect in Tropical America, extending northwa:ds to Texas. It has been recorded from Guadeloupe.

Eidionychis, Latr. Edionychis smithi, sp. n.
Piceous, the antenne black; thorax flavous, nearly impunctate ; elytra very closely punctured, obscure dark violaceous or bluish, the lateral margins, a transverse spot at the middle, and another near the apex, flavous.

Var. The anterior flavous spots on the elytra confluent at the suture, and the posterior spots nearly reaching it.

Length, $2 \frac{1}{2}$ lines.
Head more or less dark metallic blue, the space between the eyes and the clypeus obscure fulvous, the former with some strong punctures, the frontal tubercles and carina distinct ; antennæ not extending to the middle of the elytra, black, the lower three joints slightly stained with fulvous at the apex, all the joints, with the exception of the second, of nearly equal length; thorax more than twice as broad as long, flavous, the sides evenly but not strongly rounded, the anterior angles thickened, scarcely produced, the surface with a few very fine punctures, the lateral margins narrowly
flattened, the dise with some slight depressions at the sides; scutellum triangular, black ; elytra very closely, evenly, and distinctly punctured, obscure metallic bluish-black or violaceous, with a short trunsverse flavous band or spot at the middle and another near the apex, these markings sometimes connected at the suture and forming fasciæ, the extreme lateral margins also flavous, as well as the epipleuræ; underside and legs piceous, the base of the tibiæ and the extreme apex of the femora sometimes paler.

Hab. Grenada-Mount Gay Estate (Leeward side), Caliveny Estate (Windward side).

This Fdionychis may, perhaps, best be compared with O. chapuisi, Jac., from the Amazons, in which the elytra are very similarly coloured; but in that species they are nearly smuoth and impunctate, and of a bright metallic blue or green. The present species is, however, like most of its kind, subject to variation : in one specimen the central spot assumes the shape of a narrow transverse band, which extends to the suture; while in another the posterior portion of the elytra may be described as flavous, with the suture, a narrow stripe across it, a spot at the sides, and the apex, blackish-blue.

## Wdionychis sharpi, sp. n.

Black ; thorax flavous, impunctate ; elytra very closely and distinctly punctured, flavous, with a broad sutural and a sublateral stripe, extending from the base to near the apex, metallic dark blue.

Length, 2-2年 lines.
Head rugosely punctured, black, the vertex with two obscure fulvous spots, the clypeus flavous or fulvous; antennæ scarcely extending to the middle of the elytra, black, the basal joint flavous beneath, the third and fourth joints equal; thorax more than twice as broad as long, the sides slightly converging in front, but little rounded, the anterior angles acute, but scarcely produced, the disc impunctate, flavous, the lateral margins narrowly flattened; scutellum black ; elytra gradually widened towards the middle, closely and rather strongly punctured, flavous, the suture with a broad dark blue stripe, extending to the apex and slightly constricted below the middle, the sides with a narrower similarly coloured stripe, not touching the margin nor extending to the apex, the epipleure flavous, more or less obscure piceous along their inner margin ; underside and legs black, the abdominal segments more or less edged with flavous.

Hab. St. Vincent-Windward and Leeward sides.
This is one of the striped species, of which a great many have been described by von Harold in the " Berliner entomologische Zeitschrift" for 1881, with none of which it entirely agrees. E. sharpi belongs to the division in which the elytra have two stripes (instead of three), and amongst the species of this group it may be known by the immaculate thorax and the black underside and legs. CE. vittata, Har., from Tropical South America, is closely allied, but is larger, hroader, and more convex, and has a transverse black band on the thorax. The twenty specimens before me show no variation of importance, except that in one or two of them the dark stripes of the elytra are united at the apex.

## Physimerus, Clark.

## Physimerus smithi, sp. n.

Below picenus, above pale fuscous, fulvous, or flavous; antennæ (the apical joints excepted) and legs flavous; thorax with a lateral and a median fuscous stripe; clytra finely punctate-striate and pubescent, unspotted or with an obscure basal and post-median transverse fuscous band.

Length, 1-1 $\frac{1}{2}$ line.
Head minutely rugose-punctate, the frontal tubercles feebly raised ; clypeus strongly deflexed, shining ; palpi filiform ; autennæ extending beyond the middle of the elytra, filiform, flavous, the apical two or three joints fuscous, the basal joint rather long and robust, the second short, the third and fourth elongate, equal, the fifth joint slightly longer, the following joints rather shorter, the terminal one more elongate and pointed ; thorax scarcely broader than long, very feebly narrowed at the base, the surface obsoletely, obliquely depressed on either side of the disc below the middle, clothed with short pubescence, which obscures the punctuation, fulvous, a narrow stripe at the middle and one on each side fuscous; scutellum small, fuscous; elytra with fine rows of punctures, scarcely perceptibly depressed below the base, opaque, fulvous, with a transverse band at the base and another below the middle fuscous, the lower one sometimes very broad and extending upwards at the sides, the surface clothed with short pubescence and scattered stiff yellowish bristles; legs flavous; posterior tibie with a spur; posterior tarsal joints short, of nearly equal length.

Hab. St. Vincent-Leeward side and South end; Grenada-Grand Etang, 1,900 feet (Windward side).

The above description is based upon the few specimens which show the elytral bands rather distinctly; in the majority of them, however, the bands are obsolete or faintly indicated. This small species may be known amongst its allies by the three narrow fuscous vitte of the thorax.

Hypolampsis, Clark.

## IIypolampsis annulicornis, sp. n.

Below piceous, above fuscous, finely pubescent; antennæ piceous, the ninth and tenth joints, and the apex of the others, pale ; elytra finely punctate-striate, clothed with short grey pubescence, paler or darker fuscous ; legs pale testaceous.

Var. Above and below pale testaceous, the elytra with a more or less distinct dentate darker band below the middle.

Length, $1 \frac{1}{2}-2$ lines.
Head finely and closely rugose-punctate, longitudinally depressed between the eyes, and clothed with very short yellow or grey pubescence, the space between the antennæ in the sbape of an acutely-raised ridge; labrum flavous; palpi filiform, scarcely thickened ; antennæ extending to the middle of the elytra, rather robust, piceous, the joints testaceous at the apex, the ninth and tenth entirely of that colour, the seventh and eighth joints and also the terminal one entirely dark; thorax subquadrate, distinctly narrowed at the base, the disc with two slightly raised tubercles before the middle, very finely punctured, fuscous, and clothed with very short pubescence ; elytra much broader than the thorax, obsoletely transversely depressed below the base, rather finely but distinctly punctate-striate, the interstices slightly costate, and clothed with short grey or yellowish pubescence; underside piceous, impunctate; legs pale, the femora sometimes darker at the apex ; posterior tibiæ straight, without small teeth, the apex with a short spur.

Hab. St. Vincent-Windward and Leeward sides; Grenada-Balthazar (Windwarả side), Mount Gay Eistate (Leeward side).

As in most of the species of this genus the coloration of the upper surface is dull and rather variable, the paler forms showing some obscure darker patches and the
others being entirely dark fuscous. The principal mark of distinction lies, however, in the coloration of the joints of the antennæ, which seems to be constant, even in the pale variety. The elytra in the latter show one or two pale fuscous, deeply indented, transverse bands, before and below the middle.

## Megistops, Boh.

## Megistops granulatus, sp. n.

Obscure pale fulvous, above pale flavous, the apical joints of the antennæ darker ; thorax transverse, finely granulate, opaque ; elytra similarly sculptured, the sides and two triangular spots at the middle dark brown.

Length, 2 lines.
Of elongate shape ; the sides of the head entirely occupied by the large eyes, which, in the male, meet at the vertex, leaving a narrow triangular intermediate space below, the frontal elevations very small, the labrum piceous; antennæ extending to the base of the elytra, slender, fulvous, the terminal joints fuscous, the basal joint elongate and thickened, the second and third joints small, equal, the former also thickened, the fourth joint longer than the following ones, the terminal joints much shorter ; thorax nearly three times broader than long, the sides straight and obliquely converging in front, the anterior angles thickened, slightly oblique, the surface minutely granulate, without any punctuation, flavous, opaque ; scutellum piceous; elytra conjointly rounded at the apex, elongate, rather convex, somewhat subcylindrical, the surface coloured and sculptured like that of the thorax, the sides with a narrow piceous stripe, which, at the middle, widens into a small triangular spot, while a similar spot is placed transversely near the suture (this latter spot is absent in one specimen); legs obscure flavous ; the posterior femora strongly incrassate ; posterior tibiæ robust, dilated, with a broad spur, emarginate at the apex ; posterior metatarsus as long as the following joints together.

Hab. Grenada—St. George's and Mount Gay Estates (Leeward side).

If Megistops is to be retained as distinct from Dibolia, on account of the large eyes meeting on the median line, the present species must be referred to it, although a difference will probably be found in regard to this structure in the two sexes. The prosternum, however, in Megistops
is not formed for the reception of the parts of the mouth, as in Dibolia. The present species is peculiar, owing to the almost complete absence of punctuation; a few feeble punctures are, however, visible near the suture of the elytra.

Subfam. GALERUCIN $\boldsymbol{E}$.
Schematiza, Blanch.
Schematiza livida.
Galeruca livida, Oliv., Encycl. Méth., vi., p. 589 ; Ent., vi., p. 631, t. 1, fig. 2.
Galerucella livida, Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 479.
Hab. Grenada-Caliveny Estate and Granville (Windward side), Mount Gay Estate (Leeward side).

Many specimens. Originally described from the Island of Guadeloupe.

Diabrotica, Chevr.

## Diabrotica melanocephala.

Galleruca melanocephala, Fabr., Ent. Syst., Suppl., p. 95.

Galeruca melanocephala, Oliv., Ent., vi., p. 652, t. 4, fig. 65.
Hab. St. Vincent-Kingstown, and Leeward and Windward sides; Grenada-Balthazar, Mirabeau Estate (Windward side), Mount Gay and Vendôme Estates, Grand Etang Road (Leeward side).

Found in plenty in St. Vincent. A South-American species, not extending to Central America.

## Diabrotica bivittata.

Crioceris bivittata, Fabr., Syst. Eleuth., i., p. 455.
Hab. St. Vincent-Windward side; Grenada-Balthazar (Windward side), Mount Gay Estate (Leeward side).

Another Tropical American species ; not extending to Central America.

Cerotona, Chevr.

## Cerotoma ruficornis.

Galeruca ruficornis, Oliv., Encycl. Méth., vi., p. 200.
Cerotoma ruficornis, Jacq. Duval, in Sagra's Hist. fis. polit. y nat. de Caba, Ins., p. 126, t. 2, fig. 8 ; Jac., Biol. Centr.-Am., Col., vi., 1, p. 616 ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 480.
Galeruca denticornis, Oliv., Ent., vi., p. 659, t. 5, fig. 78.
Cerotoma atrofasciata, Jac., P.Z.S., 1879, p. 792.
Hab. St. Vincent-Kingstown; Grenada-Mount Gay and Vendôme Estates, Mt. Maitland (Leeward side), Balthazar, Granville (Windward side) ; Grenadines -Becquia I.

Found in plenty in both St. Vincent and Grenada, and also met with by Mr. Smith at Barbados. A common species in Tropical America, ranging from Mexico to Venezuela, and also known to occur in C'uba, Puerto Rico, and Guadeloupe.

## HISPIDA AND CASSIDIDA.

By G. C. Champion.
Fam. HISPIDÆ.
Chalepus, Thunb.
Chalepus sanguinicollis.
Hispa sanguinicollis, Linn., Mant. Plant. alt., vi., p. 530 (1771) ; Oliv., Ent., vi., p. 765, no. 95, t. 1, figs. 12, a, b.

Odontota sanguinicollis, Chapuis, Ann. Soc. Ent. Belg., xx., p. 13.

Hab. St. Vincent-Leeward and Windward sides; Grenada-Mount Gay Estate, St. George's, Mt. Maitland (Leeward side), Chantilly, Caliveny and Lake Antoine Estates, Granville, Balthazar (Windward side), Grand Ance (South end) ; Grenadincs-Becquia I., Union I.

Inhabits San Domingo and Tropical South America.

## Chalepus plebeius.

Odontota plebeia, Chapuis, Ann. Soc. Ent. Belg., xx., p. 16 .

Hab. St. Vincent-Leeward and Windward sides; Grenada-Woodford Estate and Mt. Maitland (Leeward side), Mirabeau and Chantilly Estates and Grand Etang (Windward side).

The numerous specimens from the above localities seem to be referable to this species.

It is variable in colour, like many of its allies, three wellmarked forms being present in the series obtained-one with a black median vitta or oblong mark on the disc of the thorax, one with the thorax immaculate, and one with the femora obscurely rufescent near the base. The head is black, smooth, and dull, and canaliculate between the eyes. The thorax is transverse, subconical, the sides being strongly constricted in front and slightly sinuate before the base; the surface is closely impressed with coarse, shallow punctures; it is ferruginous or flavo-ferruginous in colour, with a median vitta or oblong spot on the disc, which is sometimes completely obliterated or only faintly indicated. The elytra are long and parallel, with ten rows of punctures, except for a short distance before the middle, between the second and fourth coste, where the number is reduced to nine; the second, fourth, and eighth interstices are strongly, and the sixth at the base and apex more feebly, costate ; the apices are conjointly rounded, each with about six or eight rather long, fine teeth; each elytron has a very broad, marginal, ferruginous or flavo-ferruginous stripe extending from the base to far beyond the middle, leaving about the apical fourth, and the suture broadly, black. The legs are entirely black, except in one specimen.

Examples of the same species from Colombia and Venezuela are contained in the British Museum. Chapuis' type was from Colombia.

Fam. CASSIDIDÆ.
Mesomphalia, Hope.

## Mesomphalia exclamationis.

Cassida exclamationis, Linn., Syst. Nat., 12th edit. i., 2, p. 577.

Mesomphalia exclamatinnis, Boh., Mon. Cassid., i., p. 379 , and iv., p. 176 ; Champ., Biol. Centr.-Am., Col., vi., 2, p. 145 ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 480 ; Horn, Proc. Calif. Acad. Sci. (2), iv., p. 344.
Mab. St. Vincent-Leeward side; Grenada-Lake Antoine Estate and Balthazar (Windward side), Mount Gay Estate (Leeward side); Grenadines-Union I.

A widely-distributed. Tropical American insect, extending northwards to Lower California, and recorded from Trinidad, Martinique, and Guadeloupe.

## Chelymorpha, Boh.

Chelymorpha polysticha.
Chelymorpha polysticha, Boh., Mon. Cassid., ii., p. 56 ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 480.
Hal. St. Vincent; Grenada-Mirabeau and Chantilly Estates, Balthazar (Windward side), Woodford Estate, Mt. Maitland (Leeward side).

Found in numbers in Grenada. Described from Guadeloupe I.

Coptocycla, Boh.

## Coptocycla judaica.

Cassida judaica, Fabr., Spec. Ins., i., p. 109.
Coptocycla judaica, Boh., Mon. Cassid., iii., p. 293, and iv., p. 441 ; Champ., Biol. Centr.-Am., Col., vi., 2, p. 209.

Hab. St. Vincent-Leeward and Windward sides; Grenada-La Force, Mirabeau, and Lake Antoine Estates, Balthazar (Windward side), Mount Gay Estate (Leeward side).

A Tropical American species, extending to the southern part of the Isthmus of Panama.

## Coptocycla bicolor.

Cassida bicolor, Fabr., Ent. Syst., Suppl., p. 83.
Coptocycla bicolor, Champ., Biol. Centr.-Am., Col., vi., 2, p. 212.

Coptocycla aurichalcea, Boh., Mon. Cassid., iii., p. 142, and iv., p. 402.
Coptocycla aurisplendens, Boh., loc. cit., iii., p. 349, and iv., $p, 452$.
? Coptocycla bistripunctata, Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 481.
Hab. St. Vincent-Leeward and Windward sides; Grenada-Mirabeau Estate (Windward side), Woodford Estate (Leeward side) ; Grenadines-Becquia I.

Twelve specimens, inseparable from the var. aurisplendens of C. bicolor, an abundant insect in the Southern United States and Central America.

## Coptocycla guadeloupensis.

Coptocycla guadeloupensis, Boh., Mon. Cassid., iii., p. 427, and iv., p. 468 ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 481.
Hab. St. Vincent-Leeward and Windward sides; Grenadines-Mustique I.

If I have correctly identified the nine specimens obtained by Mr. Smith, Boheman's description must have been made from a pallid variety, with the thoracic and elytral markings obliterated. In fully-coloured examples of the present species the thorax has a black or reddishbrown subquadrate patch on the dise at the base, this being deeply excised in the centre in front and dilated laterally behind; and the elytra have a broad fascia on the disc below the base, and a large patch before the apex, neither reaching the suture and sometimes connected laterally, fusco-olivaceous. In two specimens the markings of the thorax and elytra are almost obsolete, thus nearly agreeing with Boheman's description.
X. On the Serricorn Coleoptera of St. Vincent, Gienada, and the Grenadines. By George Cearles ChamPion, F.Z.S.

> [Read March 17th, 1897.]

This paper, like the preceding, gives an account of a portion of the Coleoptera collected by Mr. H. H. Smith in St. Vincent, Grenada, and the Grenadines, under the auspices of the West India Committee of the Royal Society and British Association. Three families of the Serricorn series, the Elateridæ, Rhipidoceridæ, and Dascillidæ are here dealt, with.

The species are as follows:
Elateride.
Agrypnella squamifera, Caud. Eolus melliculus, Cand.
Chalcolepidius virens, F .
Physorhinus erythrocephalus, F.
silbermamni, Chevr.
Dicrepidius insuluris, sp. n.
Crepidius fluvipes, sp. n.
Ischiodontus inornatus, Cand.
Monocrepidius posticus, Eschsch.
Heteroderes laurenti, Guér.
Eolus nigromaculatus, Drap.
Rhipidoceride.
Callirrhipis l'herminieri, Lap.
Dascillide.

Cneoglossa, sp. ?
Prionoscirtes dilaticornis, sp. n. Scirtes pilatei, Guér.
" angustutus, Champ.
," insularis, sp. n.
," suborbiculatus, Champ.

Scirtes salicis, Champ.
Cyphon dehiscens, sp. n. , caraibus, sp. n. Ptilodactyla humerosa, Champ. " sancti-vincentis, sp.n. " antillarum, sp. n.

Fam. ELATERID风.
Group $A G R Y P N I N I$.
Agrypnella, Champ.
Heterostethus, Schwarz, Deutsche ent. Zeitschr., 1896, p. 147.
trans. ent. soc. lond. 1897.-part ilit. (septr.)

Cryptohypnus squamifer, Cand., Elat. Nouv., i., p. 38 (1864) ; Fleut., Ann. Soc. Ent. Fr., 1891, p. 283.

Agrypnella squamifera, Champ., Biol. Centr.-Am., Col., iii., 1, pp. 415, 556, t. 18, figs. 21, 21a, $b$; Ent. Monthly Mag., xxxii., p. 161.
Heterostethus pictus, Schwarz, Deutsche ent. Zeitschr., 1896, p. 147.

Hab. Grenada-Telescope Estate (Windward side).
Three specimens. A widely-distributed insect in the warmer parts of America, ranging from Guatemala to Monte Video and Paraguay.

## Group CHALCOLEPIDIINI.

Cifalcolepidius, Eschsch.
Chalcolepidius virens.
Elater virens, Fabr., Mant. Ins., i., p. 172.
Chalcolepidius virens, Cand., Elat. Nouv., iii., p. 22 ; Bull. Soc. Ent. Belg., 1886, p. Ixxiii.; Champ., Biol. Centr.-Am., Col., iii., 1, p. 280.
Hab. Grenada—Balthazar (Windward side).
Two specimens, females. A Tropical-American insect extending to as far north as Mexico.

## Chalcolepidius silbermanni.

Chalcolepidius sillermanni, Chevr., Col. Mex., Cent. ii., fasc. 8, No. 197 (1835) ; Cand., Monogr. Elat., i., p. 275 ; Champ., Biol. Centr.-Am., Col., iii., 1, p. 280, t. 11, fig. 25.

Hab. St. Vincent-Windward side.
Four specimens, females, varying very greatly in size and to some extent in the colour of the scales. The commonest and most widely-distributed species of the genus in Central America, ranging from Northern Mexico to Venezuela.

# Group DICREPIDIINI. 

## Dicrepidius, Eschsch.

## Dicrepidius insularis, sp. n.

$\star$ Very elongate, narrow, flattened above, shining ; piceous or reddish-brown, the hind angles of the prothorax, and in one specimen the anterior part also, reddish in colour, beneath reddishcastancous, the antennæ and legs ferrugineo-testaceous; above and beneath somewhat thickly clothed with fulvo-cinereous pubescence. Head coarsely punctured, short, deeply sunk into the prothorax, sulcate between the eyes, declivous in front, the front subtriangular, the frontal carina not prominent as viewed from above, the eyes large ; antennæ very elongate, extending to far beyond the middle of the elytra, the joints from the third each with an exceedingly elongate, slender ramus. Prothorax as long as broad, subcylindrical, slightly narrowed in front; the hind angles long and feebly divergent, a little incurved at the tip, carinate ; the surface somewhat thickly, moderately coarsely punctate (more sparsely and more coarsely in one specimen), the punctuation becoming sparser and finer towards the base, and with a median channel extending from a little beyond the middle to the base. Elytra about three and one-third times longer than the prothorax, gradually narrowing almost from the base ; punctate-striate, the striæ deeply impressed in front, the interstices convex and sparsely, rugulosely punctured.

Length 14, breadth a little over 3 millim.
Hab. St. Vincent-Leeward side; Grenada--Balthazar (Windward side).

One specimen from each locality, differing a little inter se in the colour of the body and the intensity of the puncturing of the thorax. D.insularis resembles the Central-American D. politus, Champ., in the form of the antennæ in the male, except that the rami are still more elongate; but differs from it in the less attenuate elytra, the more closely punctured thorax, the hind angles of which are less divergent, etc. The exceedingly elongate slender rami of the antennæ in the male also separates it from $D$. palmatus, Cand., recorded from Guadeloupe by Fleutiaux and Sallé. The present insect cannot be identified with either D.ignotus or D. elegans, Fleut. and Sallé, from the same locality, apparently described from females only.

Crepidius, Cand.

## Crepidius flavipes, sp. n.

đ Moderately elongate, rather convex, narrow, shiuing ; black, the legs flavo-testaceous, with the tarsi slightly infuscate ; above and beneath sparsely clothed with rather long, fine, decumbent hairs, which are fuscous on the elytra and fulvo-cinereous on the other parts of the body. Head coarsely, closely punctate, deeply triangularly excavate in front, the frontal plate moderately prominent and rounded anteriorly ; antenne about reaching the basal fourth of the elytra, stout, joints $3-10$ gradually becoming flabellate, $6-10$ each with a long, stout, flattened ramus. Prothorax a little broader than long, convex in front, very gradually narrowing from the base forwards, the sides rounded anteriorly ; the hind angles greatly produced, slightly divergent, and acutely cariuate ; the surface thickly, coarsely punctate-the punctuation becoming sparser and finer on the basal portion of the disc, and very coarse, crowded, and umbilicate towards the sides anteriorly,-and with a median channel bohind. Elytra about three and one-third times longer than the prothorax, gradually narrowing from a little below the base ; with rows of coarse punctures placed in shallow strix, these, however, being deeply impressed on the basal declivity, the interstices very sparsely punctured. Hind coxal plates abruptly, triangularly dilated inwards.

Length $10 \frac{3}{1}$, breadth 3 millim.

## Hab. St. Vincent.

One example. This very distinct species may be readily known by the deep black colour of the body, the black antennre, and the yellow legs. It is closely allied to C. rhipiphorus, Cand. (of which C. brunneus, Fleut. and Sallé, is probably the female), from Guadeloupe ; but may be distinguished from it (apart from the dissimilar coloration of the legs and antennæ) by the shorter antennal rami of the male, and the courser, deeper, and more crowded umbilicate punctures at the sides of the thorax.

Of the two males representing C. rhipiphorus in the Janson collection one has the antenne and legs ferru-gineo-testaceous (as described by Candèze), and the other has the legs (the tarsi excepted) piceous and the antennæ black.

## Ischiodontus, Cand. Ischiodontus inornatus.

Ischiodontus inornatus, Cand., Monogr. Elat., ii., p. 100 ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 409.
Hab. St. Vincent-Kingstown, Windward and Leeward sides; Grenada-Mount Gay (Leeward side), Balthazar (Windward side) ; Grenadines-Mustique I.

Found in plenty in St. Vincent and Grenada. Most of the specimens, males and females alike, are reddishbrown in colour, with the thorax not darker than the elytra. Dr. Candèze gives as localities Northern Colombia and the Antilles. There are specimens of it from Cartagena and the Island of Martinique in the Janson collection, and it has been recorded by Fleutiaux and Sallé from Guadeloupe.

## Group MONOCREPIDIINI. <br> Monocrepidius, Eschsch. <br> Monocrepidius posticus.

Elater posticus, Eschsch., Entomograph., i., p. 76(1822).
Monocrepidius posticus, Cand., Monogr. Elat., ii., p. 256.
Monocrepidius posticus, var. $\gamma$, Champ., Biol. Centr.Am., Col., iii., 1, p. 350.
Hab. St. Vincent ; Grenada-St. George's (Leeward side), Balthazar and T'elescope Estate (Windward side).

Five specimens. They all have a well-defined reddishyellow spot at the apex of each elytron, and in one of them (the one from St. Vincent) there is an oblong similarly-coloured spot on the dise of each a little beyond the middle. A Tropical-American insect, extending northwards to the Mexican State of Vera Cruz.

> Heteroderes, Latr. Heteroderes laurenti.

Elater (Oophorus) laurentii, Guér., Mag. Zool., 1838, Ins. du Voyage de la F'avorite, p. 31, t. 230, fig. 3. Heteroderes laurentii, Cand., Monogr. Elat., ii., p. 373.
Hab. St. Vincent-Leeward and Windward sides; Grenada-Mount Gay Estate (Leeward side), Telescope Estate and Soubise (Windward side); GrenadinesMustique I.

Found in abundance at St. Vincent and Mustique. These specimens differ from the closely-allied $H$. amplicollis (Gyll.), recorded from St. Bartholomew and Guadelonpe, in the uniform punctuation of the under surface of the body, $H$. amplicollis having intermixed coarser punctures. A widely-distributed insect in Tropical South America, apparently not extending to the Isthmus of Panama.

Æolus, Eschsch.

## Aolus nigromaculatus.

Elater nigromaculatus, Drap., Ann. Gén. Sci. Phys., iii., p. 271, t. 42, fig. 2 (1820).

Eolus nigromaculatus, Cand., Monogr. Elat., ii., p. 301, t. 5, fig. 15 ; Champ., Biol. Centr.-Am., Col., iii., ], p. 360 .

Hab. Grenada-Balthazar, La Force Estate (Windward side), Mount Gay Estate, St. George's (Leeward side) ; Grenadines-Mustique I.

Found in plenty in Grenada. A Tropical-American species ranging from Nicaragua to the Amazons valley.

Aolus melliculus.
Aolus melliculus, Cand., Monogr. Elat., ii., p. 295, t. 5, fig. 9 (1859) ; Champ., Biol. Centr.-Am., Col., iii., 1, p. 366, t. 16, fig. 9.
Alolus moreleti, Tarn., Col. Açor., p. 94 (1860).
Eolus rubricatus, Cand., loc. cit., p. 294.
Hal. Grenada-Caliveny Estate (Windward side), St. George's (Leeward side).

Found in abundance at St. George's, all but four of the specimens belonging to the typical form, the remainder to the var. rubricatus. A common insect in Tropical-America, extending southwards to Buenos Ayres and northwards to the Mexican State of Vera Cruz, and introduced into the Azores.

## Group PHYSORHINI. <br> Physorhinus, Eschsch.

Physorhinus erythrocephalus.
Elater erythrocephalus, Fabr., Syst. Eleuth., ii., p. 241. Physorhinus erythrocephalus, Cand., Monogr.Elat., ii., p. 389 ; Champ., Biol. Centr.-Am., Col., iii., 1, p. 386.

Hab. Grenadines-Mustique I., Becquia I.
Five specimens. These differ from $P$. erythrocephalus in their rather small size, less elongate shape, and more transverse thorax, and also in having the yellow spots on the elytra rounded and very sharply defined, owing to their being surrounded by black (as is often the case in $P$.stellatus), the rest of the ground-colour being reddishbrown. As some of the species of this genus ( $P$. distig$m a$, etc.) are extremely variable in size and colour, it is perhaps best to treat the present insect as a varietal form of $P$. erythrocephalus. In the closely allied $P$. insularis, Cand., from Guadeloupe, which is perhaps an extreme form of $P$. erythrocephalus, the elytral spots are so much extended as to leave only the suture and a postmedian fascia of the ground-colour.

## Anchastus, Lec.

## Anchastus moratus.

Monelasmus moratus, Cand., Monogr. Elat., iv., p. 334. Anchastus moratus, Champ., Biol. Centr.-Am., Col., iii., 1, p. 397, t. 17, figs. 27, $27 a$.

Mab. Grenada-Mount Gay Estate (Leeward side).
One specimen, agreeing perfectly with the type from San Martin Tuxtla, in the Mexican State of Vera Cruz. The only other known localities for this peculiar species are Yucatan and San José on the Pacific coast of Guatemala, where a specimen was found by myself in 1879.

> Anchastomorpies, Champ.
> Anchastomorphus phedrus.

Anchastus phedrus, Cand., Monogr. Elat., ii., p. 401.
Anchastomorphus phedrus, Champ., Biol. Centr.-Am., Col., iii., 1, p. 400, t. 18, fig. 2.
Anchastus crux-nigra, Fleut., Ann. Soc. Ent. Belg., 1895, p. 170.
Hab. Grenada-Balthazar (Windward side).
One specimen. It has the elytra testaceous, with the suture narrowly, and a transverse mark at the middle of the disc, piceous. A widely distributed and variable Tropical-American insect, extending as far north as the Mexican State of Guerrero.

# Group CARDIOPHORINI. <br> Horistonotos, Cand. Horistonotus sericeus, sp. n. 

Moderately elongate, convex, rather broad, shining; black, the anterior and hind angles of the prothorax and the front of the head more or less reddish, the legs and antennæ testaceous or obscure testaceous ; clothed with a fine, silky, fulvo-cinereous pubescence. Head densely, minutely punctate, with intermixed much coarser punctures, the frontal carina rather prominent ; antennæ slender, extending to far beyond the hind angles of the prothorax. Prothorax distinctly broader than long, widest a little behind the middle and rapidly narrowing thence to the apex, slightly constricted towards the base, the base deeply bi-incised on either side, the marginal carina extending to near the apex; the entire surface densely, very minutely punctate, with distinct intermixed slightly coarser punctures, and sometimes with a short median channel before the base ; the hind angles moderately produced, not divergent, incurved at the tip. Elytra two and threefifths longer than the prothorax and a little wider than it at the base, somewhat rounded at the sides, gradually narrowing from about the basal fourth, the humeri rounded externally ; deeply punctate-striate, the interstices convex, all becoming acutely costate towards the apex, the alternate ones appearing a little more raised than the others, and also thickly, minutely punctate, with scattered coarser punctures intermixed. Beneath densely, very minutely punctate, with intermixed coarser punctures; the sixth ventral segment, and also the apex of the fifth, longitudinally wrinkled. Hind coxal plates very broadly dilated in their inner half. Tarsal claws bicuspid at the tip.

Length $10-11 \frac{1}{4}$, breadth $3 \frac{1}{8}-3 \frac{1}{2}$ millim.
Hab. St. Vincent—Kingstown and Windward side.
Three specimens, their sex not ascertained. Closely allied to the widely distributed $H$. exoletus, Erichs.; but much larger and broader, with the dense general punctuation of the upper and under surfaces very minute, the thorax more narrowed anteriorly, and the elytra less acuminate at the apex. From H. acutipennis, Cand., from Venezuela, which it approaches in size, it may be known by its less elongate shape, shorter thorax, less acuminate elytra, less abruptly dilated hind coxal plates, and the finer general punctuation, especially of the under surface.

## Esthesopus, Eschsch.

 Esthesopus grenadensis, sp. n.Short, moderately broad, rather convex, shining, black; the anterior and hind angles of the prothorax and the front of the head reddish, the scutellum piceous, the elytra testaceons, with a common broad sutural stripe extending to beyond the middle, and the sides narrowly at the middle, piceous, the sides of the metasternum and of the abdomen, and the epipleuræ, reddish, the antennæ and legs testaceous ; above and beneath clothed with fine yellowish-cinereous pubescence. Head densely, minutely punctate, with coarser punctures intermixed, the frontal carina moderately prominent ; antennæ slender, about reaching the base of the prothorax. Prothorax much broader than long, transversely convex, a little narrowed in front and subparallel behind, distinctly compressed laterally at the middle, the sides thus appearing sinuate at this part; the base truncate on either side, without incisions; the marginal carina nearly reaching the anterior angles; the hind angles very little produced, incurved at the tip, and excavate above for the reception of the humeri ; the surface densely, minutely punctate, with coarser punctures intermixed. Scutellum rather convex in front. Elytra about two and one-third times longer than the prothorax, and of the same width, somewhat flattened on the disc, subparallel to the middle and narrowing thence to the apex; coarsely and deeply punctate-striate, the interstices convex and densely, rugulosely punctate. Beneath densely, minutely punctate, with coarser punctures intermixed.

Length 5, breadth $1 \frac{3}{4}$ millim. (o.)
Hab. Grenada-Telescope Estate (Windward side).
One example. This peculiar little species is allied to E. hepaticus, Erichs.,* from Central and South America, pallid varieties of which are sometimes somewhat similarly coloured; but it is much smaller and narrower, the thorax is more convex above and compressed laterally at the middle, the elytra are more deeply punctatestriate, with the interstices more convex, etc.

## Group PYROPHORINI.

Pyrophorus, Illig.

## Pyrophorus noctilucus.

Elater noctilucus, Linn., Syst. Nat., 10th edit., i., p. 404 (1758).

[^12]Pyrophorus noctilucus, Cand., Monogr. Elat., iv., p. 14 ; Champ., Biol. Centr.-Am., Col., iii., 1, p. 466, t. 20, fig. 18 ( $\widehat{0}$ genitalia).

Hab. St. Vincent.
Found in abundance in St. Vincent. These specimens vary greatly in size, most of them being comparatively small. They all have the thorax very coarsely and deeply punctured, and the punctures of the elytral striæ very distinct. There are similar examples from Guadeloupe and Brazil in the Janson collection. A common species in many of the Antillean islands and also in Tropical South America, and somewhat doubtfully recorded from Central America, where it is replaced by $P$. pellucens, Eschsch.

Group AGRIOTINI.
Cosmesus, Eschsch.
Cosmesus flavidus.
Cosmesus flavidus, Cand., Monogr. Elat., iv., p. 356.
Hab. St. Vincent-Top of Soufrière.
One specimen, agreeing with Dr. Candèze's description, except in its smaller size, measuring only four (instead of five) millimetres in length. The outer vittæ on the thorax are short. The elytra are distinctly truncate at the apex, with the sutural and outer angles feebly mucronate. The type was from Venezuela.

## Fam. RHIPIDOCERIDE.

## Callirrhipis, Latr. <br> Callirrhipis l'herminieri.

Callirhipis l'herminieri, Lap., Ann. Soc. Ent. Fr., 1834, p. 250, t. 2, figs. 1, $1 a, b$ ( $\hat{\delta}$ ) ; Lacord., Gen. Col., Atlas, t. 43, fig. 3( ̂) ; Fleut. et Sallé, Ann. Soc. Ent. Fr., 1889, p. 414.
Callirhipis brunnea, Lap., loc. cit., p. 2ĕ1 (̂).
Hab. St. Vincent.
One pair. The female is (as usual) nearly glabrous and very much larger and broader than the male; it also has the
thorax more sparsely and the elytra more coarsely punctured, the legs stouter, and the rami of the antennæ very much shorter.

Originally described from the island of Guadeloupe, from males only.

## Fam. DASCILLIDE.

Cneoglossa, Guér.
Cneoglossa, sp. ?.
Hab. St. Vincent—Windward side.
One example, different from any of the three known species of the genus-two from Central America and one from Colombia; but as the head is broken off it cannot be described. The insect is fusco-testaceous in colour, with the scutellum and legs paler. It is desirable to record the presence of the genus in St. Vincent.

## Prionoscirtes, Champ.

## Prionoscirtes dilaticornis, sp. n.

t. Rotundate, convex, shining, thickly clothed with greyish pubescence ; black, the mouth-parts ferruginous, the palpi yellow, the antennæ flavo-testaceous, with the basal joint testaceous, the legs testaceous, the hind femora partly infuscate beneath, the under surface piceous ; the entire upper surface somewhat thickly, minutely punctate. Head very broad, dilated on either side in front, the mandibles prominent, the eyes large ; antenne as long as the body, joint 1 moderately stout, 2 and 3 short, small, 3 slightly longer than 2, 4-11 broadly dilated and serrate, taperivg a little towards the tip, 4 more than twice as long as 3 . Legs short, rather stout; the upper spur of the hind tibiæ nearly as long as the first tarsal joint.

Length $2 \frac{1}{2}$, breadth 2 millim.

## Hab. St. Vincent.

One example. This very distinct species is allied to $P$. nigripennis, Champ., the female only of which is known, but may be at once separated from it, apart from the difference in colour, by the very elongate, greatly dilated, strongly serrate antennæ, with relatively stouter third joint. The basal joint is not stouter than in the female of $P$.nigripennis (in the genus Prionocyphon the
basal joint is usually enormously dilated on the inner side in the males). The two known species of Prionoscirtes are both from the Pacific slope of Guatemala, and both unique, like the present insect.

Scirtes, Illig.

## Scirtes pilatei.

Scyrtes pilatei, Guér., Rev. et Mag. Zool., 1861, p. 545. Scirtes pilatei, Champ., Biol. Centr.-Am., Col., iii., 1, p. 611.

Hab. Grenada-Mount Gay Estate (Leeward side).
One specimen. A common and widely distributed insect in Central America, ranging from Tabasco to Panama.

## Scirtes angustatus.

Scirtes angustatus, Champ., Biol. Centr.-Am., Col., iii., 1, pp. 616, 661.
Hal. Grenada-St. George's (Leeward side).
Two males and one female. In the original description I accidentally omitted to notice the peculiar sexual character of the female, suggestive of that of some of the American species of Cyphon. In this sex the elytra have each a large rugulose depression before the apex, of which there is no trace in the male, the latter also differing from the female in having the fifth ventral segment emarginate at the apex.

## Scirtes insularis, sp. n.

お. Oval, depressed, shining, finely pubescent, testaceous, the eyes black. Head, prothorax, and scutellum rather sparsely, minutely punctate, the elytra thickly, finely punctate; head very broad, the eyes large and rather prominent; antennæ long, moderately slender, joint 3 very small, half the length of $2,4-11$ elongate. Fifth ventral segment feebly emarginate at the apex.

Length $2_{2}^{\frac{1}{2}}-3$ millim.
Hab. St. Vincent-Leeward and Windward sides.
Four examples. Amongst the Central-American species, this Scirtes most nearly resembles S. puncticollis,

## Coleoptera of St. Vincent, Grenada, and Grenadines.

from which it differs in its larger size, the longer and stouter antennæ, with much shorter third joint, the broader head, larger eyes, and smoother thorax. In the form of the head and antennæ it is, however, much more closely allied to S. longicornis: the anteunæ are shorter and more slender than in that insect.

## Scirtes suborbiculatus.

Scirtes suborbiculatus, Champ., Biol. Centr.-Am., Col., iii., 1, p. 614.
Hab. Grenada-Mount Gay Estate (Leeward side).
Two examples, apparently belonging to this variable species. They are testaceous in colour, with the elytra infuscate, except at the sides in front and along the suture, the antenne also infuscate, with the basal joints testaceous. S. suborbiculatus is widely distributed in Central-America, ranging from Northern Mexico to Panama.

Scirtes salicis.
Scirtes salicis, Champ., Biol. Centr.-Am., Col., iii., 1, p. 617.

Hab. St. Vincent.
One example. The types were from the Atlantic slope of Guatemala.

Cyphon, Payk.

## Cyphon teliiscens, sp. n.

ㅇ. Oblong, depressed, shining, thickly clothed with fine fuscous pubescence, which is erect on the prothorax and semi-erect on the elytra; black, the antennæ black or piceous, with the three basal joints more or less testaceous, the legs piceous, the tarsi in part and the knees testaceous. Head, prothorax, and scutellum sparsely and minutely, the elytra closely and finely, punctate ; antenne about reaching the middle of the elytra, rather slender, joint 3 very small and narrow, 4 elongate, longer than $5,5-10$ subequal in length; prothorax short, convex, narrowly margined at the sides ; elytra long, parallel in their basal half, much wider than the prothorax, obliquely truncate at the apex, and gradually becoming more dehiscent from the basal two-thirds to the apex, flattened on the
dise to a little beyond the middle and also along either side of the suture towards the apex, the dise with indications of two raised lines, the sutural angles sharp, the humeri rounded.

Length $2 \frac{1}{3}$, breadth $1 \frac{1}{5}$ millim.
Hab. St. Vincent.
Two female examples. Allied to C. quadrifoventatus, C. parallelus, and C.truncatus, Champ., but differing from the corresponding sex of all of them in the unimpressed elytra and the longer and darker antennæ. The elytra, as usual, are not so finely punctured as the thorax; they are rather widely dehiscent in their apical third.* A single Cyphon from the same locality is probably the male of the same species : it differs from the females in being much less depressed and more oval in shape, and in having the elytra more sparsely punctured, less dehiscent behind, and without trace of raised lines on the disc. Somewhat similar differences are to be found between the sexes of C. bifoveolatus, Champ.

## Cyphon caraibus, sp. n.

Elliptic, short, convex, shining, thickly clothed with fine greyish pubescence; black or pitchy-black, the mouth-parts ferruginous, the antennæ and legs testaceous, the femora slightly infuscate. Head, prothorax, and scutellum sparsely and minutely, the elytra sparsely and moderately finely, punctate; head very broad, the eyes rather large; antennæ long and moderately slender, joint 2 short and rather stout, 3 and 4 elongate, equal in length, $5-10$ slightly shorter ; prothorax short and convex ; elytra without raised lines, the suture straight to the apex, the apices rather obtuse.

Length $1 \frac{1}{2}-1 \frac{0}{10}$ millim.
Hab. St. Vincent-Windward and Leeward sides.
Five specimens. This obscure little species has very much the facies of a small black Scymnus. It is allied to the Central-American C. ampliceps, differing from that insect in its smaller size and black colour, and in having the second antennal joint not so stout and the third and

[^13]fourth joints equal in length. The punctuation of the elytra is sparse but very distinct, much coarser than that of the thorax.

## Ptilodactyla, Latr.

## Ptilodactyla humerosa.

Ptilodactyla lumerosa, Champ., Biol. Centr.-Am., Col., iii., 1, p. 642.

Hab. St. Vincent-Leeward and Windward sides.
Evidently a common insect in St. Vincent, Mr. Smith having sent twenty-five examples from the island. $P$. humerosa was described from a single male specimen from Teapa, Mexico. The third antennal joint is shorter than the fourth in both sexes. The coloration of the elytra is constant, the pale humeral patch being always well defined and the suture obscure ferruginous.

## Ptilodactyla sancti-vincentis, sp. n.

才. Oblong-elliptic, flattened above, shining, thickly clothed with short yellowish-cinereous pubescence; piceous or rufofuscous, the under surface, and sometimes the prothorax also, obscure ferruginous, the antennæ fusco-testaceous, the legs testaceous. Head closely, rugulosely punctate, the eyes moderately large ; antennæ very elongate, joints $4-10$ each with a rather long, slender ramus, 3 stouter and slightly shorter than 4. Prothorax short, convex in front, the sides rounded and rapidly converging from about the basal third to the apex, subparallel behind, the hind angles acute ; the base trisinuate, finely denticulate, and with a short projecting tooth in the centre ; the surface rather closely, finely punctate. Scutellum rugulose, notched in the centre in front. Elytra slightly wider than the prothorax, narrowly margined and a little rounded at the sides, the humeri obtuse ; flattened and seriate-punctate on the disc, the rest of the surface thickly, minutely punctate. Fifth ventral segment feebly arcuateemarginate at the apex. Tarsal claws with an acute tooth extending to about the middle.

Length $3-3 \frac{1}{3}$, breadth $1 \frac{1}{3}-1 \frac{1}{2}$ millim.

## Hab. St. Vincent.

Six examples, all males. Longer and more depressed than $P$. humerosa, the antennæ longer and with longer
rami, the third joint also relatively longer, the elytra unicolorous, etc. Amongst the very numerous CentralAmerican species, the present insect is nearest allied to $P$. marginata, Champ., from which it may be separated by its much smaller size, narrower shape, more narrowly margined elytra, shorter third antennal joint, etc. P. marginata has only been found in Southern Mexico and Guatemala.

## Ptilodactyla antillarum, sp. n.

đ. Oblong-elliptic, narrow, moderately convex, shining, somewhat thickly clothed with yellowish-cinereous pubescence; black, the elytra with an oblique testaceous humeral patch, the suture partly piceous, the antennre black, with the two basal joints reddish, the palpi and legs testaceous. Head sparsely, very finely punctate, the eyes rather small ; antennæ comparatively stout, joints $4-10$ each with a short ramus, 3 and 4 subequal. Prothorax short, convex in front, the sides rounded and rapidly converging from a little before the base to the apex; the base trisinuate, smooth ; the surface sparsely, finely punctate. Scutellum with a shallow notch in front. Elytra of about the same width as the prothorax at the base, subparallel in their basal half, narrowly margined at the sides, the humeri rounded; seriate-punctate to near the apex, the interstices sparsely minutely punctate. Tarsal claws with a rectangular tooth extending to about the middle.

Length 3, breadth $1 \frac{1}{3}$ millim.

## Hab. St. Vincent.

One male example. This insect is allied to P. humerosa, from which it may be known by the less elongate, black antennæ, with shorter rami and relatively longer third joint, the smaller and less prominent eyes, etc. Six females from Grand Etang, Grenada (1,900 feet), belong to the same, or to a very closely allied, species; they are smaller and paler than the male described, and have the thorax thickly granulate-punctate, the antennæ more slender, etc. The antennæ in $P$. antillarum are formed very much as in P. substriata, Champ., from Costa Rica.
XI. Quelques Formicides de l'Antille de Grenada récoltés par M. H. H. Smith. Par le Dr. Auguste Forel, professeur ì l'Université de Zürich.

> [Read March 17th, 1897.]

1. Camponotus abdominalis, Fabr.: r. opaciceps, Roger, 우 웅.
Cette forme est très voisine de C. sharpi, Forel, de St. Vincent, et ce dernier doit être considéré aussi comme une des nombreuses races locales du C. abdominalis.
2. Camponotus sexguttatus, Fabr., nec auctorum $(=0$. ruficeps, Fabr.): var. nov. grenadensis.
Identique à la form typique, mais les $\lcm{\downarrow}$ et $q$ entièrement d'un rouge jaunâtre clair avec l'abdomen seul noir ì six tâches blanch-
 même a la tête et le thorax plus ou moins d'un brun roussître.
M. H. H. Smith n'a rapporté que cette variété de Grenada, mais de trois endroits différents oì il a trouvé le nid sous les feuilles radicales des plantes. Je l'ai reçue en outre de Barbados par M. Jefferys.

Ayant moi-même voyagé aux petites Antilles en 1896, j'y ai étudié le $C$. sexguttatus qui y est très commun à la Martinique, la Guadeloupe et Sta. Lucia. Je n'y ai trouvé que la variété typique noire, avec la tête seule rouge chez les major et les 우. A Barbados j'en ai ouvert 20 ou 30 nids, les uns du grenadensis, les autres de la forme typique. Or j'ai observé un fait très curieux.

A la Martinique, cette espèce abonde dans la savanne où elle fait son nid en carton léger, composé de fibres ligneuses grisîtres, assez longues et agglutinées par la sécrétion des glandes des fourmis. Ce carton est disposé autour de l'aisselle des feuilles des touffes d'herbe de la savanne, ou aux endroits où elles sont rapprochées, et sert à former une enveloppe pour la fourmilière. Le nid n'a pas de chambres distinctes; tout au plus les interstices des feuilles sont-ils un peu séparés à l'intórieur les uns des autres à l'aide de ce carton. Toute la famille (les $\uparrow$, les $\hat{\text { on }}$, les larves) est entassée dans ces fragiles cavités qui ressemblent à une toile d'araignée desséchée et salie de terre ou de fibre. Dès qu'on les dérange, trans. ent. soc. lond. 1897.-part ih. (sept.) 20
les fourmis se défendent ou se cachent plus ou moins selon leur nombre. J'ai trouvé des nids analogues avec le même carton à d'autres endroits.

Or, à Barbados, pas un seul nid du C. sexyuttatus n'avait de carton. Ils se trouvaient sous l'écorce, dans les branches sèches et creuses ou sous l'aisselle de feuilles de bananes, l'un même dans la terre, sous une pierre.

A Sta. Lucia j'ai trouvé deux ou trois nids ayant un commencement de carton très lâche, à peine agglutiné. Du reste j'ai trouvé aussi quelques nids sans carton, dans des tiges creuses à la Martinique et à la Guadeloupe.
3. Prenolepis guatemalensis, Forel : r. antillana, Forel, 우 숭.
4. Prenolepis longicornis, Latr., $\Varangle$ ㅇ.
5. Brachymyrmex heeri, Forel: r. obscurior, Forel, ஒ đ
Cette forme mérite de former au moins une race. Outre les différences que j'ai déjì indiquées, il faut noter avant tout la forme bien plus allongée du thorax, surtout du pronotum et du mésonotum, la tête un peu plus allongée et les poils du corps plus épais et plus foncés. J'ai retrouvé cette race à la Martinique, la Guadeloupe, Barbados et Sta. Lucia, partout avec la même couleur foncée. Elle est un peu plus longue que le $B$. heeri typique et beaucoup plus grande que le $B$. minutus.
6. Dorymyrmex pyramicus, Roger (var. claire) $\searrow$.
7. Odontomachus hæmatodes, L.: r. insularis, Guérin, $\ddagger$ ô , et une petite variété de la $\uparrow$ qu'on peut rapporter à l'O. hirsutiusculus, Smith.
8. Anochetus (Stenomyrmex) emarginatus, Fabr.: r. testaceus, Forel, $\underset{\square}{ }$.
9. Anochetus inermis, André, $ఛ$ §
10. Anochetus mayri, Emery, ఫ઼.
11. Platythyrea pruinosa, Mayr, $\underset{\text { ¢̧ }}{ }$.
12. Ieptogenys arcuata, Roger, ${ }^{\text {of }}$.
13. Eciton klugi, Shuck., ${ }^{\text {on }}$.

Pris à trois endroits différents. Correspond exactement à la description de Shuckard, mais en outre, cette curieuse espèce a entre le front et le vertex, de chaque côté de l'ocelle antérieur et devant lui, un fort tubercule large et dentiforme. Une profonde échancrure triangulaire, médiane, sépare ces deux tubercules. Les dents do l'epistome sont très larges, grandes et fort pointues.

Cette trouvaille prouve que l'Eciton klugi habite bien les petites Antilles et ma supposition ('Fourmis de St. Vincent') qu'il pouvait y avoir eu erreur de localité est fausse.
14. ? Eciton klugi, ఫ઼ sive? E. antillanum, sp. n.

Long. 3,5 ì 6 mm . Crochets des tarses simples. Premier nœud du pédicule sans dent ni appendice en dessous. Ces deux caractères le distinguent de l'E. omnivorum (ceccum) d'un côté et de l'E. punctaticeps de l'autre. Il ressemble beaucoup à ce dernier.

Mandibules striées, sémiluisantes, avec des points épars et quatre dents obtuses, plus larges et plus convexes que chez l'E. punctaticeps. Tête des $\lcm{\text { major au moins aussi longue que large, faible- }}$ ment échancrée et rétrécie en derrière (en trapèze arrondi), à côtés convexes, non déprimés. Sillou frontal large et distinct. Yeux nuls. Scapes assez fortement clavés et courbés vers leur tiers apical (vers leur milieu et plus fortement chez l'E. punctaticeps où ils ne sont que faiblement épaissis à l'extrémité). Articles 2 et 3 du funicule distinctement plus longs que larges (plutôt plus larges que longs chez l'E. punctaticeps). Comme chez l'E. omnivorum (сгесит), le mésonotum s'élève en marche d'escalier au dessus du métanotum. Ce dernier cubique arrondi, à face déclive légèrement plus longue que la face basale. Les deux nœuds du pedicule courts, épais et cubiques, comme chez l'E. punctaticeps, mais sans dent sous le premier. Le dos du thorax est un peu plus convexe que chez l' $E$. punctaticeps. Les crochets des tarses sont simples, longs et courbés.

Luisant, sauf le devant de la face basale du métanotum qui est réticulé, ponctué et subopaque. Tête assez abondamment, régulièrement et distinctement ponctuée; les points sont cependant plus espacés et plus fins que chez $l^{\prime} E$. punctaticeps. Sur le dos du thorax, les points sont plus grossiers, plus rapprochés, un peu allongés. Côtés du pronotum, pédicule et abdomen lisses; ces derniers avec des points piligères très fins.

Pilosité fine, abondante et assez courte partout, comme chez $l^{\prime} E$. punctaticeps (chez l'E. omnivorum elle est plus longue, plus éparse et plus grossière).

Couleur rougeître de l'E. omnivorum, avec les $\underset{\neq}{ }$ minor plus pâles. L'E. punctaticeps est de couleur plus claire.

La carène latérale des joues est encore moins distincte que chez l'E. punctaticeps, courte et courbée en dedans, vers l'articulation de l'antenne.

Il est fort probable que c'est bien là l'ouvrière de l' $E$. lilugi, lors même que l'épistome et le front ne dénotent pas trace des caractères si typiques du $\hat{\text { o }}$, et lors même
que la taille est relativement forte et ferait, dans ce groupe, supposer un đ plus grand. Il n'est pas probable que la faune relativement pauvre des petites Antilles recèle deux espèces d'Eciton dont on connaîtrait les đ de l'une et les $\underset{\substack{~ d e ~ l ' a u t r e . ~ M a i s ~ l a ~ c h o s e ~ n ' e s t ~ p a s ~ p r o u v e ́ e ~ ; ~}}{ }$ les $\underset{\text { n'ont pas été prises avec les } \hat{\delta} \text {, et jusqu'à preuve suf- }}{ }$ fisante je donne à cette ouvrière le nom d'antillanum, sp. n.
15. Cryptocerus araneolus, Smith, $ฺ$.
16. Cyphomyrmex rimosus, Spin., $\ddagger$.
17. Strumigenys smithi, Eorel, $f$.
18. Monomorium minutum, Mayr : r. ebeninum, Forel, $\Varangle$ ㅇ ci.
19. Monomorium floricola, Jerd., ఛ̧.

21. Wasmannia sigmoidea, Mayr, +
22. Solenopsis castm, Forel, + .
23. Solenopsis globularia, Smith, if $\mathrm{o}^{\mathrm{s}}$.
24. Solenopsis geminata, Fabr., $\Varangle$ 아.
25. Cremastogaster brevispinosa, Mayr: r. minutior, Forel.
Cette forme mérite de former une race. La pubescence est plus abondante et plus longue que chez le C. brevispinosa typique; la suture pro-mésonotale n'est pas toujours tout-ì-fait obsolète.
26. Pheidole guilelmi-mülleri, Forel, r. antillana, For.,

27. Pheidole fallax, Mayr., $\Varangle>$.
28. Pheidole flavens, Roger: r. sculptior, For., var. nov. grenadensis, For., 孔 우 đ $\psi$.
Le 2 diffère de la r. sculptior de St. Vincent par son occiput lisse et luisant et par ses épines métanotales un peu plus longues.
29. Pseudomyrma flavidula, Smith, $\underset{\text {. }}{ }$

A part l'Eciton kilugi et son ouvrière probable, la récolte de M. H. H. Smith ne nous offre que deux variétés inédites. L'Eciton klurgi avait du reste été trouvé d'abord à St. Vincent. L'Anochetus inermis, la seule des espèces de Grenada qui n'ait pas encore été trouvée à St. Vincent à été trouvé par moi à la Martinique, de sorte qu'il existe dans nul doute aussi dans la première de des îles. L'identité des deux faunes paraît donc être presque absolue.
XII. Ne?v or little-known Sphegidæ from Egypt. By the Rev. F. D. Morice, M.A., F.E.S.
[Read June 2nd, 1897.]

## Plate VI.

The insects to be described below were taken by myself near Cairo in the spring of last year (1896). Herr Kohl, of Vienna, kindly allowed me to send any of my captures for examination either by himself or by his colleague, Herr Handlirsch, and I have described as new such species only as were pronounced to be so by one or other of these entomologists. For the accuracy of my descriptions, however, I must take the sole responsibility, though I have received useful hints from my friend and neighbour, Mr. Edward Sannders, besides suggestions from Herren Kohl and Handlirsch as to the affinities of particular insects, and have also of course been helped at every step by the published works of these authors on the Sphegidæ. As to the names and arrangement of genera I have followed Herr Kohl's "Gattungen der Sphegiden," just published at Vienna. In the descriptions, also, I have mainly adopted his nomenclature; but in numbering the abdominal segments I have not reckoned the propodeum, so that my "segment 1 " is that which follows the constriction, and so on.

My figures are drawn from the type-specimens with the camera lucida under low powers of the compound microscope. Though I am no draughtsman, I believe that the outlines of the objects as I saw them are correctly given, but a more practised artist would (I daresay) have managed to place them so as to escape the appearance of asymmetry, which I have not always been able to avoid.

The most interesting, perhaps, of these insects is the new species of Kohlia, $\hat{\delta}$ and $\dot{f}$, as that genus has rested hitherto on a single $\circ$ specimen from South Africa in the Berlin Museum (K. cephalotes, Handl.). The Tachysphex (?) with entire mandibles and a strongly
trans. ent. soc. lond. 1897.-part ili, (sept.)
punctured abdomen, which I call T. integer, is also a very extraordinary insect, being separated by characters of at least subgeneric value from all other known species.

Sphex stschurowskyi (?), Rad. (Pl. VI., fig. 1.)'
才. Totus niger. Alæ hyalinæ marginibus apicalibus late infuscatis. Facies pilis stratis argenteis atque etiam erectis aliquot nigris vestita; vertex, tempora (longissime), et thorax plus minusve nigro-hirta.

Vertex microscopice rugulosus, opacus, punctatus: mesonotum (ad latera presertim) fortius rugulosum et punctatum, a basi medio tenus impressione distincta marginibus carinatis divisum ; scutellum bi-gibbosum, linea impressa centrali divisum ; postscutellum in medio tuberculato-elevatum : propodeum clathratorugosum, lateribus nigro-hirtis; abdominis dorsum nitidum microscopice punctulatum, segmenta ventralia 1,2 nuda, reliqua brevissime pruinoso-pubescentia satisque evidenter punctulata. Tibiæ posticæ intus pallide fusco-pubescentes.

Long. circ. 20 millim.
Hab. Abbasiyeh, iuxta Cairo, 2, V., 1896.
Scribit ad me Dom. Kohl esse hunc, non, ut putaveram, S. argentifrontis, Lep., sed verisimiliter S. stschurowskyi, Rad., marem adhuc ignotum.

## Cerceris pallidula, sp. n. (?)

Pallide flava; flagello rufescente, superne infuscato; vertice (temporibus quoque in ${ }^{*}$ ) et prothorace nigro-maculatis; mesonoto nigro flavo-vittato; segmentorum abdominalium apicibus fuscis vel rufis. Alæ superioris apex infumatus. Segmentum ventrale 2 sine lamina distincta. Flagelli articuli 2 et 3 fere æquales, horum simul sumptorum (circiter) longitudine ocelli posteriores inter se et ab oculis distant. Clypeus simplex. Pronotum antice emarginatum, angulis rotundatis.

Caput dense punctatum; mesonotum satis nitidum, punctis magnis et (in disco saltem) remotis; scutellum vix nisi levissime punctulatum. Propodei latera punctata, nec confertim, nec profunde. Area basalis propodei lateribus evidenter oblique striatis, disco lævi.

Long. 7-10 millim.

Hab. 今. Koubbeh, prope Cairo, 12, V.; Abbasiyeh, 19, V.: $\mathfrak{f}$. Abbasiyeh, 12, V., 1896.

Videtur fieri posse, ut hrec C. pulchella, Klug., revera sit. Sed quia a specie illa evidenter differt, quam sub titulo pulchella, Klug., descripsit Dom. Schletterer, auctoritatem viri tanti veritus, nomen alind imposui.

## Cerceris pruinosa, sp. n. (PI. VI., fig. 2.)

¢. Precedenti pictura simillima, sed maior. Preter maculam in vertice, occiput quoque inter oculos menisco nigro notatur. Scutella pæne alba. Margines segmentorum abdominalium non nisi levissime rufescunt.

Facies pilis stratis argenteis splendens. Tempora, thoracis latera, et abdominis segmentorum dorsalium apices plus minusve distincte nitido-pruinosa.

Segmentum ventrale 2 basi elevata. Ocelli posteriores inter se et $a b$ oculis flagelli articulorum $1+2$ (circiter) longitudine distant. Clypei margo ut in fig. 2. Pronotum haud evidenter emarginatum.

Caput, mesonotum, et propodeum (extra aream basalem) satis crasse rugoso-punctata : scutella et propodei area basalis læviora, punctis nonnullis minime profundis impressa: propodei area basalis propter striolas microscopicas pæne opaca, marginibus evidenter striatis, sulco mediano consuto.

Long. 12 millim.
ot latet.
Hab. ㅇ. Abbasiyeh, 19, V., 1896.

Cerceris hirtiventris, $\mathrm{sp} . \mathrm{n}$.
才. C. quinquefasciate, Ross., hirsutie ventris, penicillis lateralibus, aliisque notis multis, affinis: differt tamen evidenter, temporibus haud post oculos incrassatis ; pronoto (postice viso) angulis lateralibus prominentibus, quam mesonoti margo apicalis evidenter magis elevatis; propodei area basali minus crasse, magis transverse, rugosa ; segmentis abdominalibus vix distincte strangulatis; pictura flava longe ditiore; alæ superioris apice fortiter infumato.

Nigra; facie (preter cavitates super antennarum insertiones nigras), maculis in vertice et temporibus, lateribus pronoti, vittis
quattuor metanoti, tegulis, scutellis, pleurarum magna parte, et abdominis fasciis latissimis segmenta pæne tota obtinentibus, flavis. Antennarum scapus flavus, Hagellum testaceum superne infuscatum. Pedes flavi, femoribus posticis et tibiarum posticarum apicibus infuscatis, tarsis testaceis.

Long. 12 millim.
ㅇ latet.
Hab. đ. Zeitoun, prope Cairo, 11, V., 1896.
Cerceris lutea, Tasch. (=C. nilotica, Schlett.)
Feminas speciei huius nonnullas cum maribus in fossa castrorum que "Abbasiyeh" vocantur, iuxta Cairo, 21 Mai, 1896, inveni, qui mares iidem sunt quos nomine C. niloticæ descripsit Dom. Schletterer.

## Cerceris tuberculata, Vill.

$$
\text { Varietas ( }=\text { C. erythrocephala, Dahlb., nec Schlett.) }
$$

Speciei huius feminas aliquot cum maribus mense Maio ad Abbasiyeh repperi, corporibus nigris, capitibus pedibusque rufis. Marem sic coloratum unum tantum inveni: ceterorum marium omnium abdomina flava erant basibus rufis, segmentorum basibus apicibusque angustissime cum.ventribus nigrantibus.

> Cerceris vidua (?), Klug.

Marem a me ad Nakhle (prope Cairo), 26 Mai, 1896, inventum scribit Dom. Kohl huic fortasse speciei adnumerandum esse. Ei descriptio Klugiana omnino convenit, excepto quod non dici debet "scutellum albobipunctatum," sed potius "postscutellum albo-subinterrupte fasciatum."

Si revera C. vidua est, de structura corporis hæc sunt adjicienda.-Ocelli posteriores inter se et ab oculis vix flagelli articulorum $1+2$ longitudine distant. Propodei area basalis crasse et longitudinaliter strigosa. Segmentum abdominis dorsale 1 latitudine sua sesqui longius, lateribus fere a basi ad apicem parallelis; 6 lateribus evidenter denticulatis: ventralia 2-4 in medio haud, in lateribus crasse punctata; 6 utrinque fortiter dentato, 8 denticulato.

Ad eandem speciem marem alterum referendum esse credo, ad Zeitoun (Cairo), 15 Mai, captum. Structura enim plane eadem est, etsi pictura aliquantum differtscutello (cum postscutello) immaculato, abdominis segmento dorsali $\partial$ albo-maculato.

## Tachytes denticulata, sp. n.

ㅇ. Nigra, seapo (partim) antennarum, mandibulis proter apices, pedibus preter coxas, et abdomine fere toto testaceis, huius segmento dorsali 4 cum basi quinti nigro-maculato. Facie temporibus et lateribus thoracis pilis stratis argenteis satis dense vestitis; abdomine (presertim in lateribus apicibusque segmentorum dorsalium) femoribus tibiis tarsisque brevius argenteo-sericeis ; vertice et mesonoto griseo-pubescentibus. Clypei pars media ut in $T$. ambidente, Kohl, bidentata : sed oculi inter se in vertice fere duplo plusquam primi secundique flagelli articuli longitudine distant. Alæ superioris areola appendicularis distincta et completa. Vertex nitidus; dorsulum tenuiter punctulatum. Metatarsi antici 6ciliati.

Long. 12 millim.
Hab. ㅇ. Zeitoun, iuxta Cairo, 22, V., 1896.

## Tachytes cameroniana, sp. n.

才. Nigra; mandibulis (partim), tegulis venisque alarum, pedum genibus tarsisque cum calcaribus, etc., apicibusque segmentorum abdominalium sordidius lutescentibus. Caput thoraxque totus (propodeum satis longe) albido pilosa; facies, tempora, pronotum, pedes superne, segmentorum abdominalium apices cum lateribus totis, et valvula analis, pilis stratis argenteis dense vestita.

Ocali inter se in vertice circiter $2+3$ articulorum flagelli longitudine distant. Cellula appendicularis vix distincte indicatur. Clypei apex haud dentatus. Metatarsi antici 5 -ciliati. Caput cum thorace dense profundeque punctatum.

Long. 10 millim.
¢ latet.
Hab. đ. Zeitoun, 22, V., 1896 .
Speciem cum antecedente aliisque in horto hospitis mei benevolentissimi Dom. Cameron, Judicis Curialis in Cairo, captam in honorem eiusdem nominari volui.

## Tachysphex fasciatus, sp. n. (Pl. VI., figs. 3, 4.)

¢. Niger, segmentorum abdominalium marginibus pallidis. Mandibulæ in medio, tarsi, tibiæ, et femora (basibus superne infuscatis) testacea. Tegulæ venæque alarum sordidius flaventes. Caput cum thorace albo-, facies argenteo-pubesceus. Abdominis segmenta 1-4 (an et 5 ?) argenteo-fasciata.

Oculis inter se in vertice circiter articulorum $1+2+3$ flagelli longitudine distant. Propodeum cum lateribus rugulosum, obscure punctulatum, haud striatum. Area pygidialis lata, marginata, punctata (fig. 3). Vena cubitalis tertia valde producta, superne bis tantum quantum secunda angustata (fig. 4).

Long. 9 millim.
Hab. Zeitoun, 15, V., 1896.

## Tachysphex ægyptiacus, sp. n.

Niger cum pedibus mandibulisque. Facies et segmentorum dorsalium abdominis $1-\frac{1}{2}$ margines argenteo-sericantes. Thorax griseo-subhirtus, punctulatus, subnitidus. Alæ fusco-hyalinæ ; areola radialis satis late truncata, appendicularis distincta, cubitalis 3 parum producta, superne lata. $\%$ area pygidialis (uṭ in T. mediterraneo, Kohl) lata, nitida, punctata.

Vertex latus. Oculi in utroque sexu evidenter plusquam articulorum $2+3$ flagelli longitudine distant.

Long. $3 \frac{1}{2}-6$ millim.
Hab. Species prope Cairo haud infrequens in mense Aprili, etiam ad Suez 16, IV., 1896.

## Tachysphex heliopolites, sp. n. (Pl. VI., figs. 5, 6.)

夫. Niger, mandibulis in medio rufis, tarsis cum genibus obscure rufescentibus. Tegulæ cum venis sordide flavæ, subcosta basi fusca. Caput cum thorace basique abdominis pallido-pilosum, hoc segmentis $1-3$ argenteo-fasciatis. Oculi inter se vix articulorum $1+2$ flagelli longitudine distant. Calcaria postica metatarsis evidenter breviora. Area appendicularis vix indicata, cubitalis 3 satis elongata.

Mesonotum et propodei area horizontalis crasse granulosorugosa, truncatura striata : scutellum minus fortiter rugulosum, punctatum.

Maris supra descripti nescio au hæc sit femina, eodem die ibidem capta.
¢. Corpus evidenter minus pilosum ; facies argenteo-sericea. Mesonotum nitidius, punctulatum. Pedes tibiis quoque rufis. Subcosta non fusca, sed rufo-brunnea. Antennæ basim versus solito (ut mihi videtur) crassiores. Oculi inter se plusquam flagelli articulorum $1+2$ (minusquam $2+3$ ) longitudine distant. Area pygidialis (fig. 5) transversim subtilissime aciculata cum punctis nonnullis magnis. Alæ superioris apex ut in fig. 6 .

Long. đै, 8; ㅇ, 10 millim.
Hab. ô et $+\underset{q}{ }$. Zeitoun, prope Cairo, 22, V., 1896.
Similis T. fluctuato, Gerst., sed vertice inter oculos evidenter latiore.

## Tachysphex buyssoni, sp. n. (Pl. VI., figs. 7, 8.)

Niger, facies of aureo- $\uparrow$ argenteo-sericans; oculi plus minusve virentes. Clypei apex, cum labro et mandibulis in medio, rufescens : his ante excavationem conspicuam latis et satis fortiter dentatis. Tarsi tibiæ femorumque apices rufi. Abdominis segmenta 1-3 (in of 6 quoque) rufa: margines omnium preter ultimum decolorati. Thorax totus concinne reticulato-rugulosus et punctulatus, in f flavescente-griseo tomentosus, in $q$ argenteo minus dense pubescens. Thoracis fasciæ parum conspicure (? nisi forte sunt detritæ). Oculi in of flagelli articuli circiter $1+2$, in $\rho$ minus quam 2 longitudine distant. Areola cubitalis tertia superne lata, haud fortiter producta (fig. 8). \& area pygidialis formata ut in fig. 7, reticulato-aciculata, apicem versus punctata haud profunde.

Long. $\begin{gathered}\text {, }, 12 ; ~\end{gathered}$, 14 millim.
Hab. Koubbeh, iuxta Cairo, đ, 23, IV.; ㅇ, 12, V., 1896.

Speciem in honorem Vice-comitis Roberti du Buysson hymenopterologi clarissimi, beneficiorum multorum haud immemor nominari volui.

Tachysphex luxuriosus, sp. n. (Pl. VI., figs. 9, 10.)
¢. Niger; clypeo, mandibulis (præter apices), scapo, et pedibus (maximam partem), testaceis. Abdominis segmenta dorsalia 3-s̃ nigra vel fuscata, reliqua testacea : venter testaceus vix fusco-fasciatus. Caput thoraxque totus, abdominis quoque segmenta dorsalia $1-5$ in lateribus apicibusque tomento denso argenteo pulcherrime vestita; immo etiam bases segmentorum argenteo-pubescentes, quod tamen nonnisi in certis aspectibus
videri potest. Sculpturam thoracis propter densissimum tomentum examinare nequivi. Vertex sane latissimus : oculi certe inter se multo plusquam longitudine articulorum $2+3$ flagelli distant. Segmentum 6 dorsale (fig. 9), area pygidiali indistinctius quam solet definita. Alæ superioris apex (fig. 10).

Long. $10 \frac{1}{2}$ millim.
$\delta$ latet.
Hab. ㅇ. Koubbeh, 27, IV., 1896.
Tachysphex speciosissimus, sp. n. (Pl. VI., figs. 11, 12.)
ㅇ. Niger. Scapus infra cum mandibulis (partim) sordide testaceus : abdomen preter maculas haud magnas basales segmentorum dorsalium 4, 5 lætissime aurantiacum ; tarsi tibiæ femorum que apices testacei. Caput et thorax precipue in lateribus dense argenteo-pubescentia, segmentorum dorsalium 1-5 apices (2-5 latera quoque) conspicue argenteo-fasciati : præterea totum fere animal certis aspectibus pubescentia argentea brevissima quasi pulveratum videtur.

Oculi inter se in vertice aliquanto plusquam articulorum $1+2$ flagelli longitudine distant. Area pygidialis angusta, bene definita (fig. 11). Alæ superioris apex ut in fig. 12. Propodei pilosissimi sculpturam videre nequivi.

Long. 10 millim.
$\delta$ latet.
Hab. ㅇ. Koubbeh, 4, V., 1896.
Tachysphex (?) integer, sp. n. (Pl. VI., figs. 13, 14.)
Niger, mandibulis in medio et pedibus (obscurius) in apicali parte rufescentibus, segmentorum abdominalium marginibus decoloratis, tegulis sordide flavis, alarum venis et precipue subcosta fuscis. Alæ plus minusve infumatæ.

Mandibulæ haud excisæ. Clypei apex ut in fig. 13 productus. Caput et thorax pallido-pubescentia; mesonotum cum scutello nitidum crasse punctatum ; propodeum opacum, fortiter rugosum. Abdomen, ut in genere Prosopigastra, fortissime punctatum (sed frons super antennis simplex); đ femora excisa. \& area pygidialis elongata, reticulato-aciculata, punctata, subnitida. Oculi in vertice inter se flagelli articulorum minusquam $2+3$, plusquam $1+2$, longitudine distant. Alæ superioris apex, fig. 14.

Long. circ. 8 millim.
Hab. Zeitoun, Chams, Koubbeh, iuxta Cairo.

Auctoritatem Dom. Kohl secutus animal hoc Tachysphecibus veris adnumero: est nihilominus in genere eo species valde abnormis.

## Prosopigastra handlirschi, sp. n. (Pl. VI., fig. 15.)

of. Nigra; mandibulis, clypei apice, callis humeralibus (obscure) et tegulis cum venis alarum, tibiis tarsisque omnibus, femoribus posticis, et abdomine toto, satis lete rufo-testaceis. Caput dense punctatum ; mesonotum cum scutello fortius sed remotius punctatum, nitidum. Propodei pars horizontalis semicircularis, clathrato-rugosa, marginata ; latera eiusdem striata, pubescentia. Segmentum dorsale altimum fere triangulare apice (fig. 15), emarginato cum angulis distinctis.

Long. 8 millim.
of latet.
Hab. ㅇ. Nakhle, prope Cairo, 26, V., 1896.
Prosopigastra larior, sp. n. (Pl. VI., figs. 16, 17.)
¢. Nigra ; mandibulis preter bases, tarsisque (his obscurius), rufis; genibus (late), tegulis, venisque alarum, pallide flavis; segmentorum abdominalium marginibus pallidis. Mesonotum scutellumque nitida, pæue lævia, punctulis satis remotis conspersa ; propodei area horizontalis basi oblique apicem versus transverse undulato-rugulosa lateribus argenteo-pilosulis.

Alæ superioris areola radialis brevis, haud procul ab apice suo venam cubitalem 3 excipiens (fig. 16). Segmentum dorsale ultimum opacum, apice (fig. 17) pallido late rotundato-truncato.

Long. 7 millim.
ot latet.
Hab. ㅇ. Abbasiyeh, iuxta Cairo, 29, V., 1896.
Hologambrus sericans, sp. n. (Pl. VI., figs. 18, 19.)
Caput oculis in vertice valde approximatis, super ocellum anteriorem tumidum nudum punctatum, inter hunc et antennas valde tuberculatum, facies præter hos duo tuberculos dense argenteo-sericea; clypeus brevis, margine medio transverse foveatus laterum angulis dentato-prominentibus ; antennæ simplices (figg. 18 et 19).

Mesonoti pars apicalis et latera dense punctata, basis cum
scutello nitida punctis sparsis ; propodei area horizontalis semicircularis, basi rugulosa, lateribus oblique striatis ; pleure (cum postscutello) et præcipue metapleuræ albo-pilosæ. Abdominis segmenta dorsalia 1-6 dense punctulata, basibus apicibusque (his decoloratis) pilis stratis argenteis fasciata, 6 apice impresso, 7 disco medio cavato nitido punctis magnis remotis consperso ; segmenta ventralia 2-6 basibus punctatis, apicibus depressis decoloratis breviter aureo-sericeis, 2 (lateribus minus distincte), 3-5 (evidenter) transverse callosum, 8 apice emarginato.

Corpus nigrum, mandibulis partim rufescentibus, tegulis (maximam partem) venis alarum, tarsis, tibiarum basibus apicibusque, femorum et segmentorum abdominalium apicibus pallide flavis.

Long. 8 millim.
of latet.
Hab. §. Koubbeh, 13, V., 1896.

## Dinetus cereolus, sp. n.

¢. Statura minima, long. vix $4 \frac{1}{2}$ millim. Oculi cum vertice, macula triangularis in disco pronoti, mesonotum inter parapsidas (exceptis punctis duobus lateralibus ante scutellum), fascia basalis postscutelli, propodei vitta lata centralis (basi in utrumque latus anguste excurrens), femora supra plus minusve, et mandibularum apices, nigri ; ceterum corpus pallidissime flavum.
ot latet.
Hab. ㅇ. Cairo, 25, IV., 1896.
A D. picto, Jur. (qure unica adhuc generis huius species innotuit), præter exilitatem picturamque dissimilem, differt evidentissime, dorsulo non dense punctulato sed microscopice reticulato, punctis perpaucis magnis hic illic interstincto; lateribus propodei nudis, haud argenteo-sericeis, alis magis albo-hyalinis, venis pallidioribus.

Animalis huius partes pallidæ propter minutissimam reticulationem ceream quandam opacitatem habent, quod in nomine imponendo indicare volui.

Palarus saundersi, sp. n. (Pl. VI., figs. 20-22.)
む. Pictura (preter antennas fuscas) et statura (circ. 15 millim.) Palaro spinola, de Sauss., simillimus, his tamen notis facillime dignoscitur.

Oculi inter se in vertice multo minus distant (fig. 20): mesonotum longe subtilius punctatum: ale haud subfuscofasciate: area superior propodei minus profunde sulcata. Segmentum ultimum dorsale abdominis neque (ut in P. spinole, de Sauss., P. flaripete, Fabr., et P. humerali, Duf.) apice bifurcato, neque (ut in P. orientali, Kohl) basi bispinosa, sed pæne simplex (fig. 21) : segmenti veutralis 2 callus transversus (postice visus) margine apicali denticulato (fig. 22).
of latet.

## Hab. Koubbeh, 4, IV., 1896.

Kohlia coxalis, sp. n. (Pl. VI., figs. 23-27.)
Vertex intra ocellos subtiliter, extra eosdem multo fortius punctatus. Mesonotum et scutella subnitida punctis magnis conspersa, atque etiam inter hæc puncta microscopice punctulata. Propodei area horizontalis clathrato-rugosa. Abdomen opacum, crasse, valde irregulariter, haud profunde punctatum, punctis ita dispositis ut nonnusquam fere in strias continuas transversas vel undulatas (uunquarm longitudinales) confluant. Coxæ anticæ ut in fig. 23 singulariter scutato-dilatatæ. Trochanteres magni. Metatarsi antici of (evidenter) of (longius) pectinati. Metatarsi postici in utroque sexu prope basim curvati (fig. 24). Flagelli articulus 2 (fig. $25,{ }^{\text {® }}$ ) curvatus et leniter excisus. Alæ in utroque sexu satis breves.

む. Segmenta ventralia apicalia pilis sat densis conspicue fimbriata. Segmentum ultimum ventrale bidentatum (fig. 26). Genitalia (fig. 27) stipitibus processus binos apicales longos emittentibus, interiores nudos, super sagittas quodammodo arcuatos, exteriores sub pilosos: sagittarum apicibus valde dilatatis, deflexis (an etiam counatis? mihi quidem sic videtur).

ㅇ. Segmentum dorsale ultimum, triangulare, nudum, fortiter strigosum, strigis a basi ad apicem convergentibus.
§. Capite et thorace nigris, albescente flavo opulentissime variegatis, antennarum scapis flavis, flagellis aurantiacis; abdomine aurantiaco, pallidissime flavo- (pæne albo-) late fasciato; pedibus partim aurantiacis, partim pæne albis.
q. Pallide flava; fronte media, vertice, occipitis basi cum pronoti apice, mesonoto (exceptis lateribus vittisque duabus flavis), propodei basi centralique parte, et maculis quibusdam parvis lateralibus in abdominis dorso nigris. Color aurantiacus vix nisi in flagellis antennarum et in ventre apparet. Frontis latera, clypei
pars basalis, et mesonoti apex, in utroque sexu breviter sed conspicue argenteo-pubescentia.

Long. ơ, 11 ; ㅇ 12 , millim.
Hab. đ, 26, V.; 우, 21, V., 1896; prope Cairo.
Generis Kohlix, Handl., exemplar unicum tantum ( $K$. cephalotes, Handl., \&) ante hæc duo nostra est repertum. Indicavit iam Dom. Kohl in opere suo "Die Gattungen der Sphegiden" (p. 418),* maris huius nostri characteres, quibus genus Kohlia magis exacte definiri possit.

Stizus fuscatus, sp. n. (Pl. VI., figs. 28, 29.)
§. Totum pæne corpus nigrum vel cyanescens, satis dense punctatum. Pedes apice plus minus cum calcaribus, tegulæ, scapus subtus, et venæ alarum rufi. Labrum inmaculatum. Segmenta dorsalia 3 , 4 , in lateribus obscure flavo-guttata. Alæ fuscoviolascentes, marginibus late hyalinis. Antennarum articulus ultimus pallet.

Oculi in clypeum vix convergentes: facies sat lata (fig. 28). Vena cubitalis 1 mediocriter, 2 valde, curvata. Antenne (fig. 29) simplices præter articulum ultimum curvatum, apice evidenter oblique truncato. Pedes et venter simplices. Segmenti 7 dorsalis latera sinuata ; apex obtusus.

Long. 21 millim.
of latet.
Hab. § ad Cairo, 5, V., 1896.
S. spinulosi, Rad., marem hactenus ignotum credideram hunc fortasse esse. Sed S. spinulosum (quem non vidi) in manipulum S. ruficornis adscribendum esse Dow. Handlirsch in Monographia sua docet: nostrum animal S. fasciati potius ad manipulum pertinet, quod, specimine examinato, mihi vir clarissimus iam significavit.

## Stizus niloticus, Handl.

$\ddagger$ (hactenus ignota). Structura corporis exemplaribus magnis $S$. fusciati, Fabr., simillima ; alis minus flavescentibus, in radiali parte distinctissime infuscatis; segmento dorsali sexto basi ipsa tenus pilis stratis squamiformibus læte aureis satis dense vestito.

[^14]Caput maximam parte n ferrugineum ; macula T-formi ocellos includente et occipite inter tempora nigris; facie sub antennis flava. Antennæ ferrugineæ, articulo 1 flavo, 9 supra infuscato.

Prothoracis pars media (non humeri), latera mesonoti, scutellum totum, pedes preter bases nigras, et venæ alarum ferrugineorufescentes. Abdominis segmentum dorsale 1 læte rufo-pictum, 2 nigrum fascia magna interrupta flava, 6 obscure ferrugineum, cetera pæne tota flava. Infra abdominis pars basalis rufa est ; media nigra; apicalis sordide flava.

Long. circ. 25 millim.
Hab. Chams, prope Cairo, 18, V., 1896.
Teste Dom. Handlirsch, S. rufiventri, Rad., (quem non vidi) valde affinis.

- Stizus cheops, sp. n. (Pl. VI., figs. 30, 31.)
S. nilotico similis sed minor ( $\widehat{\circ}$ circ. $15 ; ~$ ㅇ, 19 millim.). Alæ, of vix infumate, $q$ prorsus hyalinæ, tantum in ipso angulo basali flavescentes. $\widehat{*}$. Antennarum articuli 3 ultimi (fig. 30) subæquales, artic. 13 minus etiam quam in $S$. nilotico curvatus. Facies (fig. 31) inter oculos aliquanto angustior. Segmentum ultimum dorsale ( $₫$ ) nigricat, pilisque brevissimis nigris vestitur; ( $q$; rufescit, apicem versus pilis stratis aureis plus minusve obtectum.

Hab. Zeitoun, Koubbeh, mensibus Aprili et Maio, 1896.

Pictura corporis pæne ut in $S$. nilotico, sed venter in utroque sexu nonnisi angustissime nigro-natatur, caputque feminæ nigrum est (non ferrugineum). Maris antennarum flagellum supra multo minus distincte infuscatur, articuli duo ultimi toti flavent.

Bembex kohli, sp. n. (Pl. VI., figs. 32-34.)
Affinis B. portschinskii, Rad., eidemque similis. Oculi subparalleli; inter se fere tantum distantes, quantum a clypei basi anterior ocellus. Caput cum thorace dense cinereo-pilosum; thoracis dorsum microscopice rugulosum, punctis quibusdam magnis minime profundis irregulariter sed satis dense conspersum. Alæ longitudine normali, nervis pallidis, subcosta nigricante.

TRANS. ENT. SOC. LOND. 1897.—PART III. (SEPT.) 21

す. Antennarum articuli $8,9,10$ ante apices dentato-producti (fig. 32). Pedes antici simplices, metatarsis septem-ciliatis. Pedes intermedii femoribus dentatis (dente medio maximo); tibiis evidenter curvatis, apice producto, sine calcari magno; metatarsis in medio emarginatis, ante excisuram et in apice setigeris (fig. 33). Segmentum dorsale 6 lateribus ante apicem leniter constrictis, apice obtuso angusto ; 7 apice triangulariter producto. Segmenta ventralia 2 et 6 tuberculata; 7 carinatum inter carinam et marginem lateralem impressum, apice leniter inciso; 8 acuminatum. Genitalia ut in fig. 34.
ot. Corpus nigrum, orbitis oculorum occipitalibus, lateribus frontis cum spatio inter antennas, clypeo, labro, mandibulis præter apices nigros, lateribus prothoracis cum humeris tegulisque, et maxima parte pedum nigro-lineatorum flavis; antennis ferrugineis, nigro-lineatis. Abdomen pæne totum nigrum ; segmenti 2 fascia dorsali plus minus obsoleta, et macula utrinque ventrali, viridiflaventibus, quæ pictura etiam ad segmenta $1,3,4$, nonnunquam extendit.

ㅇ. Pictura B. portschinskii (secundum descriptionem Dni. Handlirsch) simillima; sed segmento quinto dorsali (sicut quattuor anticis) fasciato, et lateribus frontis pallescentibus, his cum clypeo toto evidenter argenteo-pubescentibus. Structura corporis ab omni parte normalis.

Long. 15 millim.
Hab. Sexus uterque juxta pyramides Saccharæ repertus, 30, IV., 1896.

## Bembex nasuta, sp. n. (Pl. VI., figs. 35-39.)

of. B. rostratce, Linn., similis et affinis. Antennarum articulus 1 infra multo minus turgidus $7-10$ dentati, 11-13 excavati, 13 multo gracilior et longior (fig. 35). Segmentum dorsale 6 non rotundatum, sed truncatum angulis lateralibus distinctis (fig. 36). Segmentum ventrale 8 lateribus maximam partem parallelis, ante apicem ad mucronem efficiendum satis subito contractis (fig. 37). Stipites genitalium margine interiore evidentissime exciso (fig. 38), quæ excisura in $B$. rostrata vix aut ne vix quidem apparet.

Pedes, cum femoribus intermedio dentatis (fig. 39), sic ut in B. rostrata formati. Metatarsus anticus 7-ciliatus. Tubercula ventralia ut in B. rostrata. Pictura pallida abdominis in specimine nostro unico nusquam vere flavet : in discis segmentorum dorsalium 1-3 glauca est, alibi aurantiaca. Flavent prothorax pæne totus, orbity posteriores, spatium inter antennas harumque articulus
primus; cetera facies (clypeus, labrum, etc.) albet. Antennarum flagellum ferrugineum est; nigro-supra lineatum.

Long. circ. 25 millim.
q latet.
Hab. đ ad Cairo, 19, V., 1896.

Bembex frey-gessneri, sp. n. (Pl. VI., figs. 40-43.)
む. B. oculatce affinis sed distincta. Antennarum articulus 7 simplex ; 8, 9, 10, evidenter in medio dentati (fig. 40). Segmentum dorsale 6 apice latius rotundato, non (ut in B.oculata) margine ante apicem sinuoso-constricto, ipso apice leniter emarginato (fig. 41). Segmentum ventrale 7 apice latiore quam in $B$. oculata, carinis tribus multo minus approximatis (fig. 42). Genitalium stipes truncatus, non ad apicem constrictus neque acuminatus (fig. 43).

Pedes simplices præter femora intermedia serrato-dentata, dentibus spiniformibus. Metatarsi antici ciliis longis quinque.

Pictura abdominis glauca, non (nisi in lateribus plus minus) flavescens. Clypeus (præter puncta duo nigra), labrum mandibularum bases, orbitæ, prothoracis basis et latera, humeri, tegulæ, scutella et puncta nonnulla mesopleurarum, flava. Antennarum articulus 1 flavus, ceteri ferruginei; 1 (ad apicem), 2 et 3 nigro supra lineati. Pedes flavi, nigro-lineati.

Long. 15 millim.
of latet.
Hab. §. Koubbeh, iuxta Cairo, 13, V., 1896.
Speciem Dom. E. Frey-Gessner Genevensi, entomologo peritissimo, amico benevolentissimo, dicare gaudeo.

## Miscopluts ægyptius, sp. n.

ๆ. Niger, obscure ænescens, subnitidus, mandibulis cum palpis plus minusve rufescentibus.

Caput et mesonotum subtilissime punctata, scutellum subtiliter quidem sed fortius, punctis magis remotis; propodei area horizontalis carina elevata longitudinaliter divisa, oblique utrinque concinne striolata, apice abrupte truncata lateribus distincte angulatis, eiusdem pars declivis basi foveata, tota satis crasse transversorugosa : abdomen subtiliter punctatum.

Femora antica valde incrassata, tarsi antici vix pectinati.

316 Rev. F. D. Morice on New or little-known Spliegidie.
Clypei margo apicalis levissime crenulatus (won ut in M. spurio, Dahlb., productus neque reflexus). Alæ cellula petiolata parva.

Long. 5 millim.
$\delta$ latet.
Hab. Abbasiyeh (Cairo), 26, IV., 1896.
XIII. Mimetic Attraction. By Frederick A. Dixey, M.A., M.D. F.E.S., Fellow of Wadham College, Oxford.
[Read May 5th, 1897.]

## Plate VII.

In a former contribution* to the Transactions of this Society, I endeavoured to trace, by means of actual examples, the successive steps through which a complicated and practically perfect mimetic pattern could be evolved in simple and easy stages from a form presenting merely the ordinary aspect of its own genus. In the present paper I propose to enter somewhat further into the subject of mimetic change, and in the first place to show how the process of gradual assimilation, starting from one given point, may take not one direction only, but several divergent paths at the same time; in other words, how the members of a single group may assume several different mimetic developments, each one corresponding to a distinct model, but all derived by easy stages from the same original form.

In the paper just referred to it was shown that a very complete transition could be demonstrated, by means of ${ }^{*}$ closely-allied and still existing species, between an ordinary Pieris such as $P$. phaloe, presenting only the usual features of its genus, and a form of such widely different aspect as Mylothris pyrrha of ; the latter being a nearly exact copy of Heliconius mumata. But although these facts are sufficiently striking, it is perhaps still more remarkable that from the same or closely allied and very similar forms of typical Pierine aspect, at least four other lines can be traced, each showing almost as perfect a transition as that from $P$. phaloe to $M$. pyrrha, and each leading up to a presumably distasteful model ; these models being in appearance entirely different from $H$. numata and from each other.

[^15]A full illustration of this position would require a larger series of diagrams than could well be given in this place; it is hoped, however, that the series of figures on Plate VII. may suffice to show the more important links in each chain, or at any rate to make the drift of my statements intelligible. It should be borne in mind that all the forms here spoken of are neotropical.

1. The "agna" line. The first of these lines of development may be called the agna line, inasmuch as it leads towards a well-marked group of distasteful forms of which Aeria agna, Godm. and Salv., (Pl. VII., fig. 6) is a good example. Starting from a white Pieris of ordinary aspect like $P$. phalve, we find that the first step in the growth of this mimetic pattern is furnished by the prolongation of the diagonal dark bar, which in $P$. phaloe ${ }^{\circ}$ * extends from the costa to the distal end of the cell in the forewing, to meet the dark hind margin as in P. calydonia ㅇ (fig. 1, $k$ ). All stages in the development of this first feature can indeed be traced by comparing specimens of both sexes of $P$. calydonia itself. The next step is the extension of the dark hind border of the forewing, already more pronounced in P. calydonia than in $P$. phalve + , along the inner margin, as in $P$. demophile of (fig. 3, l). Simultaneously with this change the dark border of the hindwing is much broadened (ib., $l_{1}$ ), and in some specimens of $P$. demophile + , as in the one figured, the white ground colour is replaced by yellow. These changes are sufficient strongly to suggest the general aspect of the protected group referred to, and it seems difficult to believe that the appearance of the yellow female of $P$. demophile has not a significance derived from this fact.
2. The "atthis" line. But the last-named form, viz., the yellow $P$. demophile of, though the final Pierine term. in one transitional series, is but an intermediate term in another. This second line of development, starting afresh from $P$. demophile if, passes into an unmistakable mimetic relation with the protected group that centres round such forms as Heliconius atthis (fig. 8) and Tithorea pavonii.

Comparing $P$. viardi it with $P$. demophile $\dagger$, we find that in the former insect a further stage of divergence

- See Trans. Ent. Soc. Lond. 1896, pl. III., fig. 2, k.
from the original Pierine form has been reached (1) by a slight modification in shape and proportions of that area of the pale ground colour included between the diagonal bar and the dark inner margin of the forewing, and (2) by the appearance of a submarginal series of pale spots on both fore and hindwing (fig. 5, $n$ ). Both of these changes mark an approximation towards the characteristic aspect of the protected Heliconius atthis group ; but the final link in the Pierine chain, viz., the form represented in fig. 7, which appears to be the female of $P$. locusta or of a closely allied species, brings us nearer still. Here the pale area on the apical side of the diagonal bar ( $m$ ) shows a tendency to be broken up into separate spots; and the pale ground colour, which in $P$. viardi $\rho$ is uniformly yellow, in $P$. locusta i only retains the yellow tint proximally, the subapical area ( $n t$ ) and the submarginal spots ( $n$ ) having resumed their original white. These submarginal spots have also diminished in size and become more compact in outline. In all these respects a further approach is made towards H. atthis, and the whole series from P. phaloe or P. calydonia to P. locusta of and H. atthis affords as striking a succession of transitional forms as that before traced from the same ordinary Pierine types up to Mylothris pyrrha of and Heliconius numata.*

3. The "inachia" line. In this line an early step in advance of the usual Pierine pattern is taken by Pieris pandosia. $\dagger$ On the hindwing underside of this species appears a narrow chestnut-coloured streak in the midst of the dark hind-marginal band, rumning paraliel with the hind border of the wing. In P. leptalina, Bates ( $=$ P. pisonis, Hew.), both surfaces of the forewing show a diagonal dark bar as in $P$. calydonia o and other species; there is also a transverse dark bar crossing the undersurface of the hindwing nearly parallel with the costa (fig. 2). In P. pandosia, where the distal end only of this

[^16]latter bar is indicated, the chestnut-coloured streak takes no part in its formation ; in P. leptalina, however, the same chestnut-coloured streak is better pronounced along the hind margin than in P. pandosia, and is prolonged for a short distance along the transverse bar (fig. 2, o). In this way a considerable resemblance is brought about between $P$. leptalina and some of the well-known transparent neotropical Danainæ, which are presumably protected, such as Napeogenes inachia (fig. 4). It is worth noting that the bar $o$, which belongs to the hindwing in $P$. pandosia and $P$. leptalina, appears to represent the dark inner margin of the forewing in the model; and the presence upon its distal portion in $P$. leptalina of a slight prolongation of the chestnut marginal streak may perhaps stand for the turning inwards of the corresponding chestnut marginal band in $N$. inachia along the costal border (figs. 2 and 4).
4. The "numata" line. This series needs here no more than a mention, as it has been already discussed and illustrated in the paper above referred to.*
5. The "tarracina" line. This is an offshoot of the last, or numata line, diverging in the neighbourhood of Mylothris malenka $\circ$, or perhaps somewhat further back towards the original Pieris. The remarkable form $M$. alethina $\&$ shows a near approach to the pattern of Tithorea tarracina and other associated species; its own aspect being probably derived from a type like M. lorena 와 or $M$. malenlia $q$, in which the yellow of $P$. demonhile + has persisted, and the base of the forewings has become overspread with black. $\dagger$

General Considerations. There is, therefore, in each one of these cases, a continuous line to be traced; starting in every instance from the same ordinary Pierine form, and passing through a graduated series of closely-allied

[^17]species until it terminates in a Pieris or Mylothris bearing an intimate mimetic relation with some insect of entirely different affinities. It is further to be observed that, in every instance, the species here considered as the model towards which these diverging series tend, does not present an isolated and independent scheme of coloration, but is itself a member of a larger or smaller group of forms, in addition to the Pierine mimic, all of which are endowed with an aspect similar to itself-in other words, that the mimetic associations do not run simply in pairs, but in groups. This latter fact has long been recognised; and the existence of such mimetic groups has been shown by F. Müller, Meldola, and Poulton to possess a further significance than that originally detected by Bates. The elaborate work of Haase* contains an attempt to give a systematic account of the chief cases of mimetic grouping. But in spite of what has already been written by these and other authors, it may be doubted whether the importance of the principle of mimicry among the factors that have determined the facies of the insect fauna in such a region as the neo-
" "Untersuchungen über die Mimicry," Stuttgart, 1893. It may here be mentioned that several of the above-named insects have been noticed by Haase ; who, however, has not attempted to trace in any detail the lines of mimetic assimilation that diverge from the common Pierine stock. He speaks, for instance, of Mylothris lorena O and M. malenka $q$, which undoubtedly belong to the mumata group, as having arisen from such forms as $P$. demophile $\circ$, and considers that the transition took place through forms resembling $P$. viardi ㅇ. But a careful examination will I believe show that, as stated above, neither $P$. demophile of nor $P$. viardi $\circ$ is in the direct line passing from the unaltered Pieris towards M. pyrrha and Heliconius numata. Both are, in fact, intermediate terms in the series leading up to an entirely distinct assemblage, that typified by Tithorea pavonii and Heliconius atthis (Haase's "Bonplandi Tracht"); while P. demophile shows evidence of attraction by the protected agna group, and $P$. viardi by the dominant form Heliconius charitonia. Again, the red streak on the underside of the hindwing in the males of M. lorena, etc., is attributed by Haase to "inheritance from the female," but its origin is not traced by him to the primitive basal red common to many Pierine genera. (See Trans. Ent. Soc. Lond. 1894, pp.283-289 ; ibid., 1896, pp. 72, 73.) Pieris leptalina, Bates ( $P$. pisonis, Hew.) is spoken of by Haase as represeuting the first partial assimilation to certain Ithomias; rightly, :o far as the main fact is concerned; but it may also be noticed that earlier stages of the same assimilation exist in $P$. kiçaha, and, as shown above, in P. pandosia.
tropical has ever been fully recognised. The mimetic groups here referred to are no doubt mainly of the "Müllerian" kind; that is to say, they are associations between inedible species of various affinities ; each association possessing a conspicuous and distinctive pattern of its own, more or less perfectly reproduced by all its members. In the paper already cited and elsewhere* I have given reasons for considering the principle of Müllerian mimicry to be far more widely operative than has generally been supposed; and I have also endeavoured to supply a test by which, even in the absence of information as to the edibility and relative abundance of the members of a mimetic group, a conclusion may sometimes be arrived at as to whether the assemblage is Batesian or Müllerian. As there are grounds for supposing that the arguments just referred to have sometimes been misunderstood, it will be attempted in the following section to re-state, in as simple language as possible, what appears to be the best interpretation of the facts at present known.

Mimetic Attraction. When a species of butterfly has become established in such a region as the neotropical, where life of all kinds is very abundant and competition extremely keen, it may be taken for granted that the species possesses some efficient means of defence, failing: which it would be unable to maintain its position. In very many instances, as is well known, the required protection is essentially afforded by the possession of a nauseous flavour, which causes the butterfly in question to be avoided, when recognised, by some at least of its insect-eating enemies. The possibility of easy recognition in such a case constitutes, of course, an important factor in the safety of the species; since there would be no advantage in being inedible, if the fact only became known in each individual case as the result of an experiment fatal to its subject. It is in consequence of this necessity for " advertisement " that, as is also well known, inedible species tend to assume gaudy and conspicuous colours, and to adopt habits calculated to display their warning signals with the utmost publicity. In this manner the members of a distasteful and conspicuous species are enabled to profit by the experience gained at

[^18]the expense of other individuals of the same species, some of which must necessarily fall victims to their insectivorous enemies during the "education" of the latter as to the kinds of prey to be sought or evoided. Each form that thus succeeds in establishing itself becomes, in proportion to its nauseous character and the ease with which it can be recognised, a centre of attraction for other species, which, by assimilating their own aspect to that of their model, are enabled to share in the immunity from attack enjoyed by the latter. It is now considered probable by many that this power of attraction is exercised by dominant inedible species over edible and inedible forms alike ; there is, however, one important difference between the two cases, which I have before endeavoured to point out, but which seems to need a more explicit statement than has yet been given to it.

Let us first take the case of a species which is edible, and therefore liable to extermination by insectivorous animals. The chances of the survival of such a species depend on the excellence of its means of defence ; such as superior swiftness, or the power of concealment, whether by resemblance to inanimate objects, or to some other species protected by a disagreeable flavour. The force which impels an edible species to seek protection by the last-named method, viz., by sheltering itself under the reputation of a conspicuous inedible form, is the wellknown "Batesian mimicry." With reference to this, which is the most complete kind of mimicry, it is to be observed that the advantage of association is all on the side of the mimic, and is not shared in the least degree by the model. Indeed, the existence of the edible mimicking species is a source of danger to the form mimicked, inasmuch as any experience gained by tasting the former would be used to the detriment of the latter. From these considerations two consequences follow; the first being that such an association can subsist only when the numbers of the mimic are insignificant compared with those of the model, for otherwise the latter's reputation for inedibility would be interfered with, and eventually destroyed. The second consequence is that the attractive force leading to assimilation between the two forms can act only in one direction; i.e., the model attracts the mimic, but the mimic can exert no reciprocal influence upon the model. The latter stands secure upon its own
footing, any departure from which might be attended with danger to itself; while the only part played by the former is to shelter itself under as close an approximation to the aspect of the model as circumstances permit.

We may now take the case of a species possessing a nauseous flavour, and requiring some means of advertisement in order to make its inedibility available for purposes of protection. Two courses may be said to lie open for such a species. First, it may seek advertisement by acquiring a conspicuous and easily recognised aspect of its own, distinct from that of any others; or, secondly, it may obtain a share in the notoriety already attaching to some dominant inedible form by assimilating its aspect to that of the latter, instead of striking out a new line for itself. An examination of the lepidopterous fauna of such a region as the neotropical makes it certain that the latter of these methods, viz., the method of "Müllerian mimicry," has been very extensively followed. Its advantages, as compared with the former method, are obvious. In the first place it assists the memory of predaceous foes by keeping at a low figure the number of distinct inedible types to be learned and so avoided, and in the second place it benefits at least two species at the same time instead of one, and both have therefore an interest in keeping it up; for inasmuch as in this case, as distinct from that of Batesian mimicry, the mimic is inedible as well as the model, the results of experimental tasting will be uniformly the same, and will be favourable to the immunity of both species. It follows that (1) there is no such limit as exists in Batesian mimicry to the number either of individuals or species forming a Müllerian group. An assemblage of this latter kind is only strengthened, not weakened, by fresh accessions; all being alike inedible, and so all contributing to the common safety. (2) The benefit of Müllerian association being mutual, there is a distinct reason, which we saw does not exist in the case of Batesian mimicry, for the model to help on the process of assimilation by itself advancing to meet the mimic.

To summarise the foregoing. Every conspicuous and distasteful form is a centre of attraction for other forms, whether edible or inedible; but in the former case (Batesian mimicry) the mimetic attraction is limited in operation, and acts ouly in one direction, influencing
nothing but the mimic ; while in the latter case (Müllerian mimicry) the mimetic attraction is unlimited and mutual, acting reciprocally in both directions and influencing each member of the group.

This doctrine of the mutual attraction between inedible forms, leading not merely to the copying of one by another, but to the departure of each from its original aspect by the adoption of features belonging to the other, is not simply a speculation, nor does it rest only on a priori reasoning. There is much evidence that it represents a fact which does actually take place in nature; and in the two papers above referred to* I have brought forward cases which seem inexplicable by any other principle. I may be allowed to add in this place a further instance, which appears to me for several reasons remarkable.

The instance of P. locusta d. In Trans. Ent. Soc. Lond. 1896, p. 72, note, I spoke, though somewhat doubtfully, of P. locusta t as a mimic. My suspicion that this was the case at that time fell short of actual conviction. Now, however, after a further careful examination of $P$. locusta ot from this particular point of view, I have little or no hesitation in pronouncing it to be a member of a mimetic association of an exceptionally interesting kind.

It will be remembered that the males of Mylothris lorena, M. pyrrha, etc., form a good illustration of the accurate manner in which the appropriate habits are correlated with adaptive colouring-the mimetic pattern in these instances being confined to the underside, and being in all probability useless as a protection except during the resting position; while the habits of these males, as testified to by Wallace, $\dagger$ are such as would probably render a Heliconiine resemblance during flight a source of danger to its possessors rather than of safety. Similarly in $P$. locusta र , it is only on the underside that the mimetic pattern appears, and here again there can be

[^19]little doubt that its use has reference only to the resting position.

The aspect suggested is rather that of several forms of Heliconius in general than that of any one in particular ; the most definite relation, however, is with the group of which Heliconius cydno and H. galanthus are examples, a group characterised by the presence on both surfaces, but, especially beneath, of a good deal of light yellow often paling: further to white. When the undersides of Pieris locusta and one of these Heliconii, say H. cydno (which inhabits the same part of the neotropical region), are compared together, both insects being in the resting position, we find not indeed an exact resemblance, but a general similarity which, judging from other instances, we may consider as probably sufficient to suggest the possession of like qualities. In both there occurs on the forewing a certain amount of white ground colour; on one side bounded by a dark tip, and on the other more or less limited by the dark area of the hindwing; which latter is traversed by a bright yellow streak, and beset about the base with red or chestnut patches. The elements of the pattern in both insects are the same, and their general relation to one another much alike, though the pale marginal band on the hindwing that occurs in this species of Heliconius is not found in the Pierine. A further point of interest is the manner in which the partial breaking up of the white colour is effected in the Heliconius and the Pieris respectively. There is, I think, little doubt that the dark marks on the costa of the hindwing in $P$. locusta represent in a general way the dark discoidal spot and a portion of the inner dark area of the forewing in the Heliconius. The bright yellow line of the hindwing will be seen in each case to terminate in relation with a dark patch; but in the first instance (that of the Pieris) this belongs to the same wing; and in the second instance (that of the Heliconius) it is contributed to by both wings. This seems to exemplify a principle repeatedly met with in mimicry; viz., that exact homology is disregarded, and the whole exposed surface of the insect is taken as it were as a canvas on which the mimetic picture is painted with a free hand. The relation of this particular group of Heliconius with the Pierines is remarkable, and deserves more detailed treatment; here
it will be sufficient to point out that there is more reason to suppose that the Heliconius has adopted certain features from the Pieris (for example, the whiteness of the ground colour, and the disposition, if not the existence, of the basal red marks) than that the converse alone has taken place.

Reciprocal Mimicry and Convergence. This fact of the reciprocal copying of two or more species by each other is perhaps implied, though not distinctly so, in the term "convergence," which has been used by many authors to express the phenomenon of Müllerian mimicry; but I am not aware that any writer who so employs the term has laid stress on the mutual character of the changes involved, or has traced in any instance the actual modifications undergone by both species of a Müllerian couple under the influence of the attractive force existing between them. It seems hitherto to have been taken for granted that a dominant form will attract or retain other species within its own sphere of influence, without being itself attracted in return; whereas the fact is, as we have seen, that each member of an inedible association has more or less influence upon all the rest. The respective value of the attraction exercised or suffered by any member of a Müllerian group will depend on its numbers, its nauseous qualities, and its notoriety. The stronger any species is in these respects, the stronger will be its power of attraction, and the weaker in comparison will be any force tending to draw it in the direction of other members of the group. The actual mimetic path taken by any species will be the resultant of the various forces acting upon it. If the form happens to be a dominant one, these external forces will be insignificant in comparison with its own stability; and it will therefore resist change to a large extent, or perhaps altogether. The most complete intermingling of characters given and taken on both sides may be expected when two species meet on equal terms, neither being strong enough to predominate over the other.

While there can be no doubt of the convenience of the term "convergence," and its suitability to express relations of the kind just discussed, there would seem to be no sufficient reason for disallowing in their case the earlier term " mimicry." This latter word may be quite
legitimately employed to designate the adoption of any new features borrowed from another species. In so far as A copies the appearance of B, it may properly be said to " mimic" the latter, whether the object be to suggest the presence of a disagreeable flavour which it does not really possess, or merely to convey the impression that it and its model are alike in all respects. Mullerian assimilation may be quite as deceptive as Batesian, in the sense of leading to confusion between species essentially distinct ; and in the case of a "weak" species being associated with a "strong" one, the departure of a form from the typical aspect of its congeners by the development of strictly imitative features may be as well marked in the one kind of mimicry as in the other. But although either of the terms "Müllerian mimicry" or "convergence" would appear to express quite adequately the general idea of the mimetic relation between inedible species, a separate term is wanted to designate the peculiar give-and-take changes which we have seen are theoretically possible to a greater or less extent in every case of Müllerian association, and which in fact do actually occur in several. It is to supply this want of a term that I have proposed the expression "reciprocal mimicry,"* which is meant to convey, besides the general idea of convergence, the special information that in the cases to which the term is applied, the convergence is brought about not by the simple imitation of one form by another, but by the interchange of features between forms, and their consequent simultaneous approach to an intermediate position.

The foregoing remarks will, I think, have made it sufficiently clear, (1) that reciprocal mimicry can only take place in Müllerian associations, not in Batesian ; and that it is therefore, as I have elsewhere said " good evidence of the distastefulness of all the forms between which it can be shown to occur;" (2) that although a mimic which is of relatively plentiful occurrence must be Mïllerian, it does not follow that a mimic which is scarce must necessarily be Batesian. An inedible mimic may be either rare or common ; an edible mimic must be rare. Judging by these principles, we must conclude that the association of Pieris locusta $\hat{\delta}$ with Heliconius cydno is

Müllerian, and an addition is thus supplied to the evidence already existing in favour of the distasteful qualities of this and other Pierine genera.*

Conclusion. If we take a comprehensive survey of the whole butterfly facies of the neotropical region, we cannot fail to be struck with the numerous cases of mimetic assimilation which it presents. It would in fact almost seem that scarcely any conspicuous form is completely isolated. In a region where enemies to insect life are so numerous, and competition for existence is so keen, a butterfly can hardly afford to be conspicuous unless it is also distasteful; nor is the mere individual possession of these qualities in the majority of instances sufficient for safety. Any form that requires to establish a reputation for inedibility, must as it were seek allies; and no sooner does it make a bid for survival as a nauseous species, than it becomes subject to the influence of mimetic attraction, and probably finds itself drawn into the vortex of one of the great Müllerian associations.

It is no doubt true that the process of mimetic assimilation is subject to limitation by the operation of other forces. Thus it may be needful that the resemblance to a model, though close enough to deceive enemies, should not be so close as to interfere with due recognition between the sexes. We know little of the means by which insects recognise each other, but there are at least some grounds for thinking that they are assisted at times by external marks. This may afford one reason for the different ways in which the sexes of the same species occasionally react to mimetic influences; and it may possibly be the meaning of the retention of a portion of the original white ground-colour in the males of certain species of Dismorphia. It is also quite conceivable that the aspect of every species is to some extent controlled by its physiological constitution $; \dagger$ and this fact may tend to disturb the perfect operation of the process of mimetic change.

But notwithstanding all limitations, it remains the fact that any inedible form, in the midst of competing

[^20] pp. 74, 76.
$\dagger$ Vide Presidential Address by Prof. Meldola, Proc. Ent. Soc Lond. 1896, pp. lxxx. et seqq.
trans. ent. soc. Lond. 1897 -part ili. (SEPr.)
mimetic systems, is liable to be carried off in this or that direction as it comes under their influence. Sometimes, as in the forms that were discussed at the beginning of this paper, we find several species, closely related to one another by affinity, being drawn away in different directions by the attractive power of the Müllerian groups that surround them; and the same assemblage of cases illustrates the fact that a mimetic change from the original form in the direction of one protected group may serve as a stepping-stone for a further departure towards another.* Sometimes again, as in Mylothris lypera, M. lorena, M. malenka, and M. pyrrha, we see that in the males a compromise is struck between the ordinary Pierine aspect (used for flight), and a mimetic dress like that of the female (used for repose) ; while in Pieris locusta we find the same compromise in the male, with the curious difference that here even the sexes of the same species have been wrested apart into separate mimetic relations.

Finally, the comparison will perhaps not seem ton farfetched, if the several mimetic groups, each with its own type of coloration, are likened to the solar and stellar systems of astronomers. Sometimes, as in the solar system, there is one central body (i.e., species) dominating the whole, and influencing its attendant planets (i.e., mimics) to an extent in comparison with which the force they themselves can exercise is insignificant. At other times, as in the systems of double and multiple stars, there are bodies (i.e., species) more nearly equal in mass and importance, bound together by mutual attraction into a single combination, where each one effectively controls and is controlled by the rest. We may even push the comparison so far as to find an analogy between those irregular wanderers through cosmic space which from time to time get drawn within the limits of some

[^21]established system, and certain species which seem to hover on the outskirts of mimetic groups, undecided as it were whether to throw in their lot with one association or another.

I am indebted to Professor Poulton, F.R.S., for free access to the Hope Department, and for permission to figure insects from the collection under his charge.

## Note.

In the course of the discussion which followed the reading of this paper, my friend Professor Poulton expressed the opinion that the term "mimicry" should be restricted entirely to cases of Batesian association, and should not be applied to resemblances between distasteful forms. I am, of course, entirely at one with Professor Poulton as to the essential difference between the false warning which is the leading feature in the one case, and the true warning which characterises the other ; and I agree that it would be most desirable to mark the distinction by the use of separate terms. Though the present paper must stand as it was read, I am willing in future to attempt the restriction which he recommends. Perhaps "Müllerian assimilation" and "reciprocal assimilation," though a little cumbrous, may serve instead of the terms used in the text ; and it may be hoped that the advantage of greater precision thus gained will outweigh the disadvantage of having to drop such convenient words as " mimic," "mimetic" and "model" when speaking of a Müllerian group.-June 2, 1897.

## List of Species Mentioned.

Pierine.<br>Pieris phaloe, Godt.<br>P. calydonia, Boisd.<br>P. demophile, Linn.<br>P. viardi, Boisd.<br>P. locusta, Feld.<br>P. pandosia, Hew.<br>P. kiçaha, Reak.<br>\{ P. leptalina, Bates.<br>\{P. pisonis, Hew.<br>Mylothris lypera, Koll.<br>11. lorena, Hew.<br>M. malenka, Hew.<br>M. pyrrha, Fabr.<br>1. alethina, Butl.

Heliconiine.
Heliconius numata, Cram.
H. atthis, Doubl.
II. charitonia, Godt.
H. cydno, Doubl. \& Hew. H. galanthus, Bates.

Danaine.
Aeria agna, Godm. \& Salv. Tithorea paronii, Butl. T. tarracina, Hew. Napeogenes inachia, Hew.

## Explanation of Plate VII.

Fig. 1. Pieris calydonia
2. P. leptalina, underside.
3. P. demophile $\circ$.
4. Napeogenes inachia.
5. P. viardi $q$.
6. Aeria "gna.
7. P. locusta $甲$.
8. Heliconius atthis.

## In all the Figures

$k$, diagonal dark bar of forewing.
$l$, dark bar of forewing parallel to inner margin.
$m$, pale area on apical side of diagonal bar.
$u$, submarginal pale spots.
$o$, transverse bar of hindwing.
N.B., $k$ and $l$ as in Trans. Ent. Soc. Lond. 1896, Plates III.-V.
> XIV.-The Changes in the Structure of the Wings of Butterflies. By A. Radcliffe Grote, A.M.

[Read̉ June 2nd, 1897.]
In the literature relating to the course and position of the veins in the wings of Butterflies and Moths, I find no recognition of the causes which modify their direction, and underlie the changes we observe as they pass from a generalized to a more specialized arrangement. As the biological progress which these changes indicate must depend on dynamical requirements, a mechanical explanation naturally suggests itself.

From a study of the butterflies I find that the changes take a direction which stands probably in relation to the mode of flight, and that the processes themselves may be distinguished as follows:-firstly, the reduction by absorption of the radial veins; secondly, the disintegration of the median series; and, thirdly, the reduction and suppression of veins above the radius and below the cubitus. These various modifications are carried out to an unequal extent in one and the same group, as well as in different groups or families of the butterflies, which are here especially discussed. They all appear to have their origin in the lepidopterous hindwing, and, according to the greater or lesser degree of their expression, the wings are said to be specialized or generalized. That they are inaugurated in the hindwings is to be explained by the greater strain laid upon the latter in supporting the body and checking the downward stroke of the forewings. As compared with the primaries in one and the same individual the secondaries are the more specialized.

All these changes have apparently as their ultimate aim the simplification of the venation, the furcations being the result of partial absorption of the veins. The proof that these views are generally correct is afforded by the fact that in Hepialus the radius of both fore and hindwings is five-branched, and that the five-branched radius of the primaries in those groups where the radius of the secondaries appears one-branched evidently under-
trans. ent. soc. lond. 1897.-part iv. (dec.) 23
goes a parallel process, i.e., the reduction of the radial veins by a process of absorption in the more specialized forms.* Thus, among the Pieridæ, the Cabbage butterflies have a three- to four-branched radius, in the Yellows the radius has four veins, whilst in Anthocharis and Leptidia the normal five branches attain the margins of the wing. A parallel case is offered by the Blues, where the four radial veins of Lycæna are reduced to three in Thecla. It is evident that these characters, repeating themselves as they do in otherwise different groups, are insufficient to warrant the view of a near relationship between the forms exhibiting them. They are characters of convergence, and, therefore, secondary in their nature. At the same time their presence in different groups proves the essential unity of the process of development or evolution in the wings.

The second direction, in which the progress of simplification manifests itself, is in the disintegration of the median series of veins. In some Tineides the main stem (or stems) of the media, between the base of the wing: and the cross-vein, which serves now as the point d'appui for the three median branches (veins $\mathrm{iv}_{1}, \mathrm{iv}_{2}$, and $\mathrm{iv}_{3}$ ), is present. But in the butterflies, as well as in most of the moths, this stem has disappeared, or is represented merely by scars upon the surface of the tegument of the median cell. The former passage of these stems along: what is now an unbroken surface is indicated by slight processes, apparently emerging from the cross-vein closing the cell at its outer extremity and turned towards the base of the wing in the direction in which the stems of the media appear to have formerly lain. The suppression of these stems has been evidently the first step towards the abolition of the median series which, in the day butterflies, asserts its existence only through the three branches arising from the cross-vein and attaining the outer margin. We have now to consider the fate of these three branches, and to see what becomes of them during the evolution of this portion of the wings.

In the case of the absorption of the radial veins we found that the condition of the hindwings of most recent

[^22]Lepidoptera exhibits an advance upon that of the forewings as regards simplification. Similarly an examination proves that the change of the median series is almost invariably accentuated, however slightly, in the secondaries. A scrutiny of the course which the three branches of the media take necessitates a clear recognition of the primitive generalized condition and arrangement of these veins. This is illustrated again by Hepialus as well as by the position of the veins in the ante-imaginal stage.*

The position, so far as the middle branch (vein $\mathrm{iv}_{2}$ ) is concerned, is a median one, and those forms in a group in which this is retained, that is, in which the middle branch is equidistant from its two companions, are clearly the most generalized.

We are now concerned with the shifting of the middle branch from its original median position. Evidently, as a comparison of the entire series of butterflies and moths shows, it may move in one of tivo opposite directions. Sometimes it moves towards the radius, and sometimes it is attracted by the cubitus. The amount of its movement in either direction is the test of the specialization of the insect in this particular, just as the extent of the absorption of the radial veins is there the measure of progress. 'Thus, this movement of the median branches tends to break up the series, with the object of dividing the residue between the radius and cubitus. In this distribution of the former property of the media, the upper branch (vein $\mathrm{iv}_{1}$ ) from its proximity falls generally and natirally to the share of the radius, and the lower branch (vein $\mathrm{iv}_{3}$ ) as naturally to the share of the cubitus. But a contest arises as to the middle branch (vein $\mathrm{iv}_{2}$ ). As long as it keeps its original position, it sustains the relative integrity of the median series. When it yields in either direction, it abandons its primitive character, but in thus yieiding it preserves its own existence. In some groups it has resisted the attraction of the dominant veins of the present lepido-

[^23]pterous wing, and the result of this independence has been that it has faded out into a scar, as in the secondaries of the Skippers. The reason for this disappearance lies in the loss of connexion and supply of nutriment which it suffers by the reduction and final disappearance of the supporting cross-vein, the next step in the disintegration of the median series. On either side of vein iv ${ }_{2}$ the supporting cross-vein ranishes and the branch loses its power of movement. Meanwhile its companion on either side has assured its perpetuity by a union with one of the two competing systems of the wing.

The cross-vein itself finally vanishes. In any event, the movement of the middle branch towards either radius or cubitus results in a lengthening of the middle portion of the cross-vein, and leads to its disintegration. It breaks in spots, fading into a functionless scar, sometimes yieldingat its middle, sometimes near the upper end, so that oftenest the sole remnant is a vein-spur representing its inferior portion. As the cross-vein thus divides and disappears, it opens the net-work of the wing longitudinally from the base to the outer margin. The wing is thenceforth virtually separated into a radial and cubital field, the support of the tegument along the middle having fallen away. In course of time all scar or trace of the former position of the cross-vein vanishes likewise, as in the case of the Purple Emperor (Potamis iris).

I find that that portion of the cross-vein between the radius and the upper branch of the media, as well as that again between the lower branch and the cubitus, is retained physiologically as the base of the respective vein, upon the disappearance of the middle portion of the cross-vein.

We have mainly followed the fortune of the middle branch of the media (vein $i v_{2}$ ), and have seen that, as it attaches itself to either radius or cubitus, this or that system is strengthened. This attachment probably has an influence upon the mode of flight. The sailing tlight of Nymphalis or Potamis seems to follow the acquisition of vein $\mathrm{iv}_{2}$ by the radius; the beating or hovering flight of Papilio and Sphinx from its conquest by the cubitus. But the fortunes of rein $\mathrm{iv}_{1}$ are not less interesting to follow. In the course of events this vein sometimes leaves its position on the cross-vein and creeps along the radius, or vein $\mathrm{iii}_{5}$, until its fusion with the latter is
carried out for nearly a third of its length in the Large Cabbage White. In the Nemeobiidx also there is a parallel absorption of the upper branch of the radius (vein $\mathrm{iv}_{1}$ ).

The median series must now be left, in order briefly to discuss the third modification by which the evolution of the venation is manifested. The theoretical number of veins below the cubitus with its two branches, and between this main vein and the lower or inner margin of the wing, is four. Vein vi. is indicated in a few cases alone as a scar, generally it has departed without leaving a trace behind. The cross-vein in Papilio between the cubitus (vein v.) and vein vii. has been identified by Prof. Comstock with vein vi. For the reason that I am disposed to consider this cross-vein in Papilio as of similar nature to the intercalary vein between ii. and iii. in the hindwings of Sphinx, I am scarcely prepared to endorse this identification at the moment. Next, we have vein vii. present as a true vein on both wings in the butterflies. Below vein vii. two abbreviated veins exist on the forewings in some moths. Of these the upper appears as a loop, joined by its outer end to vein vii., in one series of the butterflies, which show no trace of vein ix. In the other series vein viii. is wanting, being apparently crowded out, whilst instead a stout, atrophied, spur-like vein is found to run in an opposite direction to viii., and is curved downwards to the inner margin, which it joins not far from the base of the wing. This I designate as vein ix. On the hindwings veins vii. and viii. are both present as true, long veins in that series of the butterflies in which viii. is alone found on the primaries. In the other series where ix. is present on the forewings, vii. alone remains on the secondaries, whilst viii. has disappeared. This disappearance through specialization of vein viii. is accompanied by a shrinking and inward curving of the inner margin of the secondary. Again we are admonished of the essential uniformity in the course of these changes by witnessing the same occurrence in the Attacid genera (Rothschildia, Samia, \&c.). The mechanical cause of the abbreviation and degeneration of the veins below vii. on the primaries may lie in the friction of the edges of the fore and hindwings. Above the radius on the primaries there is a single subcostal vein (ii.) tending to split at the base in Thais. Further, there is a vein-
like thickening of the costa at the base, which I designate, after Comstock, as vein i., for the reason that I am disposed to consider it, together with all thickenings of the tegument, as homologous with the other veins.* Even if another derivation for it were established, its existence might still be indicaied by a number.

If, now, we review the venation of the butterfies in search of features which shali throw light upon the phylogeny of the group, and prove available for the purposes of taxonomy, it is clear that secondary characters must be set aside in the endeavour to find those which are primary in their nature. It must be borne in mind that this distinction is a relative and not an absolute one, and that here as elsewhere our conception of the value of any character changes with the extent of our information. A scheme of classification is therefore the measure of the acquaintance, or non-acquaintance, of the classifier with his subject. Classification itself becomes a possible field for psychical activity, solely by reason of the differentiation which has attended biological development, and has arisen through the interaction of the organism and the conditions permitting its existence. In a study of the wings of all the families of the butterflies, I have been able to rely only upon the aforesaid characters offered by the abbreviated veins below vein vii. on the primaries, which allow us to distinguish the Parnassiidæ and Papilionidæ from the rest of the butterflies, including the Hesperiidæ. The remarkably distinct feature of the appearance of vein ix. upon the forewings of the Swallowtails and their allies leads me to consider it of both phylogenetic and taxonomic import, and as indicating a common origin for the series of forms exhibiting it, which is separate from that of the remaining day-flying Lepidoptera; it seems to be of subprimary value.

Furthermore, I have persuaded myself from the data

[^24]observed that all contention as to forms occupying a higher or lower position in a linear series is to a great extent illusory, since specialization proceeds unequally; and it has been from practical considerations that I have adhered to the Linnean arrangement. Moreover, my scheme is' accompanied by a synopsis of the grades of specialization presented by the venation of the different groups which authors have proposed.

The attempt to find distinctive characters of venation for all the suggested families has so far failed as to render the tabular arrangement presented here of only partial use as a guide to the recognition of the forms it contains. Before offering it I shall attempt to render the subject more lucid by classifying in a brief summary of the families the characters upon which I lay stress.

Fam. Parnassidde. In the Parnassiinæ, the more specialized subfamily, the radius is four-branched ( $\mathrm{iii}_{1}+2, \mathrm{iii}_{3}, \mathrm{iii}_{\mathrm{f}}, \mathrm{iii}_{5}$ ), the cell remains closed, the upper mediar branch ( $\mathrm{iv}_{1}$ ) has left its more generalized position on the cross-vein and emerges from the radius without the cell, the middle branch (vein $\mathrm{iv}_{2}$ ) has become cubital in position on both wings, whilst on the secondaries vein vii. has become shortened. In the Thaiinæ the radius is in a more generalized state, being 5 -veined; vein iv ${ }_{1}$ springs from the cross-vein very near the radius, the cell is closed, and vein vii. of the secondaries is less abbreviated.

Fam. Papilionidæ. More generalized than the Parnassiidæ. The radius is 5 -veined, the furcation of veins $\mathrm{iii}_{4}$ and $\mathrm{ii}_{5}$ is longer than in the preceding; vein $i v_{1}$ is removed from the radius, vein $\mathrm{iv}_{2}$ has a median generalized position on the primaries whilst on the secondaries it inclines towards the cubitus; the cells are strongly closed and vein vii. of the hindwings is more developed than in the Parnassiidæ.

In contrasting the characters of this with those of the succeeding series, the Parnassiidæ and Papilionidæ (Papilionides, auct.) are seen to be more specialized in the absence of vein viii on the secondaries, while the absorption of vein $\mathrm{iii}_{2}$ in the Parnassiidæ is a convergent character which we meet with again in the Pieridæ and Lycænidæ. Their generalized condition is evidenced by the presence of vein $\mathrm{ix}_{\mathrm{x}}$ on the primaries, and in the Papilionidæ, by the position of vein $\mathrm{iv}_{2}$ on the same wings.

In a vertical arrangement the latter stand lower than the Pieridæ and Nymphalidæ when compared as to the primary wing by the same standards. As to the secondary the whole group stands higher.

Fam. Pieride. Specialization is evidenced both in the absorption of the radial veins and in the disintegration of the cell in the higher groups. In the Leptidiinæ the middle median vein, which has taken elsewhere a radial position, becomes cubital on the secondaries and offers an analogy with Papilio. I consider two subfamilies only to occur in the European fauna.

Fam. Nymphalide The radius remains in a generalized condition, comparable with that of Papilio ; veins $\mathrm{iii}_{4}$ and iii $_{5}$ vary in the extent of the absorption and both reach the outer margin, as in Papilio, but nearer the apex; this position may be brought about by the breaking up of the median series and the assimilation of the two upper branches with the radius.

Fam. Agapetide ( $=$ Satyridæ, auct.). More generalized than the Nymphalidæ but running parallel with the less specialized groups of the latter; the radius is also 5 -veined, but vein $\mathrm{iii}_{4}$ attains the costa as in the Pieridæ and Libytheidæ.

Fam. Libytheide. This agrees with the specialized groups of the Nymphalidæ and Agapetidæ in that vein ii. of the secondaries is absorbed by the radius up to the point of issue of the rudimentary vein i . The family shows generalization in the median position occupied by vein $\mathrm{iv}_{2}$ on the primaries. The abbreviated vein viii. of the primaries, which in the Pieridæ appears often as a scar, but sometimes (Colias rhamni, \&c.) seems to present the character of a true vein, is strongly marked. The cross-vein of the secondaries joins the cubitus very nearly at the point of issue of vein iv ${ }_{3}$, thus agreeing with the more specialized Agapetidæ (Pararginæ) and the Nymphalidæ.

Fam. Nemeobider. The venation is not of the type found in the Riodinidæ and Lycænidæ, but corresponds essentially with that of the Pieridæ and Libytheidæ.

Fam. Lycenide. The position of vein $\mathrm{iv}_{2}$ remains median, and the degeneration of the cross-vein has left it isolated. The radius is specialized through the absorption of vein $\mathrm{iii}_{3}{ }_{+4}$, which in the Theclinæ entirely disappears in iii $_{5}$; vein viii. reappears as a scar.

Fam. Hesperiade. While the general plan of the wing is identical with that of the Lycænidæ, all five radial veins are separate. The absorption manifested in the Blues has not been inaugurated. The cross-vein has disappeared and left not only vein iv but also vein $\mathrm{iv}_{1}$ on the primaries isolated. On the hindwings vein ivg has degenerated in consequence to a scar, while $\mathrm{iv}_{1}$ has preserved its further existence by a fusion with the radius. Vein viii. of the primaries is strongly represented as a loop-like appendage at the base of vein vii. In the American family Megathymidæ Comstock's figures show a specialized Hesperian type in which vein $\mathrm{iv}_{2}$ has assumed a cubital position, and would thus preserve its existence amid the disintegration of the median series.

## Table of Characters.

A. Vein ix. of the primaries present....PAPILIONIDES.

1. Vein $i \mathrm{v}_{2}$ of the primaries approximate to the cubitus Parnasside.e.
Vein $\mathrm{iv}_{1}$ springing from the radius ...... Parnassiince. Vein $\mathrm{iv}_{1}$ springing from the cross-vein ... Thaidina.
2. Vein $\mathrm{iv}_{2}$ of the primaries central in position Papilioxide.
B. Vein ix. of the primaries absent....HESPERIADES.
3. Pieride.Vein iii ${ }_{1}$ of the primaries leaving theradius within the cellPierina.
Vein iii $_{1}$ leaving the radius without thecellLeptidince.
4. Nymphalide.Vein ii. of the secondaries absorbed bythe radius up to the point of issue of $i$.Nymphalince.
Vein ii. absorbed by the radius up toa point inferior to the issue of $\mathrm{i} . . . . .$.Argynninace.
5. Agapetide.The cross-vein on the secondaries joiningthe cubitus.Parargine.
The cross-vein on the secondaries joining vein iv ${ }_{3}$ Agapetince.
6. Liminadide.
7. Libytheide.
8. Nemeobiide.
9. Riodinide.
10. Lycenide.Vein $\mathrm{iv}_{1}$ joining the radius
$\qquad$Theclince.Vein iv ${ }_{1}$ joining the cross-veinLyeconine.
11. Megathymide.
12. Hesperiade.Vein i. of the primaries wanting ... Pamphilince.Vein i. of the primaries present......Hesperiince.

## Variation in the Course of Veins.

In making preparations of one and the same species I have usually found little variation in the butterflies, but my experience is limited to from two to six individuals; in some cases I have contented myself with one preparation, but usually I have made a second and, if it quite agreed, have gone no further in my examinations. Sexual characters I found to exist only in the swollen veins of the Meadow-Browns and Potamis. But in the moths I have found some variation which lies in the general direction of the changes which are indicated above. The most surprising to me was that, among five preparations of Copismerinthus ocellatus, I found one female in which vein $\mathrm{iv}_{1}$ did not emerge from the radius immediately beyond the cross-vein, but from the cross-vein itself. This was a generalized individual. The usual position of this vein is from the radius at a greater or less distance from the cross-vein. Another female had an intermediate position for vein $\mathrm{iv}_{1}$ which, on the primary at least, seemed to occupy precisely the angle of the junction. These characters cannot be expected to be other than plastic, and it is sufficient for our theory if the variation takes the same line, within the assumed limits of one. species, as that which it exhibits in different species. Undoubtedly in the primitive Smerinthus the origin of vein $\mathrm{iv}_{1}$ was from the cross-vein, from which it has been removed in most of the forms, permanently as it appears, to the radius.

The second kind of variation consists in the sudden appearance of short spur-like processes arising from the veins. I found such a prong issuing from vein iii $_{4}$ in a female Endromis. Another case occurred with a female Smerinthus in which vein $\mathrm{V}_{2}$ showed a curved prong arising near the base. In the process of individualization the mould sometimes breaks.

In conclusion, I would urge the method of photography in picturing the venation. The published drawings are frequently inaccurate and insufficient for purposes of study.
XV. The Structure and Life-history of Phalacrocera replicata. By Professor L. C. Miall, F.R.S., and R. Shelford, B.A. With an Appendia on the Literature of the earlier stages of the Cylindrotomina, by Baron C. R. Osten Sacken, Hon. F.E.S.
[Read April 7th, 1897.]

> Plates VIII.-XI.

## THE STRUCTURE AND LIFE-HISTORY OF PHALACROCERA REPLICATA.

1. The form and habits of the larva.
2. The alimentary canal of the larva.
3. The heart of the larva.
4. The respiratory organs of the larva.
5. The nervous system of the larva.
G. The reproductive organs of the larva.
6. The development of the imaginal organs.
7. The process of pupation.
8. The pupa.
9. The imago.
10. Egg-laying.
11. Comparison with nearlyallied insects.

## 1. The forms and habits of the larva.

The larva of this Dipterous insect is sometimes abundant upon submerged mosses or other aquatic plants. It is, so far as our experience goes, a very local species. Our supply, which we owed in the first instance to the kindness of Mr. Henry Scherren, came from marshes between Pevensey and Bexhill, where the larva feeds upon a moss, Amblystegium exanuulatum.* Fragments of this moss are easily recognised by the microscope in the ali-

[^25]TRANS. ENT. SOC. LOND. 1897.-PART IV. (DEC.)
mentary canal ; they give a green tinge to young larvæ when seen through the semi-transparent body-wall, especially from the underside. Older larvæ are more opaque, and of a brownish-green colour, with a pale and indistinct striping; the ventral surface of such larvæ is white. Full-grown larvæ are about an inch long. They are distinguished at a glance from other Dipterous larvæ by the long, transparent processes, which stand out from every surface. The larva is extremely sluggish, remaining almost motionless for hours together. It clings to a moss-stem by its large anal hooks, and, thus secured, it may at times be observed to sway its body from side to side, as if to promote respiration. It creeps from stem to stem by grasping with the mandibles and the anal hooks alternately. When alarmed, it curls itself up like a caterpillar. Ecto-parasitic organisms, such as Algæ, Diatoms, and Infusoria, often attach themselves in great numbers to its skin, and especially to the outstanding processes. A small Planorbis has been found creeping upon it, and probably feeding on the vegetable growths. These parasitic organisms, together with the general colour of the body and the form of the numerous filaments, give the larva a strong protective resemblance to the moss among which it dwells. Even when held up against the light it is not easily distinguished from the leafy stalks of the moss, and in the darkness of a weedy pool it must be altogether invisible.*

De Geer, who gives a good account of all the stages of Phalacrocera, with many illustrative figures (Mém. Hist. Ins., vi., p. 351, pl. xx.), tells us that the larva can endure long and severe cold. Being obliged to shut up his country-house, he left four of the larvæ to the mercy of a Swedish winter. The water by which they were surrounded froze at once to a solid mass. On returning in the following May, De Geer found the ice melted and half-evaporated. Two of the larvæ still survived, and were able to creep about and devour fresh food. Before the end of May both of them pupated.

The head can be completely retracted into the first and second thoracic segments, and is usually so retracted,

[^26]except when the larva is feeding. The orifice of protrusion is a transverse cleft on the front of the prothorax. As usual in the retractile heads of Dipterous larvæ, the hinder part, or occipital region, is imperfectly chitinised, and excavated by deep notches. No eyes or eye-spois have been found. There is a pair of small and slender antennæ (figs. 8, 9). The mandibles are small, but strong, curved inwards at the tip, and furnished, as is not uncommon, with a fringe of setæ, which help to close the mouth-opening (fig. ©). They are not externally visible, being enveloped within the maxillæ, which form the most. conspicuous appendages of the head (figs. 9, 10, 11). They appear on both dorsal and ventral surfaces, and consist of a number of sclerites, united by soft integument, and surmounted by small palps. The largest sclerites are ventral (fig. 11, sc.), and are furnished with brushes (br.), which flank the labium on either side. Internal to these are subulate organs (so.), which possibly represent the labial palps. The so-called labium is a transverse plate, armed with teeth along its fore-edge, against which the mandibles act (figs. 10, 11, 12). As in some other Dipterous larvæ, a second plate of similar outline overlies it (fig. 6).

The body of the larva consists of eleven segments, most of which are subdivided into annuli. The varying number of the annuli, and the fact that in several segments the dorsal and ventral annuli differ in number, show that their morphological value is slight. It may be added that they vary a good deal in different Dipterous larvæ. In the first three segments the annuli are illdefined; there seem to be two dorsal and three ventral annuli in segments 2 and 3. Segment 4 has three dorsal (ill-defined) and four ventral ; segments 5 to 10 four dorsal and five ventral ; and segment 11 no dorsal and perhaps three ventral.

On the front surface of the prothorax is a large transverse cleft, the orifice of invagination of the larval head. Above the cleft, when the head is protruded, a thick lip shows itself, which disappears from view when the head is completely retracted. The lip is seen in sections to be a fold of the body-wall, which facilitates the protrusion and retraction of the head. Like the floor of the invagination beneath the head, its morphologically external surface is covered with close-set setæ.
$3 \pm 6$ Prof. Miall and Mr. R. Shelford oit the Structure and
The anus opens on the ventral surface of the last segment. It is surrounded by about eight radiating folds, which together form a large circular area (fig. 2), which at first sight suggests a sucker, though we have no reason to suppose that it is ever used as such. The folds are continued internally for a considerable distance into the rectum, part of the mucous wall of which is therefore ordinarily everted. The folds are capable of retraction.

The chitinous cuticle is unusually thick in most parts of the body. It is plainly divisible into two layers, an outer one, which is dense, shagreen-like, and composed of small scaly prominences; and a much thicker and softer inner layer, which stains readily (fig. 31). Microscopic examination of a larval skin cast during pupation shows that the inner cuticle is absorbed before moulting.

Numerous long processes stand out from all surfaces of the body. These are grouped in dorsal, lateral and ventral series.

Dorsal series (fig. 1). Segment 1 (prothorax) bears one pair, segments 2 and 3, each two pairs of simple processes. In all the succeeding segments except the last the arrangement is :-annulus 1 , no process; annulus 2 , no process; annulus 3, an unbranched process ; annulus 4, a branched process. Segment 11 has only the branched process, and the branch is so small that it, can only be seen by close examination; it is of solid chitin, and forms what De Geer calls the smaller pair of anal hooks.

Lateral series (figs. 1, 2, 4). Segment 1 bears one pair ; segments 2 and 3, two pairs each, the posterior being rudimentary; segment 4, two unequal pairs; the other segments with the exception of the last, three pairs each, the middle pair being the longest. Segment 11 has only a rudimentary lateral process.

Ventral series (figs. 2, 4). Segment 1 has no ventral processes, but only a few setæ ; segments 2 and 3 have each a pair of rudimentary processes near the middle line, and also a pair of long processes, which are almost as much lateral as ventral ; segment 4 has a pair of rudimentary processes on annulus 1 , a pair of short ones on 2, a pair of long ones, besides a short median one, on 3 ; segments $5^{-9}$ exhibit five ventral annuli, of which the last bears a short median process, while the others have only
a patch of scales in the same position; all the annuli except the first have a pair of lateral ventral processes, which increase in length and become more widely separated from the 2nd to the 5th annulus. The last or 11 th segment has no ventral processes, except a median setose tubercle on the second of the two annuli which lie in front of the anus.

These large and numerous processes suggest a respiratory function, which is partly confirmed by the presence of a good-sized trachea, running along every one. In the branched processes there are, as De Geer remarks, two separate tracher, which diverge at the fork.

Sections through the processes show that they are covered by a cuticle of relatively enormous thickness, far exceeding the diameter of the contained tracher ; it is dense and tuberculate externally, but less compact within, the generating epidermis coming nearly into contact with the generating layer of the trachea (fig. 31). So thick and solid a covering is not easily reconciled with the respiratory character of the processes. It will be seen from the description of the tracheal system that the larva has spiracles, and that it visits the surface occasionally to supply them with air.

The closest parailels that we know to the numerous and long appendages of this larva are found, not in any Dipterous larva, but in the Lepidopterous Paraponyx stratiotata* and the Coleopterous Cnemidotus casus. $\dagger$ 'Trichopterous larvæ too may bear filaments more or less like those of Phalacrocera. $\ddagger$

The larva has no true limbs. The last segment bears a pair of large, curved anal hooks, which are strongly chitinised on the convex dorsal side (figs. 1, 2, 4). Near the base and on the concave side is a setose tubercle. The tip of the hook is bifurcate, and just beneath it is a small bunch of setæ. These hooks are constantly used for grappling and locomotion. The "small anal hooks" of De Geer are described in connection with the dorsal processes (p. 346).

[^27]
## 2. The alimentary canal of the larva.

The mouth and œesophagus present no unusual features. There is a large œsophageal invagination. A capacious cylindrical stomach succeeds, which extends to the middle of the eighth segment, where the four Malpighian tubules enter the alimentary canal, and the intestine begins (fig. 18b).

The transition from the epithelium of the cesophagus to that of the stomach is quite sudden.* At this point the longitudinal muscles, which were internal in the œsophagus, pass through the annular muscles, and become external. $\dagger$

The epithelium of the stomach, especially in the neighbourhood of the csophagus, exhibits many narrownecked, rounded protrusions, which push through the striated hem into the lumen of the stomach, and at last become detached as spherical masses. The protrusions are finely granular, and stain well (fig. 22). $\ddagger$

Certain enlarged cells which are particularly numerous near the beginning of the stomach, contain peculiar granular masses of spherical shape (fig. 23). The granular masses are highly refractive, and stain badly or not at all.§ A nucleus is sometimes visible in the same cell. The masses occasionally divide within the cell into three or four (fig. 23), but the nucleus undergoes no corresponding division. The granular masses are ultimately discharged entire into the cavity of the stomach.||

We have no conclusive evidence as to the function of either the protrusions or the granular masses. The protruded spheres have, however, been traced into drawn-out layers of fibrous or glairy texture which invest the food, and we are inclined to believe that they yield the peritrophic membrane described below. The non-staining granular masses are perhaps stages in the formation of some digestive secretion. $\boldsymbol{T}$

[^28]A striated liem (fig. 23) is present in the epithelium of the stomach, though it is often demonstrated with difficulty. The hem consists of close-set, short, and blunt processes, which superficially, at least, resemble the perforated (?) end-plates of the epithelium of the villi in Vertebrates.

The epithelium is regenerated by small cells at the base (fig. 23), which are often grouped in twos and threes (Watney's buds).*

A peritrophic membrane $\dagger$ is found here as in some (perhaps many) other Dipterous larvæ. It is a secretion of the epithelium, which encloses the food and keeps it from direct contact with the epithelium. In the Chironomus larva it is particularly firm and homogeneous, forming a distinct tubular membrane. In the Dicranota larva what appears to be the same thing is voluminous and irregular. $\ddagger$ We think it probable that the peritrophic membrane originates in the protrusions described above. It persists throughout the stomach and a great part of the intestine. It is a singular circumstance that the peritrophic membrane should arise in quite different fiashions in different insects. In the Chironomus larva, and probably in Lepidopterous larve, it is a perpetually renewed prolongation of the chitinous lining of the stomodæum ; in Myriopods, various Dipterous larvæ, incluaing Phalacrocera, and other insects, it seems to be a secretion of the epithelium of the stomach (Balbiani, loc. cit., pp. 30-32). We can confirm Balbiani's account so far as relates to Chironomus.

The epithelium gradually changes its character in the different parts of the stomach. Near the œesophageal invagination it is slightly folded, and consists of tall, columnar cells, grouped in bundles. Protrusions and

- Watney, Phil. Trans, 1877 ; Miall and Denny, The Cockroach, p. $1 \mathscr{2}$ (1886); Oudemans, Bijdrage tot de Kennis der Thysanura en Collembola, p. 54 (1887) ; Balbiani, loc..cit., p. 54 (1890).
+ 'The name is Balbiani's (loc. cit., p. 32). The same author gives references to Plateau, Schneider, and other naturalists, who have described a membrane enclosing the food in the intestine. See also Cuénot, Etudes physiol. des Orthoptères, Arch. Biol. (2), xiv. (1896).
$\ddagger$ I now think that the secretion poured out upon the food in the Dicrunute larva originates in the stomach. L. C. M.
trans. ent. soc. lond. 1897.-Part iv. (dec.) 24
granular masses are frequent. Towards the middle of the stomach the epithelium hecomes regularly columnar. There are no protrusions or granular masses, but a finely granular secretion is poured forth. Beyond this zone the epithelium becomes cubical, and the granular masses reappear. Protrusions also occur, though not so frequently as in the upper portion. 'Towards the lower end of the stomach the epithelium becomes thin and flat. The Malpighian tubules and the beginning of the chiti-. nous intima of the proctodæum show that the stomach passes into the intestine at a place where there is no change in the diameter of the tube. In young larva there seem to be no granular masses in the epithelium, which is uniform and irregularly columnar throughout the stomach; Watney's buds are very numerous. In starved larex the epitheliam becomes unusually folded, and the protrusions are frequent, while the granular masses and the secretion in the cavity of the stomach are more copious. The cell-outlines are less clear than usual, and the epithelial cells appear to be more distinctly grouped into bundles than in normal larvæ.

The intestine (fig. 186) may be divided into two tracts, colon and rectum. In the beginning of the colon the muscular layer, and especially its annular fibres, gradually increase in strength, while the epithelium and chitious intima become folded. A circular valve occurs at the end of this section of the colon. Then the muscular wall thins out again, and for a variable length the intestine becomes flexible and capable of dilatation. A considerable oval enlargement, filled with food, is often seen somewhere in this portion.* The epithelium beyond the muscular thickening is at first cubical, but gradually becomes thin and flat. At the beginning of the rectum the muscular wall again becomes thickened. The epithelium and chitinous intima are, as usual, strongly folded. The anus has been described above (p. 345).

Salivary glands (fig. 18a). A pair of convoluted salivary glands lie along the osophagus and the beginning of the stomach. Large nucleated cells, which form a single epithelial layer, bulge into the narrow and irre-

[^29]gular cavity. The glands are widest behind, and here the lining epithelium almost disappears, so that the glands become converted into mere reservoirs; they taper forwards, and pass into ducts, which unite below the subœsophageal ganglion to form a slender common duct, which enters the floor of the mouth (figs. 10, 18a.)

Malpighian tulules (figs. 18a, 18b). There are four long Malpighian tubules, which open at the junction of the stomach and intestine. Each passes forwards nearly as far as to the cosophageal invagination, and then turns backwards, ending opposite the colon in a coiled extremity.

## 3. The heart of the larva.

The heart (fig. 18a, 18b) lies in a pericardial space, which is cut off from the body-cavity (hæmatocœl) by the usual diaphragm. The pericardial cells and alary muscles present no uncommon features. In the hinder part of the heart are several pairs of valvular inlets. There is one feature of the heart which we have never met with in any other insect, nor do we know of a close parallel in any other animal. 'Two cellular cords lie free in the cavity, which they traverse from end to end. They are attached behind to the body-wall between the spiracles, and extend forwards as far as the brain. They are here and there attached to the wall of the heart by slender threads. The cords are cylindrical, and consist of a transparent, slow-staining substance, in which are imbedded innumerable quick-staining cells, with relatively large nuclei (figs. $24-26$ ). The cells are irregular, and often branched; between them and towards the centre of the cord is an irregular but probably continuous cavity. We are inclined to think that this cavity is filled in the living larva with a fluid, perhaps with blood. Sections reveal the very unexpected fact that the cords are of epidermic origin, tubular extensions of the epidermis of the hinder end of the body. They appear to pass into the heart through a pair of openings in its posterior wall.*

In the pupa the cords become beaded, break up, and finally disappear altogether. The difficulty of investigating the details of the process is very great, owing to the

[^30]small size of the dorsal vessel and the rapidity with which the cords break up. We have observed that during disintegration very minute filaments, or rods, project from the cord, as if they were about to become free and form some constituent of the blood. The nuclei also become free and escape into the blood, as we infer from their frequent occurrence at the critical stage in a nearly detached condition. In a young pupa the cords are almost the same as in the larva, while in a pupa approaching the time of final transformation, not a trace of the cords is to be found.

The observations nest to be related may throw some light upon the nature of the cellular cords.

In a young larva there was seen, just in front of the rectum and close to the anus, a multicellular, vacuolated body of rounded, irregular form, which seemed to be continuous with the epidermis, to which it was attached by a narrow stalk. Similar bodies have been found projecting from the dorsal surface. They all lie in the bodycavity (hæmatocoll). Segmentally arranged and single œnocytes occur throughout the body of the larva. They are often attached by threads or stalks to the body-wall, and when disintegrating have been observed to give off many fine filaments, which perhaps pass into the blood. The nuclei are of enormous size, and contain many nucleoli. The protoplasm of the conocytes includes a vast number of granules or corpuscles, with occasional vacuoles. A peripheral nucleus is sometimes found (fig. 32).

We have not been able to find a close parallel to the cellular cords in any other insect. Outside the class of insects we can only point to rather vague and distant analogies, such as the following:-

Certain Oligochret worms possess organs which have been called cariliac bodies and blood-glands.* The Enchytræidæ sometimes possess a cellular rod which runs the whole length of the dorsal vessel, being attached to its ventral wall. Michaelsen, the discoverer of the structure, assigns to it a mechanical function, that of facilitating occlusion of the tube during systole, without extreme contraction of the wall of the vessel. It has been suggested, though apparently not proved, that this cellular cardiac body of the Enchytreidæ originated in a dorsal diverticulum of the œsophagus. If this is well-

[^31]founded, the cardiac body cannot be morphologically similar to the cellular rods of Phalacrocera. The other blood-glands described in Beddard's "Oligochæeta" are still more remote from anything that we have found in Phalacrocera.

A second case of doubtful resemblance is found in the elæoblast of Tunicates. We have to thank Prof. W. A. Herdman, F.R.S., for the following statement of the facts:-
"The elæoblast of Salpa has been homologized by various writers with the tail of a normal Ascidian. It projects from the ventral surface of the embryo near its posterior end, but is not exclusively epidermic. There is a central mass of irregular vacuolated cells, more or less (according to the species and age of the embryo) in process of degeneration, which is supposed by Salensky, Brooks, and others, to be notochordal tissue. But the internal structure is rather indefinite ; it is very probably the degenerate representative of several tissues, and the elæoblast seems to be formed at least partially by wandering kalymnoblasts (follicle-cells which have immigrated into the embryo). A good deal of phagocytosis goes on in the elæoblast, and it becomes greatly reduced towards the end of embryonic life. A trace of it can sometimes be found in a young adult. It is difficult to trace any morphological connection between the elæoblast and the epidermic cords in the heart of Phalacrocera, though they may be physiologically comparable, since both exercise a nutritive function at a time of rapid tissue-formation."

Certain epithelia are known to be capable of resolution into substances which are sometimes, though not always, nutritive. In the secretion of milk, nuclei, filaments and oil-drops are liberated by the breaking up of epithelial cells.* Both cock and hen pigeons feed their young for some days after hatching, upon curdy masses formed out of the thickened and fat-laden epithelium of the crop. $\dagger$
'I'he epidermis of various Fishes, Amphibia and Inverte-

[^32]brates, contains scattered cells or collections of cells which may discharge mucus, fibres, and nuclei.*

All insects which have been anatomically studied seem to agree in the possession of numerous blood-cells, which may float in the blood as corpuscles, or form sheets and solid masses in the blood-cavities. The yellow œnocytes described by Wielowiejski, $\dagger$ the pericardial cells, and the fat-body, answer to this description. The pericardial cells and the fat-body are believed to be peculiar kinds of cœlomic epithelium, but the œnocytes arise from the ectoderm. In Hydrophilus groups of parastigmatic œnocytes have been traced to invaginations of the ectoderm. $\ddagger$ Such structares may be rudimentary analogues of the cellular cords, which attain such an extraordinary development in the larva of Phalacrocera.\$

Kowalewsky || finds that in certain Orthoptera (Pachytylus, Locusta) Malpighian tubules penetrate the heart, entering by the cardio-columic apertures which he has described, becoming much convoluted, and ultimately reaching the pericardium through the cardio-pericardial apertures. Here the motive seems to be, not nutrition at the expense of the blood, but purification of the blood itself, for which a large surface of contact is equally necessary.

We must now attempt some physiological interpretation of the cellular cords in the heart of Phalacrocera. We do so in a very guarded manner, feeling the difficulty of the task, and the necessity of a more searching inquiry than we have been able to undertake. It seems to us unlikely that the cords of Phalacrocera serve any such purely mechanical function as is ascribed by Michaelsen (see above) to the cellular rod of the Enchytreidæ. Numerous and large nuclei would not be required in a tissue which has no more complex function than to stop up a cavity. Nor does any such mechanical

[^33]interpretation throw light upon the disappearance of the cords in the pupa, or upon the resemblance of the cords to the stalked prominences found elsewhere in the hiematocœl, and to the œnocytes. It seems to us much more probable that all the structures described yield corpuscles, filaments, or other living nutritive particles, which are discharged into the blood at a time when the rapid growth of new tissues calls for enrichment of the fluid.

In the cellular cords we have a mass of epidermic reserve-tissue, which projects far into the hæmatocœl, and into that part of it which becomes specialized as the heart. This is one more instance of that tendency of epiblastic and hypoblastic tissues to bulge into any intervening space, which has led to so much perplexity in the interpretation of so-called mesoblastic organs.

We have considered the possibility that the cellular cords may be an organ of internal secretion. There is no positive evidence known to us which points to any such couclusion, and the rapid disappearance of the cords during the pupal stage seems to tell strongly against it.

## 4. The respiratory organs of the larva.

There is one pair of spiracles, situated on the dorsal surface of the last segment, between the base of the dorsal process and the anal hooks. The larva is therefore metapneustic, as is nearly alivays the case with Tipulidæ. The skin about the spiracles can be retracted so as to form a deep recess, with which both spiracle; communicate. The spiracle forms the outer end of an air-chamber, into whose cavity strong and close-set setie project. Towards the surface the setie become rod-like, and their inner ends are attached to a central plug. The structure is much the same as in the larva of Dicranota,* and in neither case have inlets for the air been discovered. In both larvæ, however, the spiracle is exposed at times to the air, and the trachere are filled with air. The renewal of the air seems to take place at night, when both Phalacrocera and Dicranota have been seen to push their spiracles out of the water. There are two main tracheal trunks, which run along the dorsal surface and give off branches. In most of the segments there is a

[^34]small cross-connexion at the level of the pericardial diaphragm. As usual in submerged Diptera the branches of distribution are scanty, but relatively large tracher pass to the long processes. (See p. 347.)

The Phalacrocera larva can endure long abstinence from fresh air. We have kept them alive for a fortnight in a bottle absolutely full of water. In boiled water the larve lived for five days, when the experiment was discontinued. When access to fresh air is cut off the natural sluggishness of the larvæ is increased, but no permanent injury results unless the experiment is greatly protracted. The larva can live long out of water.

## 5. The nervous system of the larva.

The ganglia are the brain, the subœsophageal, three thoracic and eight abdominal (figs. 18a, 18b). When the head is retracted, the brain and two, or even three, of the succeeding ganglia are enclosed within it ; when it is extended to its utmost (about one-third being then exposed) it contains only the brain and subœsophageal ganglion.

According to Brauer's peculiar nomenclature the Phalacrocera larva has a true head, the Chironomus larva only a "kiefer-kapsel." Yet his system requires that Chironomus should have the true head, and Phalacrocera the "kiefer-kapsel." It is becoming plain that Brauer's classification of the Nemocera by larval characters is based upon an insufficient knowledge of the structure of the larve.

The first abdominal ganglion is commonly found in its own segment, the last abdominal in segment 10. Between the brain and the first abdominal ganglia the connectives are double; in the abdomen they are single.

A pair of small nerves issue from the brain, run along the dorsal vessel, and enter a pair of ganglia, which are closely applied to it (figs. 19, 20). These are connected by short nerves with a frontal ganglion and a recurrent nerve. The whole arrangement is very similar to what exists in the Chironomis larva, and the larva of the Crane-fly.* In the thoracic region paired nerves issue

[^35]from the connectives of the nerve-cord and unite in pairs to form ansee, or loops, from which lateral "respiratory" nerves usually proceed to the adjacent spiracles. We have not traced these nerves in the fly; in the larva there are no thoracic spiracles.

## 6. The reproductive organs of the larva.

The ovaries (fig. 30) form a pair of cylindrical bodies, tapering to each end, which lie on either side of the beginning of the intestine. The ovary is invested by a thin fibrous sheath. It consists of a central cellular cord, which is excavated by a row of cavities, communicating with one another. 'I'he wall is drawn out into many projecting follicles (fig. 31), which are pear-shaped, with narrow necks. Each follicle encloses a group of large nucleated cells, one of which is probably selected to form an ovum, but this we have not seen.

Such an ovary is unlike that of most Insects, and resembles, at least superficially, the ovary of many Mollusca, such as the cockles.* Instead of a small number of long ovarian tubes opening nearly at the same place into a common oviduct, we find in Plalacrocera a great number of short, single-chambered, though many-celled follicles, which open at various points into a central tube. The eggs of which (as we suypose) only one ripens in each follicle, may pass direct from such an ovary into the oviduct, whereas in the other arrangement they can only be liberated a few at a time. The ovary of Phalacrocerct seems to be adapted to the almost simultaneous discharge of all the eggs, while the more usual disposition is appropriate to the successive discharge of eggs during a much longer time. In such Diptera as we are familiar with there is a multitude of short tubes or follicles, though Tachince and some few others have a few long tubes instead.

The testes occupy the same position as the ovaries, but are much smaller (fig. 27). At first they are filled with closely packed nucleated cells (spermospores), which by division produce loosely packed spermatozoa (fig. 29). Ripe spermatozoa may be found in advanced larvæ.

[^36]7. The development of the imaginal organs.

As usual in Diptera Nemocera, the rudiments of the future legs and wings appear simultaneously as three dorsal and three ventral invaginations. The ventral invaginations give rise to legs ; of the dorsal rudiments the prothoracic becomes the pupal respiratory organ, the mesothoracic the functicnal wing, the metathoracic one of the halteres. The homology of the pupal respiratory organ, whether tube or bunch of filamerts, with a prothoracic wing seems to be evident, thongh such a wing is unknown in any recent insect. The Carboniferous Ephemeridæ seem to furnish the best example.

The invaginations for the antennæ of the fly extend from the larval antenna to the brain; the rudiments of the compound eyes form near their hinder ends. Paired labial invaginations (fig. 6) form beneath the cosophagus as good-sized oval projections, extending backwards into the larval head.

## 8. The process of pupation.

A larva kept in confinement pupated on Oct. 16th. Air-bubbles were seen to form upon the processes, and when these were detached by shaking, new ones appeared. The larva was thus made buoyant, and floated in a horizontal position at the surface of the water. Shortly before the larval skin opened the spiracles were exposed to the air. 'The skin split along the dorsal surface of the prothorax, and the white head-end of the pupa began to protrude. The tips of the pupal respiratory tubes were brought to the surface of the water, and the body took a vertical position in consequence of changed hydrostatic conditions. The abdomen was alternately flexed and extended until the larval skin was slipped off backwards. As soon as it fell off and sank, the pupa lay horizontally at the surface. The work of extrication occupied a quarter of an hour. The pupa was at first pure white, except for a pair of bright-red spots on the fourth abdominal segment. These spots, which can sometimes be seen before pupation through the larval skin, are due to a red pigment which forms in the fat-body; they appear in both sexes, but only show through the larval skin in male larve. Two hours after pupation the pupa
had taken a dark-green colour. The fly appeared on Oct. 27th, so that the pupal stage lasted eleven days, unusually long in comparison with other aquatic Diptera.* The cast pupal skin was found to be attached to a leaf of moss by the dorsal projections from the hinder abdominal segments.

## 9. The pupa.

The pupa differs strikingly from the larva in its habits. It is comparatively active, and moves when requisite by flexion of the abdomen. When laid on the hand, it wriggles about, bending its body almost into a circle. The usual attitude of the pupa is vertical, the prothorax with the respiratory tubes just reaching the surface of the body; the pupa maintains itself in this position by grasping fioating weeds with its dorsal abdominal hooks. Considerable disturbance of the water does not cause it to loose its hold. The pupa is also found at times floating at the surface; if turned over, it recovers its ordinary position, which is necessary to respiration, by movements of the abdomen. Sometimes it descends to a fair depth from the surface by the help of the weeds. The pupa is asphyxiated by a submergence of six hours.

Its length varies from three- to four-fifths of an inch. Its general colour is greenish-brown ; there is a darker band along the mid-dorsal line, besides a median and two lateral dark bands on the ventral surface. The body is flattened dorso-ventrally, and prodeced laterally into thin margins, as in the Chironomus pupa. A pair of respiratory tubes project from the prothorax, diverging strongly from each other. The sixth and eighth abdominal segments are provided with dorsal projections, which serve to attach the pupa, and to prop it up in such a position that the prothorax is out of the water; there are also ventral and terminal projections. The thoracic legs are short, not reaching beyond the third abdominal segment. Rows of black dots are found on the dorsal, ventral, and lateral surfaces, whose arrangement is shown in figs. 13-15.

[^37]The dorsal abdominal projections consist of one pair on the sixth abdominal segment, which are curved, pointed, and directed backwards, and of two pairs on the eighth, which diverge from each other. Of these last the anterior pair are directed forwards, and are finely serrated on both margins; the posterior pair are turned backwards, and are serrated only on the anterior margin. A chitinous thickening which surrounds the segment connects them all together. On the ventral surface of the seventh abdominal segment is a pair of short, straight, and pointed processes, directed obliquely backwards. The last segment of all terminates in four small processes, two dorsal and two terminal ; the dorsal pair are short and pointed, the terminal pair somewhat longer and also pointed. The processes of the eighth segment seem to serve for attachment; those of the sixth segment for maintaining the erect posture. Most of the segments show a division into three annuli.

## 10. The imago.

The perfect insect usually emerges in April, but one or more later broods may appear. The males and females are about equally numerous. The fly is sluggish, and does not travel far from the pool in which it was reared.
11. Egg-laying.

A female fly was observed to lay her eggs in a piece of moss. She crawled over the moss, inserting the extremity of the abdomen into the axils of the leaves, until about sixty had been laid. The moss selected is submerged. The eggs are laid singly, and adhere slightly to the moss; they are dark-coloured, opaque, and spindle-shaped. The surface of the chorion is irregularly pitted. At one end is a rosette-like micropyle, which was found to be beset with numerous spermatozoa.

## 12. Comparison with nearly allied insects.

The larva of Cylindrotoma distinctissima, as described by Zeller,* bears some resemblance to that of Phalacrocera. Unfortunately it has not been anatomically studied.

$$
\text { * Isis, } 1842, \text { p. } 808 .
$$

The larva is terrestrial, feeding upon the leaves of Anemone nemorosa, Stellaria nemorum, etc. It attains a length of nearly an inch, and is narrow, depressed, tapering to each end, and of grass-green colour. There is a slight dorsal ridge, from which a row of short, backward-directed fleshy spines projects; oze spine in each segment exceeds the rest in length. There is a broad lateral margin, bearing very short processes. The tracheal tubes are externally visible in the hinder part of the body; they open by conspicuous brown spiracles. The head can only be partially protruded. Zeller remarks that the orifice of protrusion is employed as a sucker. There are eight pairs of ventral prominences, like the pseudopods of caterpillars, but without hooks, and one pair of longer, backward-directed processes, beneath the anus. The larva can hold on either by the head or the tail. The pupa fixes itself to stalks or leaves by the tail, which is still covered by the remains of the larval skin; it is flattened, greenish in colour, and provided with two short respiratory trumpets. The occurrence of spines or processes (much shorter, indeed, than those of the Phalucrocera larva) in the terrestrial larva of Cylindrotoma seems to indicate that these are not necessarily organs of aquatic respiration. A fuller description of the structure and life-history of Cylindrotoma is much to be desired.

The supposed larva of Triogma (p. 364) resembles that of Phalacrocera in coloration, in the retractile head, and in the presence of numerous spines. Its appearance is strongly protective, and even when imprisoned in a collecting-box, it was not easily discovered. The pupa was pale green, bore many spines on the abdomen, and according to De Rossi's recollection, had two thread-like appendages on the prothorax.

We have to acknowledge with hearty thanks the pains bestowed upon the plates by Mr. Hammond, who has, among other things, materially improved and corrected our drawings of the larval head.*

[^38]
## REMARKS ON THE LITERATURE OF THE EARLIER STAGES OF THE CYLINDROTOMINA, A SECTION OF THE TIPULIDA.

By Baron C. R. Osten Sacken, Hon. F.E.S.

In the Monograph of North American Diptera, iv., pp. 289-308 (1869), in giving an account of the Section Cylindrotomina, I introduced whatever was known about their life-history at that time. Very little has been added to our knowledge since. What I have done now is to overhaul the existing literature for a second time, and to prepare a detailed digest of it, arranged under the headings of the three principal genera of the section. It will be seen that with this mode of treatment the peculiarities of the larvæ and pupre of the Cylindrotomina are bronght out with more distinctness than they were in my work of 1869, and that these peculiarities fully bear out the intermediate position which I have given to that section between the lipulide: longipalpi and lrevipalpi. This intermediate position has been further justified by the discovery that, during the Oligocene period in Western North America, the Cylindrotomina were, apparently, much more common than now, and that, for this reason, they may be considered as the ancestral form among the present Tipulidæ. Many specimens were found in the fossiliferous strata about Florissant, Colorado, and the White River, Utah. Whether they represent as many species as Mr. scudder makes out of them, remains to be seen. (Compare Scudder, Tertiary Tipulidæ, Proc. Am. Phil. Soc., xxxii., 1894.)

The three genera of Cylindrotomina, about the transformations of which I reproduce the (in one case hypothetical) literature, are :-Phalacrocera, Schin., Oylindrotoma, Macq., and Triogma, Schin. The life-history of the genus Liogma, introduced by me (Monogr., iv., p. 298,1869 ), is as yet unknown.

## 1. Pifalacrocera, Schin.

De Geer (Nova Acta Upsal., i., pp. 66-77, Tab. 6 (1773) ; Mém. Hist. Ins., vi., p. 351, Tab. xx., figg. 1-16 (1776).-An excellent description of the external form and habits of the larva, pupa, and imago of Phalacrocera replicata, Linn.
Grube (Jahresb. d. Schles. Ges. für Vaterl. Kultur, 1867, p. 59).-A rather detailed description of evidently the same larva, but not identified.
Engel (Ent. Nachr., 1884, p. 260).-Short notice of the discovery by him of the same larva upon the stems of Ranunculus fluitans, in a lake, in the vicinity of Frankfurt-on-the-Oder.
Giard, Prof. A. (Bull. Soc. Ent. France, 1895, p. ccxxxv.).-An interesting notice of the same larva, which he found in pools of water among the downs between Wimereux and Ambleteuse (Dépt. Pas de Calais), hidden in the aquatic moss, Hypuum elodes, Spruce. He quotes a number of other continental stations.

## 2. Cylindrotoma, Macq.

Schellonberg (Genres des Mouches Diptères, Zïrich, 1803).-In French and German. Tab. xxxvii., fig. 1, represents a Tipula, wrongly named in the corresponding letter-press (pp. 22-23) Tipule histrio, Fabr. As I pointed out in 1869 (Mon., p. 299), the figures of the larva and pupa make it evident that the species is Cylindrotoma distinctissima, Meig. The text merely says, "We know this larva, which has been found on Viola bitlora, Linn.; we shall give its history in another place." This promised publication has, to my knowledge, never appeared.
Boie (Kröyer Naturh. Tidskr. ii., p. 234, 1838; half a page).-Boie did not know of Schellenberg's publication. He gives a short description of the larva and pupa, which answers to Schellenberg's figures. He adds: "It deserves to be noticed that the green colouring of the larva indicates quite a different mode of life from that of other 'lipulidæ. Numerous congregations of them were
observed gnawing the leaves of Stellaria nemorum in shady places among woods about the end of August. The transformation took place on the stems of the plants, to which the pupæ adhere by the tail, just like the chrysalids of butterflies. The fly develops about the middle of September."
Zeller, P. C. (Dipterologische Beiträge, 2te Abth., Isis, 1842, pp. 807-809.-Limnobia distinctissima, Wied., Meig.). Zeller refers to Boie, but deems it useful to give a more detailed description. He found the larve near Glogau (Silesia) in the spring, on leaves of Anemone nemorosa; in some places they occurred abundantly. The larve generally remain on the underside of the leaves, and by gnawing, make holes in them. About the middle of May they leave their food plants, fasten themselves upon grass-blades, leaves, etc., and usually pupate on the very next day; the pupa show a remarkable analogy to those of the genus Pterophorus (Lepidoptera). They hang fastened by the tail of the larva-skin, which is not stripped off the last three or four segments. Zeller gives a more detailed description of the larva and pupa than his predecessors. It results from the preceding statements that the larva of Cyl. distinctissima occurs on various phanerogamous plantsViola, Stellaria, and Anemone, and that it has, at least in some localities, two generations, one in the spring (Schellenberg, Zeller) and the other in autumn (Boie).

## 3. The supposed larva of Triogna.

G. de Rossi (Ent. Nachr. 1876, pp. 30, 31) describes a peculiar larva which he had discovered in woods, upon a species of moss (Hypnum), among which it was hidden. He succeeded in rearing the pupa, but unfortunately the pupa produced only an Ichneumon. As he had not made a description of the larva before its pupation, he published an account of it from memorv. In this account I recognised the larva of a Tipulid belonging to the Section Cylindrotomina. A short article, which I published about it in the same periodical (Ent.

Nachr. 1878, p. 5), contains the following state-ment:-"'lhe three-fold branches of the thornlike processes (die dreifach veriistelten Dornen) of the larva of De Rossi, remind one of the aquatic larva described by De Geer, and as this new larva seems to hold the middle place between the terrestrial larva of Cylindrotoma and the aquatic one of De Geer, it seems to me possible and even probable, that it may belong to a third of the known genera of the Section Cylindrotomina, Triogma. This supposition seems to be supported by the fact that this larva, like the aquatic larva of Phalacrocera, feeds upon a species of moss (Hypnum), differing in this from the larva of Cylindrotoma, which, as we have seen, occurs on different kinds of phanerogamous plants."

In the Monograph of North American Diptera, iv., pp. 289-292, I have shown that the Cylindrotomina occupy an intermediate position between the two great, and otherwise very well defined, divisions of the Tipulidæ, the longipalpi and brevipalpi. And I have called attention (l. c. p. 295) to the anomalous character of their larvæ, corresponding with that of the perfect insects. Larvæ climbing upon living plants, feeding upon them, and gnawing holes in their leaves, are toto coelo different from ordinary larvæ of Tipulidæ. These larvæ must of course show corresponding adaptations for such a mode of life, and it will be the task of future investigators to describe these structural differences in detail. What we can gather from the existing descriptions is very little, and is found principally in Zeller. According to him, climbing is made possible by sucking-cups, the principal one of which is produced by the withdrawal of the head into the thoracic segments, thus forming a hollow, the edges of which complete the cup. He believes that eight pairs of conical, fleshy protuberances on the ventral side when withdrawn, may likewise act as sucking-cups for locomotion. Zeller's statement about the breathing apparatus proves that the larvæ of Cylindrotoma distinctissima are metapneustic, like those of Phalacrocera and other Tipu-
trans. ent. soc. lond. 1897.-part iv. (dec.) 25

## 366 Baron Osten Sacken on the Cylindrotomina.

lidæ. He says-" The translucent tracheæ end, a short distance from the anus, on the dorsal side, in two brown, very distinct spiracles; their anterior end is not visible, because, in the anterior segments, they lie deeper from the surface."

The pupæ of the Cylindrotomina are also very peculiar ; they are fastened to the food plants, and resemble the pupæ of some Lepidoptera.

PLATES VIII.-XI.
[The explanation faces the Plates.]
XVI. Descriptions of New Lepidoptera from Australia and New Zealand. By Edward Meyrick, B.A., F.Z.S., F.E.S.
[Read Nov. 3rd, 1897.]
The following descriptions are in most instances drawn up from specimens taken by Messrs. J. A. Kershaw, G. V. Hudson, the late Geo. Barnard, and several other esteemed Australian correspondents, and liberally communicated by them to me; the types are in my collection, but the collectors usually possess similar examples.

## I. Australian Lepidoptera.

## CARADRINID风.

## Sub-fam. POLIADES.

Orthosia, Ochs.
O. horologa, sp. n.

才 33 mm . Forewings rather dark fuscous, slightly purplishtinged, somewhat mixed with lighter brown; a white discal dot before first line, and several ou costa posteriorly ; first and second lines paler, internally partly blackish-edged, white-mixed towards extremities, clear white on costa ; orbicular and reniform brownish, edged with white and outlined with black, posterior edge of reniform very acutely indented in middle ; claviform partly blackishoutlined ; interneural black streaks between reniform and termen; subterminal line partly whitish, interrapted. Hindwings whitishfuscous, becoming white towards base, fuscous towards termen ; cilia white, with a fuscous subbasal line.

Melbourne, Victoria; one specimen, but I have seen a second.

> Sub-fam. MELANCHRIDES.
> Meliana, Curt.
M. aylogramma, sp. n.
t 26 mm . Antennal ciliations long (3). Forewings greyishochreous, suffusedly streaked with ochreous-whitish, with a few scattered black scales, median vein whiter ; a darker fuscous-mixed trans. ent. soc. lond. 1897.-part iv. (dec.)
median longitudinal streak from base to termen, interrupted by median vein ; subterminal line indicated by a series of minute black dots ; a terminal series of black dots. Hindwings pale grey; cilia white.

Duaringa, Queensland; one specimen received from the late Mr. G. Barnard.

## Sub-fam. CARADRINIDES.

Heliorhis, Ochs.
H. leucatma, sp. n.
of 36 mm . Forewings pale greyish-ochreous, mixed with light brown and grey, and irrorated with blackish ; subbasal, first, and second lines obscurely whitish, dark-edged ; orbicular centrally dark grey, whitish-ringed; reniform dark grey, preceded and followed by whitish patches; subterminal line very obscurely whitish : cilia barred. Hindwings grey-whitish; veins, a thick suberescentic discal spot, and a rather broad terminal band dark fuscous.

Melbourne, Victoria; one specimen, but I have seen others.

## Eremochroa, gen. n.

Face with truncate-conical horny prominence ; tongue obsolete ; eyes glabrous. Antennæ in ot bipectinated to apex. Palpi moderately long, porrected, clothed with dense scales, rather spreading above, terminal joint concealed. Thorax with loose anterior and posterior crests. Abdomen rather elongate, smooth. Tibix loosely haired. Hindwings : 3 and 4 stalked, 6 and 7 stalked, 8 anastomosing with upper margin of cell to near middle.

Type. E. psammias. The genus is distinctly related to Luperina.
E. psammias, sp.n.
to $\ddagger 2 t-31 \mathrm{~mm}$. Forewings with costa slightly sinuate; whitish-ochreous, in of suffusedly irrorated with whitish, with a very few scattered black scales; first and second lines faint, whitish, internally darker-edged, sometimes almost obsolete, first curved, second somewhat bent in middle; orbicular, claviform, and reniform small, faintly paler, hardly defined, surrounded by a somewhat deeper ochreous tinge and two or three black scales;
subterminal line faintly whitish, hardly perceptible. Hindwings in $\delta$ whitish-fuscous, whitish-suffused towards costa, in $\uparrow$ wholly whitish.

Carnarvon, West Australia; five specimens in October.
E. alphitias, sp. n.
of $30-33 \mathrm{~mm}$. Forewings with costa almost straight ; whitishochreous, finely irrorated with fuscous and dark fuscous, and suffusedly mixed with white except towards middle of disc ; subbasal line indicated by some black scales, very near base ; first and second lines whitish, little marked, dark-edged internally, curved ; orbicular, claviform, and reniform small, white, distinct, edged with some black and dark fuscous scales, claviform touching first line, lower end of reniform bilobed ; subterminal line whitish, edged anteriorly in middle with a short dark fuscous mark. Hindwings whitish, in © greyer posteriorly; a faint fuscous-tinged subterminal shade.

Adelaide, South Australia; (?) Sydney, New South Wales ; two specimens.

## Micrapatetis, gen. n.

Eyes glabrous. Antennæ in ${ }^{t}$ ciliated. Thorax and abdomen without crests. Forewings : 10 out of 9 near base, not connected with 9 .

This and the following genus, which are closely connected, are probably allied to Caradrina.
M. orthozona, sp. n.
of $15-16 \mathrm{~mm}$. Head and thorax dark fuscous, face white. Forewings white, sometimes yellowish-tinged; a triangular spot on base of costa, a straight median fascia, a terminal fascia with anterior edge somewhat projecting in middle, and cilia dark fuscous, slightly purplish-tinged. Hindwings fuscous.

Duaringa, Queensland (G. Barnard) ; seven specimens.

## Xenopseustis, gen. n.

Face rounded-prominent; eyes glabrous. Antennæ in ot ciliated. Thorax and abdomen without crests. Forewings: 10 separate, not, connected with 9.

## X. peecilastis, sp. n.

of $\uparrow 19-20 \mathrm{~mm}$. Head orange. Forewings dark fuscous; two or three white spots about base ; first line forming a straight irregular-edged white fascia; a white dorsal spot beyond this; reniform white, somewhat 8 -shaped; second line white, usually reduced to costal and dorsal spots; subterminal white, irregular, more or less interrupted and connected with termen. Hindwings rather dark fuscous; base and sometimes a cloudy median shade yellowish.

Duaringa, Queensland, in February (G. Barnard); three specimens.

## Caradrina, Ochs.

## C. heliarcha, sp. n.

of ㅇ $30-35 \mathrm{~mm}$. Antennæ in ot ciliated. Abdomen unusually stout, in ${ }^{*}$ with blackish hairs above. Forewings light greyishochreous irrorated with fuscous, basal half in ठ suffused with yellow-ochreous; first and second lines pale, darker-edged, obtusely angulated near costa, thense nearly straight; orbicular indicated by a black dot, posterior edge of reniform by a fine curved transverse whitish line ; median line rather dark fuscous ; subterminal faintly pale. Hindwings prismatic grey-whitish, greyer dorsally, basal half in of suffused with light ochreous-yellow ; veins dark fuscous; termen suffused with fuscous.

Brisbane, Queensland; two specimens.

## Actinotia, Hüb.

A. acmophora, sp. n.
đ $q$ 29-32 mm. Antennæ in $\ddagger$ bipectinated, towards apex simple. Forewings fuscous irrorated and partly suffused with white (most of the scales fuscous outlined with white) ; first and second lines indistinctly paler, dark-edged, irregularly dentate, connected by a black oblique line on fold ; second forming a double clear white angulated mark towards dorsum ; median shade dark fuscous; orbicular oblique-oval, whitish-edged, outlined with black; reniform black-outlined anteriorly; subterminal line represented by a dark fuscous oblique cloudy streak from apex, three or four fine black wedge-shaped interneural marks in disc, and a dark brown black-marked streak from below middle of termen to subdorsal angle of second line. Hindwings whitish ; terminal half dark fuscous ; cilia white.

Melbourne, Victoria; two specimens.

Hadena, Schranck.

H. bryochlora, sp. n.
đ 35 mm . Antennæ in ot ciliated. Abdominal crests slight. Forewings light olive-green, darker terminally ; subbasal and first lines white, partly darker-edged ; median straight, darker; reniform obscurely darker, white-edged on sides; a white shade beyond it from costa to below middle, terminated beneath by an irregular black mark connected with second line; second line mixed with white and darker olive-green, black-edged anteriorly in disc and below middle ; subterminal irregular, white, partly edged with suffused blackish marks : cilia light olive-green, tips white. Hindwings dark fuscous, lighter auteriorly ; cilia olivegreenish, tips white.

Sydney, New South Wales; one specimen, but I have seen a second.

## PLUSIADA.

Sub-fam. PLUSIADES.
Mormoscopa, gen. n.
Head with appressed scales. Antennæ in ot ciliated. Palpi very long, recurved, second joint with appressed scales, terminal long, pointed. Thorax and abdomen without crests. Anterior tibiæ in ${ }^{t}$ with long horny apical hook, tibiæ rough-scaled. Hindwings: 5 approximated to 4 .
M. crossodora, sp. n.
to $\frac{45-48 \mathrm{~mm} \text {. Forewings rather dark fuscous; first and }}{}$ second lines cloudy, whitish-ochreous, internally darker-edged ; orbicular dot-like, whitish-ochreous ; reniform narrow, somewhat curved, edged with whitish-ochreous; subterminal line irregular, ochreous-whitish, conspicuous, terminal space beyond it in of paler fuscous, in ot wholly ochreous-whitisb, forming a pale band abruptly excavated below costa and in middle. Hindwings pale fuscous, towards base paler and with traces of lines ; a pale subterminal line, preceded by a darker suffusion, terminal space in of wholly mixed with ochreous-whitish.

Mount Kosciusko (2700 feet), New South Wales; in January, two specimens.

## Praxis, Guen.

P. marmarinopa, sp. n.
fo of $28-32 \mathrm{~mm}$. Abdomen in of with large expansible white genital tuft. Forewings fuscous, sprinkled with dark fuscous and whitish, and more or less mixed with pale ochreous-rosy ; subbasal, first, second, and subterminal lines pale ochreous-rosy, obscurely edged with dark fuscous, waved; orbicular, claviform, and reniform roundish, pale ochreous-rosy, ill-defined ; a terminal row of small pale ochreous-rosy spots, corresponding with similar spots in cilia. Hindwings fuscous, darker posteriorly ; a slightly curved whitish postmedian line, rosy-tinged on dorsal half ; subterminal line pale rosy on dorsal third ; an interrupted pale rosy terminal line ; cilia fuscous, with pale rosy basal spots in indentations, on dorsum and an apical patch white.

Carnarvon, West Australia, and I have also one which probably comes from South Australia ; in October, two specimens.

## Catephia, Ochs.

C. melanoschista, sp. n.
of $39-43 \mathrm{~mm}$. Forewings fuscous, densely irrorated with white, especially towards costa : veins more or less marked with black lines; median line and margins of first and second darker, little distinct except towards costa, where they are very oblique, and on dorsum, where they are black and sometimes suffused ; a black longitudinal curved submedian streak from base to second line, a straight one above middle from first line to subterminal, and a short one towards termen above this, all sometimes obsolete; a blackish streak from second line on fold to termen below middle ; termen crenate. Hindwings snow-white, prismatic ; a transverse dark fuscous apical blotch, extending to below middle of termen.

Duaringa, Queensland, in December (G. Barnard); three specimens.

## Thyas, Hüb.

Head somewhat rough-scaled. Antennæ in of ciliated. Palpi rather long, ascending, second joint with appressed scales, terminal moderate, pointed, erect. Thorax densely scaled. Abdomen not crested. Middle tibie spinose. Hindwings : 3 and 4 stalked, 5 approximated to 4.

This genus includes and supersedes Achæa, Hüb., and Ophiodes, Guen.
T. irioleuca, sp. n.
t $39-42 \mathrm{~mm}$. Head and anterior edge of thorax dark fuscous. Abdomen rather dark fuscous with white rings, beneath wholly white. Forewings rather strongly narrowed towards base, white, suffusedly irrorated with rather dark brown; anterior half of costa suffused with dark fuscous ; first and second lines blackish, first preceded on dorsum by a triangular blackish blotch, second forming a very strong loop inwards below middle, which includes a clear white space, and followed on costa by a triangular blackishfuscous blotch; a small dark fuscous transverse discal mark; a rather dark fuscous terminal band, irrorated with whitish below middle. Hindwings snow-white, prismatic ; a dark fuscous apical blotch, extending to below middle of termen.

Duaringa, Queensland; New Guinea; two specimens.

## Prorocopis, gen. n.

Head rough-scaled, face with strong horny conoid prominence, apex forming a short vertical edge. Eyes with a few cilia from lower edge. Antennæ in d-? Palpi moderately long, ascending, loosely rough-scaled, terminal joint moderate, obtuse. Thorax with large dense posterior crest. Abdomen smooth. Tibie roughhaired. Forewings : areole short. Hindwings : 3 and 4 closely approximated at base, 5 approximated, 6 and 7 closely approximated at base.

## P. melanochorda, sp. n.

\& 31 mm . Forewings light fuscous, irregularly irrorated with ashy-whitish aud dark fuscous, tending to form transverse strix ; subbasal, first, and second lines fine, sharp, black, first nearly straight, sinuate near dorsum, second at $\frac{2}{3}$ rectangularly bent inwards and then upwards to beneath reniform, thence abruptly bent down again, and sinuate inwards ; median line blackish on upper half, running along anterior edge of reniform to meet second ; reniform dark-edged, inconspicuous, area between it and second line more ashy-whitish ; subterminal line slender, waved, blackish, indistinct; a fine black terminal line. Hindwings dull white ; a broad dark fuscous terminal band, narrowed at tornus; cilia white.

Carnarvon, West Australia; one specimen in October.

Ceparcha, Meyr.

## C. lichenopa, sp. n.

of ㅇ $26-35 \mathrm{~mm}$. Forewings white, more or less tinged with pale green, and irrorated with blackish; in of a broad antemedian fascia of fuscous suffusion; sometimes a black streak from base of costa; subbasal, first, second, and subterminal lines black, irregular, first and secord unusually approximated, subterminal strongest, others sometimes partly indistinct in $q$; sometimes indistinct greenish lines alternating with these; sometimes a black discal dot: cilia white, basal halt barred with blackish. Hindwings fuscous or whitish-fuscous, becoming dark fuscous posteriorly, in đ whitish towards base.

Duaringa, Queensland, in August and May (G. Barnard) ; Port Moresby, New Guinea; six specimens.

## Prionorhora, Meyr.

Head smooth. Antenur in ot ciliated, with longer setæ at joints. Palpi moderately long, obliquely ascending, with loosely appressed scales. Thorax smooth beneath. Abdomen smoothscaled. Tibiæ smooth-scaled, spurs long. Hindwings : 3, 4, 5 approximated, 8 anastomosing with upper margin of cell to middle.

The genus is here recharacterised, as the characters originally given were incomplete in some particulars. It is a remarkable form; the larva of the typical species is. slender, without prolegs on 7 and 8, and feeds on Casuarina.

## P. grammatistis, sp. n.

ô \& $22-26 \mathrm{~mm}$. Forewings elongate, termen very oblique; pale greyish-ochreous, with a slight rosy-purplish tiuge, more or less sprinkled with white and black, sometimes suffusedly streaked with whitish; veins towards costa posteriorly often suffused with dark fuscous ; a terminal series of black dots. Hindwings fuscous or whitish-fuscous, becoming whitish towards base.

Duaringa, Queensland (G. Barnard) ; six specimens.

Musotiyma, gen. n.
Head with appressed scales. Antennæ in ot simple. Palpi moderate, ascending, with appressed scales, terminal joint moderate, cylindrical. Thorax smooth-scaled. Abdomen with small crest. Tibiæ with appressell scales. Forewings : 7 separate, 10 anastomosing with stalk of 8 and 9 . Hindwings : 5 somewhat approximated to 4 .
M. cyanastis, sp. n.
© ㅇ $32-35 \mathrm{~mm}$. Forewings with slight rounded dorsal prominence before tornus ; fuscous, strigulated with whitish-ochreous and blackish ; costal edge grey; a rather broad grey dorsal stripe, tinged with fuscous and blue, from base to second line, then produced before second line to below middle; first line pale, darkedged, indistinct; median shade forming a dark fuscous spot ou costa; reniform indistinct, dark, margins and a central line pale; second line greyish-ochreous edged with whitish, marked with dark fuscous in disc, very strongly curved outwards, followed ou upper half by a deep blue-grey posteriorly white-edged and indented patch, and below middle by three blue-grey posteriorly white-edged confluent spots ; terminal space beyond this pale greyish-ochreous, marked with dark fuscous on termen. Hindwings whitish-fuscous; a suffused dark fuscous terminal fascia; cilia whitish, with a fuscous line.

Duaringa, Queensland, in December and January (G. Barnard) ; two specimens.

## Eublemma, Hüb.

E. orthopetes, sp. n.
of 18 mm . Forewings fuscous, reddish-tinged, with a few black scales, terminal half rather dark fuscous; costal edge suffused with blackish; a broad straight whitish-ochreous fascia beyond middle, somewhat narrowed dorsally, brownish-tinged posteriorly, anteriorly blackish-edged ; subterminal line pale, obscure, forming a clear whitish-ochreous blotch on costa. Hindwings fuscous, darker terminally.

Duaringa, Queensland (G. Barnard); one specimen; allied to E. pyraspis.

## STERRHID.E.

Eors, Hüb.

E. plumboscriptaria, Christ.
(Acidalia plumboscriptaria, Christ. Bull. Mosc. 1880 (2), p. 44.$)$
$13-14 \mathrm{~mm}$. Face dark fuscous. Forewings and hindwings light ochreous, with five irregular angular-sinuate light purplishgrey leaden-shining fasciæ, first three partially confluent: cilia barred.

Duaringa, Queensland (G. Barnard) ; one specimen, agreeing well with others from the Amur and Japan; not previously recorded as Australian.
E. iodesma, sp. n.
$申 16 \mathrm{~mm}$. Head and palpi dark ferruginous-fuscous, fillet whitish. Thorax whitish. Abdomen whitish-ochreous. Forewings triangular, termen slightly bowed, oblique; whitish, sprinkled with faint whitish-ferruginous; first line ferruginous, rather irregular, not reaching costa; second line thick, ferruginous, bisinuate, not reaching costa; an interrupted dark fuscous terminal line on upper half : cilia whitish. Hindwings whitish, irrorated with whitishferruginous; a central ferruginous fascia, posterior edge roundly projecting above and below middle ; an interrupted dark fuscous terminal line: cilia ferruginous-whitish.

Brisbane, Queensland; one specimen received from Rev. C. D. Ash ; somewhat allied to E. innocens.

## MONOCTENIADÆ. <br> Taxeotis, Meyr.

T. goniogramma, sp. n.
of 25 mm . Head grey, face blackish-fuscous. Palpi $1 \frac{2}{3}$, wholly blackish-fuscous. Autenne whitish. Thorax and abdomen pale grey, sprinkled with black. Anterior and middle legs dark grey, posterior pair grey-whitish. Forewings triangular, termen nearly straight above, rounded beneath; 12 connected by bar with 11 ; grey, irrorated with black, especially towards disc posteriorly, where it forms a general dark suffusion; first line only indicated towards dorsum ; a blackish discal dot, obscured by the
dark suffusion ; second line pale, blackish-edged anteriorly, from $\frac{2}{3}$ of costa to $\frac{3}{5}$ of dorsum, forming a right angle at $\frac{1}{4}$ from costa, thence almost straight; an obscure subterminal series of whitish dots, dark-edged anteriorly, with two more distinct blackish dots near dorsum ; costa pale-suffused towards apex ; a short oblique dark apical streak; a terminal series of black dots: cilia greywhitish sprinkled with black. Hindwings with termen rounded; grey, irrorated with black; a blackish discal dot; second line pale, dark-edged on both sides, central, nearly straight ; terminal dots and cilia as in forewings.

Duaringa, Queensland, in May (G. Barnard); one specimen. Allied to T. egenata, but easily separated by the angulated second line.

> T. pelopa, sp. n.
of 26 mm . Head whitish-ochreous, face dark fuscous. Palpi 1 $\frac{1}{2}$, dark fuscous, base white. Antennæ whitish. Thorax and abdomen whitish-ochreous. Legs whitish-ochreous tinged with brown. Forewings triangular, termen straight above, rounded beneath; 12 connected by bar with 11 ; pale greyish-ochreous, faintly brownish-tinged, with a few black scales towards base; first line of five black dots, somewhat irregular ; a black discal dot; second line formed of black dots, from beyond $\frac{3}{4}$ of costa to $\frac{3}{4}$ of dorsum, slightly curved; a subterminal series of ill-defined blackish dots; a terminal series of black dots: cilia whitishochreous. Hindwings with termen gently rounded ; pale greyishochreous, with a few blackish seales towards dorsum; a grey discal dot; second line beyond middle, faintly whitish, anteriorly greyedged, indistinct, nearly straight; a subterminal series of indistinct dark fuscous dots ; terminal dots and cilia as in forewings.

Melbourne, Victoria (G. H. Raynor) ; one specimen.

## SELIDOSEMID..

Pseudopanthera, Hüb.

P. iogramma, sp. n.
© 25 mm . Head, thorax, and abdomen pale greyish-ochreous, head and anterior part of thorax faintly rosy-tinged. Antennæ dentate. Forewings with apex prominent, termen obliquely bowed, rather strongly prominent in middle; 10 connected with 9 , 11 connected with 10 ; pale greyish-ochreous, slightly rosytinged towards costa anteriorly ; costal edge pale yellow-ochreous,
minutely strigulated with dark fuscous; first line ferruginousfuscous, slender, curved near costa, indistinct towards dorsum ; a black discal dot; second line straight, oblique, thick, dark fuscous suffused with ferruginous, near costa faintly curved and attenuated; an oblique cloudy whitish apical mark : cilia dark ferruginous-fuscous, base greyish-ochreous, terminal half white, with fuscous bars at apex, middle, and tornus, and traces of others. Hindwings with termen rounded, slightly angulated in middle; whitish-grey-ochreous, becoming whitish towards costa posteriorly; second line central, straight, thick, dark fuscous suffused with ferruginous, not reaching costa; termen somewhat ferruginous-suffused; cilia as in forewings, but bars less marked.

Albany, West Australia ; in October, one specimen.

## GALLERIADA.

## Melissoblaptes, Zell.

## M. hilaropis, sp. n.

o 17 mm . Head and thorax whitish-ochreous mixed with whitish. Forewings elongate-triangular, termen straight, rather oblique, 4 and 5 stalked ; rather deep ochreous; first and second lines cloudy, fuscous, first angulated in middle, second abruptly curved inwards on upper half, connected with first by an oblique bar in disc ; a narrow purplisb-fuscous terminal streak, on lower half suffused anteriorly : cilia yellow-ochreous, at apex and tornus infuscated. Hindwings light ochreous-yellow ; a fuscous terminal line; cilia pale yellowish.

Brisbane, Queensland; one specimen.

## CRAMBID平.

## Halterophora, gen. n.

Face with conical horny projection. Tongue well-developed. Antennæ in ot shortly ciliated. Forewings : 7 separate. Hindwiugs : 4 and 5 connate or stalked, 7 out of 6 ; in ${ }^{\circ}$ above with very long exsertible hair-pencil lying in a groove beneath upper margin of cell.

I characterise this genus for the reception of the well-known Crambus lativittalis, Walk. (halterellus, Zell.), which has apparently some affinity with Chilo, but camnot be justly included in that or any other described
genus. If we may suppose that the neuration of the hindwings has been directly modified in consequence of the development of the subcostal hair-pencil, perhaps the relationship is really closer with Talis.

## Canuza, Walk.

C. acmias, sp. n.
¢ 20 mm . Head, palpi, and thorax rosy-ochreous, palpi white towards base beneath. Forewings elongate, posteriorly moderately dilated, termen slightly rounded, oblique; whitish-ochreous, irrorated, and towards costa posteriorly suffused with dull rosyochreous; an ill-defined semi-oval white spot on dorsum beyond middle, irregularly edged with blackish ; a straight oblique dark fuscous streak from apex of wing towards this spot, becoming obsolete before reaching it, edged posteriorly with pale suffusion ; cilia whitish-ochreous, with two obscure darker lines, first dark fuscous at apex. Hindwings semitransparent grey-whitish ; veins and a terminal suffusion grey.

Sydney, New South Waies ; in October, one specimen (G. H. Raynor).

## Talis, Guen.

T. diacentra, sp. n.
t $20-22 \mathrm{~mm}$. Head and thorax ochreous, sides of face and a line on each side of back whitish, forehead with conical prominence. Palpi $4 \frac{1}{2}$, ochreous, whitish-sprinkled. Antennæ bipectinated. Forewings elongate, rather narrow, termen very oblique ; rather light ochreous; a moderate shining snow-white median longitudinal streak from base, beneath edged with dark fuscous from base to middle, whence proceeds an obscure line of white and dark fuscous scales along fold to tornus, above edged with dark fuscous from $\frac{1}{3}$ onwards, at $\frac{2}{3}$ almost interrupted by a triangular dark fuscous indentation from beneath, terminating suffusedly before reaching a rather inwards-curved cloudy white streak running from apex to tornus but indistinct beneath; veins posteriorly somewhat marked suffusedly with dark fuscous: cilia pale greyish-ochreous mixed with white, basal third before a fuscous or blackish line clear white. Hindwings with 4 and 5 stalked or coincident; pale whitish-fuscous, slightly yellowish-
tinged, more infuscated terminally; cilia whitish, with a pale fuscous line.

Gunbower, Victoria; two specimens (J. A. Kershaw). The variation in the neuration of the hindwings shows that Surattha, Walk., as defined by Sir George Hampson, is not tenable as a distinct genus; but I had in fact already noted the same variation in describing $T$. aylophæa, to which this species is most nearly allied.
T. enchias, sp. n.
t 25 mm . Head and thorax brownish-ochreous, forehead with conical prominence. Palpi $5 \frac{1}{2}$, light fuscous, beneath white. Antennæ strongly dentate. Forewings elongate, posteriorly moderately dilated, termen faintly coucave, oblique; light brownish-ochreous, with some irregularly scattered dark fuscous scales ; a straight white subcostal streak from base of costa to costa again before apex, above suffused into ground colour, beneath welldefined and edged throughout with dark fuscous suffusion; an indistinct dark fuscous discal dot beneath this beyond middle; median vein beyond middle and its branches faintly indicated with whitish suffusion; a white almost terminal streak from apex to tornus, indistinct on lower half; terminal black dots on veins, more distinct on lower half : cilia whitish, with a fuscous line. Hindwings with 4 and 5 stalked ; clear whitish; cilia whitish.

Melbourne, Victoria; one specimen received through Lord Walsingham. A distinct species, perhaps nearest T. invalidella.

## Diptychophora, Zell.

D. microxantha, sp. n.
\& 13 mm . Head and thorax brown. Palpi brown mixed with black, and at tips with whitish. Forewings triangular, termen rather strongly oblique, sinuate inwards above and less markedly below middle ; dark brown, closely irrorated with white ; a blotch of blackish suffusion ou base of dorsum; first line obscurely whitish, edged with dotted lines of black scales, thrice sharply dentate outwards; a transverse blackish discal mark; a streak of blackish suffusion along costa from middle to second line ; second line thick, white, only distinct on costa and towards dorsum, edged anteriorly throughout with scattered black scales; a white spot on costa before apex ; about eight small quadrate black spots on lower
portion of termen : cilia submetallic whitish-grey with two darker grey lines, and a whitish subapical spot. Hindwings with vein 4 present; clear ochreous-yellow; base dark grey; second line indicated by some dark fuscous scales; a dark fuscous terminal line; cilia whitish, with two grey lines.

Melbourne, Victoria; one specimen (J. A. Kershaw).

## PYRAUSTID.E.

Psammotis, Hüb.

## P. trygoda, sp. n.

of 19 mm . Head and thorax ochreous, mixed with dull purplish. Palpi $2 \frac{1}{2}$, dark fuscous, base white. Antennal ciliations 3. Legs yellow-ochreous, anterior pair somewhat infuscated, middle pair white. Forewings triangular, termen bowed, oblique; light dull purplish, becoming deeper purple terminally; first and second lines cloudy, dark fuscous, first slightly bent in middle, second from $\frac{4}{5}$ of costa to near termen below middle, thence moderately curved inwards to $\frac{4}{5}$ of dorsum, on costa preceded and followed by bright orange-ochreous suffusion; a dark fuscous subcrescentic discal mark: cilia yellowish, towards base orange-ochreous. Hindwings with base of vein 8 much swollen; ochreous-yellow; a spot of purple suffusion on termen below middle; cilia yellow.

Brisbane, Queensland; one specimen (G. H. Raynor). This species differs from typical forms of the genus in the long antennal ciliations (a rare feature in the family), as well as in the dilated vein 8 of hindwings, and may therefore eventually require generic separation, bat at present there seems no necessity for it.

Scoparia, Haw.

S. oxygona, sp. n.
of of $17-19 \mathrm{~mm}$. Head and thorax whitish mixed with fuscous and dark fuscous. Palpi $2 \frac{1}{2}$, grey mixed with black, base white. Antennal ciliations in $\delta \frac{1}{3}$. Forewings very elongate-triangular (somewhat broader than in S. plagiotis), termen straight, oblique ; fuscous, irrorated with white, and irregularly coarsely irrorated with black, forming streaks on veins posteriorly; first and second lines whilish, first obtusely angulated in middle, edged posteriorly

[^39]with blackish suffusion, second almost straight, slightly sinuate inwards near costa and dorsum ; orbicular small, blackish, touching posterior edge of first line ; claviform obsolete; discal $\times$-shaped, blackish, ill-defined ; subterminal line obscurely paler, cloudy, very undefined, not distinctly interrupted nor touching second line. Hindwings $1 \frac{1}{3}$; whitish-grey, somewhat darker terminally ; a faint darker postmedian line.

Melbourne, Victoria; Mount Lofty, South Australia; also from Tasmania; in February and March, five specimens. Intermediate between S. cleodoralis and S. plagiotis; well characterised by the form of the lines.

## GELECHIADÆ.

## Eschatura, gen. n.

Antennre in of filiform, simple. Labial palpi long, recurved, second joint thickened with appressed scales, terminal as long as second, moderate, acute. Posterior tibiæ rough-sealed. Forewings with apex strongly caudate ; 2 from $\frac{2}{3}$ of cell, 7 and 8 stalked, 7 to costa. Hindwings over 1 , trapezoidal, termen sinuate beneath apex ; 3 and 4 short-stalked, 5 parallel, 6 and 7 connate.

This genus belongs to the group formerly maintained as a distinct family under the name Xyloryctidæ, and is intermediate between Uzucha and Pilostibes.
E. lemurias, sp. n.
t $28-30 \mathrm{~mm}$., of $3 t-35 \mathrm{~mm}$. Head and thorax light reddishfuscous, patagia posteriorly whitish-ochreous. Palpi dark reddishfuscous, basal joint white, terminal white posteriorly. Forewings elongate, moderately broad in middle, costa very strongly arched, apex very strongly produced, caudate, termen appearing strougly concave beneath this ; in of whitish-ochreous, in $\$$ deep ochreous, in both with a strong shining whitish gloss ; a grey-whitish discal spot edged with dark reddish-fuscous suffusion, ill-defined ; costal cilia orange ; terminal cilia whitish, on upper half and round apex reddish-fuscous except at base. Hindwings pale yellowish; cilia round apex reddish-fuscous.

Brisbane, Queensland; four specimens (Dr. A. J. Turner).

# TINEIDA. 

Narycia, Steph.

## N. scotinopis, sp. n.

© $11-12 \mathrm{~mm}$. Head fuscous, hairs of crown pale ochreous. Palpi, antennæ, thorax, abdomen, and legs dark fuscous. Forewings dark fuscous, lighter-mixed ; a more or less indistinct narrow fuscous-whitish fascia before middle, obsolete on costa, forming an enlarged distinct whitish spot on dorsum ; a transverse fuscouswhitish dorsal spot bafore termen ; two small sometimes nearly obsolete fuscous-whitish spots towards termen beneath apex : cilia fuscous. Hindwings and cilia fuscous.

Gisborne, Victoria; in January and February, four specimens (G. Lyell).

## II. Lepidoptera from Neiv Zealand.

## CARADRINID $£$.

Leucania, Ochs.

L. micrastra, sp. n.
of 41 mm . Head and thorax reddish-brown, mixed with whitish-ochreous. Forewings rather light reddish-brown ; veins irrorated with grey-whitish and fuscous; lower end of reniform indicated by a fuscous dot, preceded and followed by a minute whitish dot: cilia light brown-reddish. Hindwings fuscous, somewhat lighter towards base : cilia pale brownish, tips whitish.

Wellington; one specimen (G. V. Hudson). Allied to L. phaula and L. alopa.

## PLUSIADE.

## Hyperaucha, gen. n.

Eyes naked. Antennæ in ot bipectinated, towards apex simple. Palpi very long, recurved, in ot reflexed over thorax, second joint densely rough-scaled, above with longer projecting scales, terminal joint in đ much longer than second, densely scaled to apex, obtuse, concave throughout on inner side and containing a long expausible
hair-pencil, in $?$ somewhat shorter than second, acute, posteriorly with broad dense projecting tuft of scales. Thorax and abdomen without crests. Posterior tibiæ loosely scaled above. Hindwings : 5 approximated to 4 towards base.

Probably with some affinity to Rhapsa.
H. octias, sp. n.
of of $25-30 \mathrm{~mm}$. Head and thorax light greyish-ochreous, sometimes sprinkled with dark fuscous. Forewings with termen obtusely angulated on 4, subconcave above this ; pale greyishochreous, sprinkled with brownish and dark fuscous; first and second lines fine, dark fuscous, wared-dentate, more or less interrupted; median shade nearly straight, fuscous or dark fuscous, strongest in $\delta$; orbicular represented by a minute whitish dot edged with red-brown ; reniform mixed with red-brown, partially finely edged with whitish, and outlined with red-brown; subterminal line obscurely pale, on lower half faintly dark-edged but almost obsolete except on dorsum, on upper half irregularly edged with red-brown or blackish, more broadly anteriorly ; a terminal row of blackish dots : cilia on upper half of termen barred with dark fuscous. Hindwings whitish-fuscous, more whitish towards costa ; median and second lines as in forewings, but median faint ; subterminal margined with fuscous or dark fuscous.

Wellington (G. V. Hudson); also from Richmond River and Sydney, New South Wales, and from Victoria; in October, four specimens. This is, I think, Australian in origin.

## HYDRIOMENID E.

## Microdes, Guen.

M. epicryptis, sp. n .
of $\frac{1}{2} 21-22 \mathrm{~mm}$. Head and thorax whitish-ochreous. Palpi 6 , whitish-ochreous sprinkled with dark fuscous. Forewings with costa strongly arched, termen unevenly bowed, very oblique; whitish-ochreous, more whitish on dorsal half, somewhat deeper and sometimes infuscated towards costa, with some scattered black scales; a median longitudinal streak of clear pale groundcolour; second line indicated by a strongly curved series of black dots on veins: cilia ochreous-whitish. Hindwings considerably narrowed; ochreous-grey-whitish; in ot with area of cell
depressed, and a costal streak of modified blackish scales from near base to beyond middle.

Wellington; two specimens (G. V. Hudson).

## Chloroclystis, Hüb.

## C. aristias, sp. n.

of 24 mm . Head white. Antenaæ with short fine pectinations terminating in fascicles of long cilia. Thorax ochreous-whitish, sprinkled with fuscous. Abdomen ochreous-whitish, somewhat blackish-mixed, segments 2 and 3 suffused with blackish, anal segment rosy-tinged. Forewings ochreous-whitish, with faint striæ of light reddish and dark fuscous scales; basal patch suffused with crimson and dark fuscous towards costa; edges of median band stronger and darker-marked, especially on costal half; a narrow transverse dark fuscous discal mark; fifth and sixth fasciæ greyish-ochreous, suffused with dark fuscous towards costa. Hindwings with termen sinuate beneath apex; fuscouswhitish, with scattered dark fuscous scales indicating very faint striæ; a dark fuscous discal dot ; a postmedian series of small black dots ; a rosy suffusion towards termen.

Mount Arthur; one specimen (G. V. Hudson). Mr. Hudson states that the species varies considerably.

## Hydriomeva, Hüb.

## H. hemizona, sp. n.

t 25 mm . Head and thorax fuscous, darker-irrorated. Antennal ciliations $\frac{1}{3}$. Forewings with termen waved, gently rounded, oblique ; fuscous, irrorated with dark fuscous, forming obscure strix ; median band somewhat darker, anterior edge preceded by an obscure pale ochreous-tinged stria, more whitish towards costa, posterior edge obtusely prominent at $\frac{1}{4}$ from costa, and with a more rectangular prominence in middle, marked with a spot of blackish suffusion, followed by a dull whitish and then by a light brownish-ochreous stria, more conspicuous on upper half ; a small dark fuscous transverse discal spot. Hindwings pale fuscous.

Wellington; one specimen (G. V. Hudson). An obscure species, but very different from any recorded New Zealand form; perhaps allied to the Australian H. imperviata, but the resemblance is not very pronounced.

Xanthorhoe, Hüb.

X. lophogramma, sp. n.
o 27 mm . Head and thorax grey-whitish, irrorated with fuscous and black. Anteunal pectinations, $a 7, b 8$. Forewings with termen slightly waved, oblique ; fuscous-whitish, irrorated with fuscous ; a stria near base, and edge of basal patch dark fuscous, curved ; median band formed by two fascie of three suffused dark fuscous striæ each, outermost blackish, anterior edge curved, posterior edge with a rectangular projection at $\frac{1}{4}$ from costa and a broader rounded prominence in middle, indentation between these rounded-angular, abrupt ; fifth fascia indicated by a fuscous costal suffusion ; sixth suffusedly fuscous, with a triangular blackish. fuscous spot below apex, edged above with a whitish-ochreous suffusion: cilia fuscous, terminal half obscurely spotted with whitish. Hindwings dull ochreous-yellowish.

Castle Hiil ; one specimen (G. V. Hudson). At first sight very similar to $X$. semifissata, but the peculiar form of the posterior edge of median band is distinctive ; the pale strie beyond this band are much less defined.

## Notoreas, Meyr.

N. isoleuca, sp. n.
¢ 20 mm . Head and thorax ochreous-yellow, mixed with black. Forewings with termen bowed, rather oblique ; dark fuscous, irregularly sprinkled with yellow; a cloudy transverse streak of yellow irroration near base, and another of yellow and white scales near beyond it, bent near costa ; a curved white streak at $\frac{1}{3}$, suffused with yellow on costa and in middle; a rather irregular tolerably straight white streak in middle, suffused with yellow towards costa, middle, and dorsum ; a white streak at $\frac{2}{3}$, obtusely angulated in middle, yellow on costa; subterminal line very fine, yellow, irregular, forming small spots on costa and in middle : cilia white, basal half fuscous. Hindwings as in forewings, but first three streaks obsolete, other two nearer base, postmedian curved, hardly angulated.

Wellington; one specimen (G. V. Hudson). Nearly allied to $N$. mechanitis, but differing especially in the single well-defined median streak, which in N. mechanitis is replaced by two cloudy streaks of yellowish suffusion.

# SELIDOSEMIDA. 

Selidosema, Hüb.

## S. cremnopa, sp. n.

大 $32-33 \mathrm{~mm}$. Head and thorax light brownish mixed with dark fuscous. Antennal pectinations $a 8, b 9-10$. Forewings with termen rounded; brown, towards costa suffused with ochreouswhitish, especially posteriorly; first and second lines strong, white, first sharply angulated near costa, slightly sinuate below middle, second almost straight ou upper $\frac{2}{3}$ and nearly parallel to termen, dorsal third sinuate inwards, first edged on both sides and second anteriorly with dark fuscous, more broadly towards dorsum; dise suffusedly mixed with dark fuscous; a blackish transverse discal dot ; a dorsal spot of white suffusion following second line ; subterminal line fine, waved, whitish, interrupted above middle by a spot of dark fuscous suffusion, towards costa merged in a quadrate whitish-ochreous apical spot. Hindwings light ochreousyellowish ; margins of postmedian and subterminal lines indicated by fuscous shades.

Auckland; in December, two specimens. Perhaps nearest $S$. productata, but the form of the second line is wholly different.

## Gonophylla, Meyr.

G. ophiopa, sp. n.
t 35 mm . Head and thorax whitish-ochreous, mixed with deeper yellow-ochreous. Fcrewings rather elongate-triangular, termen oblique, angularly prominent on 4 , and dentate on 6 ; yellow-ochreous, somewhat paler-mixed ; first and second lines brownish, marked with blackish dots on veins, first ill-defined, with very acute teeth marked with black elongate dots above and below middle, second anteriorly well-defined and pale-edged, posteriorly suffused, running from costa near before apex to $\frac{2}{3}$ of dorsum, slightly sinuate inwards above and more strongly below middle ; a black discal dot ; a subterminal series of blackish dots. Hindwings whitish-ochreous, mixed with yellow-ochreous beyond a postmedian line of dark-grey dots and brownish suffusion.

Wellington; one specimen (G. V. Hudson). Allied to $G$. fortincte, but quite distinct.

## PHYCITIDA.

## Crocydorora, Meyr.

In the absence of the male the generic location of the following species cannot be absolutely assured; but it agrees in all essential characters with Crocydopora, though the labial palpi are notably shorter than in the typical species. The family is so scantily represented in New Zealand, that any addition is interesting.
C. enospora, sp. n.
o 17 mm . Head and thorax fuscous mixed with ferruginous. Labial palpi $2 \frac{1}{2}$, light ferruginous, towards base whitish. Abdomen elongate. Forewings elongate, narrow, little dilated posteriorly, costa almost straight, teimen somewhat rounded, very oblique; fuscous, irrorated with black and grey-whitish, and much suffused with ferruginous, especially in disc ; first line straight, oblique, obscurely pale, edged posteriorly with a dark shade except towards dorsum, and preceded on dorsum by a spot of blackish suffusion; an obscure whitish discal dot, placed in a streak of ferruginous suffusion; second line cloudy, obscurely pale near termen, somewhat indented near costa, edged anteriorly with a dark shade except towards dorsum ; extreme costal edge white on posterior half. Hindwings dark fuscous.

Castle Hill ; one specimen (G. V. Hudson).

## TORTRICIDÆ.

Cacecta, Hüb.

C. torogramma, sp. n.
of 19 mm . Head and thorax whitish-ochreous, slightly reddish-tinged. Palpi moderately long. Antennal ciliations in む 1. Forewings suboblong, costa rather strongly arched, termen siuuate, rather oblique, costal fold in ot short, basal ; whitishochreous, reddish-tinged, or mixed with pale reddish and whitish ; outer edge of basal patch straight, very oblique, dark fuscous or red-brown; central fascia evenly broad, straight, very oblique, edged with dark fuscous or red-brown streaks, posterior not reach-
ing tornus, in $\xlongequal[+]{ }$ followed by a wedge-shaped whitish costal spot reaching half across wing, dark-edged posteriorly. Hindwings whitish-fuscous, rather darker in $q$.

Wellington; two specimens (G. V. Hudson).

## (ECOPHORID.

## Semiocosma, Meyr.

## S. balanophora, sp. n.

o 21 mm . Head and thorax white, with a few dark fuscous scales, shoulders narrowly dark fuscous. Palpi white, basal half and a subapical ring of second joint, and median band of terminal joint dark fuscous. Forewings elongate, moderate, costa moderately arched, apex obtuse, termen obliquely rounded; white, with a few fuscous and dark fuscous scales ; elongate dark fuscous marks along costa at base, before middle, and beyond middle ; stigmata fuscous mixed with black, plical obliquely before first discal, a minute black dot between first and second discal ; obscure indications of an angulated fuscous shade before termen ; a terminal series of undefined dark fuscous dots: cilia whitish sprinkled with fuscous. Hindwings whitish-fuscous.

Wellington; one specimen (G. V. Hudson).

## PLUTELLID天.

## Hypeuryntis, gen. n.

Head with loosely appressed scales. Antennæ -- ? basal joint without pecten. Labial palpi long, curved, ascending, second joint somewhat loosely scaled beneath, terminal shorter than second, acute. Maxillary palpi obsoiete. Posterior tibie loosely haired above towards base. Forewings : $1 b$ furcate towards base, 2 from near angle, 7 and 8 separate, 7 to apex. Hindwings $1 \frac{1}{2}$, ovate-trapezoidal, termen subsinuate beneath apex; 3 and 4 stalked, 5 closely approximated to 3 at base, 6 and 7 stalked.

An interesting genus, on the line of transition to the Gelechiadæ.
H. coricopa, sp. n.

९ 28 mm . Head, palpi, and thorax whitish-ochreous, base of palpi dark fuscous. Forewings elongate, rather narrow, costa
gently arched, apex obtuse, termen slightly sinuate, rather oblique; whitish-ochreous, with a few scattered dark fuscous scales ; second discal stigma minute, blackish; an angulated line of dark fuscous dots rather near and parallel to termen : cilia whitish. Hindwings dull whitish.

Wellington; one specimen (G. V. Hudson).

## XVII. Description of a new Coleopterous Insect of the family Pausside. By Cbarles O. Waterhouse, F.E.S.

> [Read Oct. 6th, 1897.]

In 1892, Dr. Gestro described in the "Annali del Museo Civico di Genova" (ser. 2, xii, p. 706) a new genus of Paussidæ which he named Protopaussus. It was the first member of this family with eleven joints to the antenne. The discovery of a second species of this genus by Mr. J. J. Walker, in China, during the voyage of H.M.S. "Penguin," is therefore of great interest. The affinity of the Paussidæ with the Carabidæ was, I believe, first suggested by Burmeister (Mag. de Zool., 1841, pl. 76, pp. 1-14). M. Raffray (Nouv. Arch. Mus., 1885, xviii, p. 354), while admitting a relationship with the Carabidæ, thinks that it is more remote than Burmeister supposed.

The discovery of a Paussid with eleven joints to the antennæ, makes the relationship with the Carabidæ still more apparent. The species which I here describe goes a step further, for it has an emargination on the inner side of the anterior tibie, a marked character of the Carabidæ.
M. Raffray, who has gone very fully into the matter, does not mention the singular similarity in the neuration of the wings. One peculiarity in the wings of Carabidæ and Hydradephaga is the presence of a small, upright, closed cell on the disk. This cell is present in the Paussidæ, and so far as I know occurs nowhere else among Coleoptera.

## Protopaussus Wallieri, sp. n.

Elongatus, sat nitidus, rufo-piceus. Elytris nigris, basi apiceque rufo-piceis, crebre fortiter punctatis, apice ipso declivi, nitido, lævi, singulo ad basin dente acuto instructo. Long., 6 mill.

Hab. China (J. J. Walker, in Mus. Brit.).
Judging from the figure and description of P. Fex, Gestro, from Burmah, this species differs in being of a darker colour. The antennæ are longer, the three terminal joints being longer than broad. The head trans. ent. soc. lond. 1897.-part iv. (dec.)
appears to be similar, closely punctured in front, impressed and much less rugosely punctured behind. The thorax in front is a little narrower than the head across the eyes, obliquely narrowed for a short distance, and then considerably dilated, the dilated part terminating posteriorly in a very acute point, which is slightly turned outwards. There is a deep fovea occupying the area of the anterior angle, and two dsep impressions on the disk,


Fig. 1. Protopuassus Wullerri. Fig. 2. Wing of Protopaussus. Fig. 3. Wing of $O$ zent (Carabidæ).
only divided by a slight ridge. There are two small impressions on the margin of the dilated part. The elytra are strongly and closely punctured, except at the extreme apex. The humeral part of the elytron is produced into a conical tooth, which projects somewhat over the base of the thorax, fitting into the space between the dilatation of the sides and the base of the thorax. The tibire are only slightly widened towards the apex; the anterior pair are slightly bent inwards at the apex, with a distinct pubescent emargination on the inner side, occupying about half the length of the tibia.

The structure of the antennæ and the emargination of the anterior tibire are very like what is seen in a CentralAmerican Carabid, which is, I believe, Ozæna brevicornis, Bates.

Mr. Walker informs me that he found two specimens on "Mount Combe," thirty miles S.E. of Ning-po, China, by sweeping long grass at an elevation of 1600 feet, June 2nd, 1892.
XVIII. Revision of the Notonectidæ. Part I. IntroIuction, and Systematic Revision of the genus Notonecta. By G. W. Kirkaldy.
[Read Oct. 6th, 1897.]
Tae genus Notonecta was erected by Linnæus in 1758, ${ }^{1}$ and contained three species, N. glauca, N. striata, and N. minutissima. In 1762 Geoffroy ${ }^{2}$ proposed the genus Corixa for N. striata, which, however, was not (or was only in small part) striata of Linnæus; nevertheless the latter belongs to Geoffroy's genus, and the type is therefore limited to the two other original species. In 1794 Fabricius ${ }^{3}$ enlarged the scope ${ }^{4}$ of his genus Sigara to admit a new species, minuta ( $=N$. minutissima, L.), thus indirectly but actually establishing $N$. glauca as the type of the genus Notonecta. In 1818 Leach published his "Classification of Notonectides" ${ }^{5}$ with a new genus Plea (type Notonecta minutissima, Fourcr.), and in the following year, C. R. Sahlberg's "Observationes quasdam Historiam Notoneciidum . . . illustrantes," appeared, in which Leach's conclusions were closely followed. Spinola completed his "Essai" in 1837, proposing two new genera, viz. :-Anisops for N. nivea and Enithares for N. indica, L., and a new species, E. brasiliensis. ${ }^{6}$ In 1844 Fieber published his "Entomologische Monographien,"7 including a monograph (pp. 294-7) of the genus Ploa (Plea), and seven years later appeared his "Rhynchotographieen" 8 upon pp. 469-486, of which (usually quoted from the separate copies, pp. $45-62$ ) were described all the species known to him of the other genera, Bothronotus being arbitrarily substituted for Enithares. Unfortunately the latter work has been rather a hindrance than a help, as the descriptions are not based upon structural characters,

[^40]whereas, in the Notonectidæ at least, any other method is of little avail ; moreover, the majority of the types are lost, and it is apparently impossible to appropriate the descriptions with any degree of certainty.

Since then, little has been done; a few species have been described at intervals, and three new genera, viz.: -Antipalocoris, Scott, ${ }^{1}$ Martarega, B. White, ${ }^{2}$ and Signoretiella, Berg, ${ }^{3}$ each with a single species.

Before proceeding, I must express my thanks to the friends and correspondents who have lent or given me types or other specimens, and otherwise assisted me; as these include nearly all the entomologists who are interested in Rhynchota, it is impossible even to enumerate them. I am particularly indebted to Professors Uhler and Montandon, to M. Maurice Noualhier and Mr. Edward Saunders ; also to the directors and assistants of the British, Budapesth, Hamburg, Hope (Oxford), Paris, Stockholm, and Vienna Muscuns.

## Fayr. NOTONECTIDA.

Rostrum 3-4 segmentatum; antennæ 4-segmentatæ; pronoti margine postica pedes antici inserti; scutellum magnum.
The insertion of the anterior pedes on the posterior margin of the pronotum at once separates the Notonectidæ and Corixidæ from all the other aquatic pagiopodous Rhynchota, in which the insertion is on or near the anterior margin ; the visibility and size of the scutellum distinguishes the Notonectidæ from all the Corixidæ, except Diaprepocoris, Kirk., from which, however (and from the other Corixidæ), they are readily differentiated by the three- to four-segmentate rostrum; the anterior tarsi, moreover, are quite differently shaped in these two families, being simple and raptorial in Notonectidæ, while in Corixidæ they are more or less dilated and spoon-shaped.
'I'wo subfamilies are embraced :-
1 (2) Tibie posticæ tarsique postici ciliati ; venter carinatus, ciliatus ; rostrum 4 -segmentatum ; oculi permagni, conspicui . . . votonectine.

[^41]2 (1) Tibix posticæ tarsique postici non ciliati ; venter nec carinatus nec ciliatus; rostrum 3-segmentatum; oculi parvi, vix conspicui . . . plein.t.

## Subfam. NOTONECTINX.

A Oculi ad basin non contigui; femora postica non attingentia hemielytrorum apicem.
a (b) Pronotum non transversissimam ; alæ adsunt, areer hemielytrorum distinctæ.
1 (2) Antenarum segmentum ultimum penultimo multo brevius ; tarsi postici unguiculis destituti.

## Notonecta, L.

2 (1) Antennarum segmentum ultimum penultimo multo longius ; tarsi postici unguiculis instructi.

Anisops, Spin.
b) (a) Pronotum transversissimum; antennarum segmenta ultimum penultimumque subæqualia; tarsi postici unguiculis longis instructi.
1 (2) Hemielytrorum areæ distinctæ; alæ adsunt; tarsi intermedii bisegmentati. . Enithares, Spin.
2 (1) Hemielytrorum areæ nullæ seu subobsoletæ; alæ desunt; tarsi intermedii unisegmentati.

Marturega, B. White.
A A Oculi ad basin contigui ; hemielytrorum aree nullæ seu indistinctæ; alæ nullæ; pronotum transversissimum.
1 (2) Femora postica ultra hemielytrorum apicem extensa; antenuarum segmentum ultimum penultimo multo longius ; tarsi postici unguiculis brevissimis instructi . . . . . Auttipalocoris, Scott.
2 (1) Femora postica non attingentia hemielytrorum apicem; antennarum segmentum ultimum penultimo multo brevius; (? tarsi postici unguiculis destituti).

Signoretiellu, Berg.
I have seen no satisfactory account of the structure of the head in this family; and as it is very obscure in the mature imago, and can be worked out only from a comparative study of the larval stages, novel but provisional terms have been employed in describing it. That portion of the head which is apparent from a dorsal aspect is named the notocephalon; it is more or less constricted close to the base, this constriction, here termed the
synthlipsis, being of great convenience for diagnostic purposes. The imaginary anterior margin of the notocephalon is called the vertex. The junction of the metathorax and abdomen has been taken as the centre of the insect. This will explain why the tip of the scutellum is called its " base," and why the " third side" is termed its " apical margin."

Head. Antipalocoris and Signoretiella are at once recognised by the contiguity of the eyes basally; in Anisops the notocephalon is very narrow, in the other genera wider. In Anisops the labrum attains to the apex of the second rostral segment, in Notonecta, Enithares, and Martarega to about the centre of that segment; Berg and Scott do not mention it. The ultimate and penultimate antennal segments are subequal in Enithares and Martarega; the ultimate is much the longer in Anisops and Antipalocoris, and much the shorter in Notonecta and Signoretiella.* The scntellum in Notonecta is large and almost equal in length to the metanotum, except in $N$. mexicana, where it is only about half its length; in Enithares and Martarega it is about half, and in Anisops and Antipalocoris about one-third the length of the metanotum. Berg does not mention it in Signoretiella.

The Hemielytra are divided into clavus, corium, and membrane in Notonecta, Enithares, and Anisops, and these genera are furnished with alæ, which are wanting in the other genera, in which also the hemielytra are not or at least very obsoletely divided into areas.

Pedes. The length of the pedes in Antipalocoris readily distinguishes that genus, the apices of the

[^42]posterior femora extending beyond the aper of the hemielytra; to which they do not attain in the othor genera.

## Notonecta, L.

Linn., 1758, Syst. Nat., Ed. x., p. 439 ; Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., pp. 205 and 472; Flor, 1860, Rhynch. Livl., i., p. 766.
Type. N. glauca, L. ; Fabr., 1794, Ent. Syst., iv., p. 57.

Flor has given such a masterly description of the genus that it is not necessary here to do more than indicate the leading features; to comprehend the exotic species it is necessary, however, to modify slightly Flor's description of the head and eyes. Fieber's figures (l. c., pl. iii., D) are admirable except that the pronotum is too long in proportion to its breadth, the posterior pedes are represented with long unguiculi, of which they are really devoid, and the alar neuration is not quite correct in its proportions.

To the characters given previously, it may be added that the intermediate ambulacra are not nearly contiguous (as they are in Enithares) and the posterior ambulacra are practically contiguous, distinguishing the genus at once from Anisops; the median ventral carina of the abdomen is thickly pilose, as are the lateral margins, thus forming a waterproof covered way over the "gutters," which lie, one on each side of the carina, for the conveyance of air. The junctures of the connexival ventral segments are always covered with short thick hair, and the scatellum and hemielytra are generally clothed with short golden yellow pubescence. 'The sexes are almost indistinguishable in size, form, colour and general appearance, though, of course, the female, when full of mature ova, is dilated more than at other times. They can be very readily separated by an examination of the last three or four abdominal ventral segments. These are horizontal in the female, rounded and anteriorly excavated in the male.

Notonecta is a genus of which the species are singularly lacking in specitic characters suitable for diagnosis: and the analytical table has been based principally upon the structure of the notocephalon and pronotum. With
trans. ent. soc. Lond. 1897.-part iv. (dec.) 27
the exception of certain minor differences in the ventral abdominal segments and the proportions of the scutellum, I am unacquainted with any other such characters; while several structural features, largely employed for diagnostic purposes in other groups of Rhynchota, appear to be valueless in Notonecta. The sculpture of the head and pronotum, and the colour and pattern of the hemielytra are not constant, although a more or less bright crimson or scarlet dorsum abdominis seems to be characteristic of $N$. insulata, W. Kirb., and N. montezuma, Kirk., and a rich black and yellow metanotum and dorsum abdominis of $N$. glauca, var. marulata, Fabr.

Unless otherwise mentioned, the scutellum, metanotum and sterna are black, the sternal hairtufts varying. from bronze-yellow to dark bronze-brown.

Melanochroism and leucochroism are more marked in this genus than in any other of the Rhynchota with which I am acquainted. I have examined melanochroic individuals of six species, viz.: N. glauca (nigra and marginata), N. undulata, $N$. americana, $N$. variabilis, N. lactitans (stygica), and N. mexicana, while certain examples of N. irrorata, N. shooterii, N. triyuttata and N. insulata have almost a right to the name.
$N$. lutea has been treated as a separate species; but it may perhaps be regarded more correctly as a nearly stable leucochroic race of N. glauca; an African form of N. glauca, var. maculata, is generally concolorous, dark luteous. Similarly coloured (though much lighter) forms occur commonly in $N$. undulata, $N$. americana, $N$. shooterii, and probably in other species.

A noteworthy fact is that, with the exception of $N$. undulata, N. americana, one or two N. shooterii and the luteous form of maculata (which, strictly speaking, is not leucochroic), all the luteous specimens, some forty or fifty, that I have seen, have unequal-lobed membranes. Dr. Bergroth kindly pointed out this peculiarity in $N$. lutea; I was at first inclined to regard it as a specific character, but found this view to be premature on meeting with luteous examples of $N$. shooterii (q.v.), some with ordinary, some with semi-developed. lobes.

Unless otherwise indicated, it may be assumed that the head, pronotum, and pedes are greenish testaceous,
varying from almost stramineous to full rich green; after death the green fades, and these parts acquire a sordid stramineous or even brown hue. The apical rostral segment appears to be constantly piceous.

Great hopes were entertained by me that the $\hat{\delta}$ genitalia would furnish a reliable diagnostic character, but in the few species ( $N$. glauca, N. lutea, N. irrorata and $N$. undulata), of which suitable material was available, these hopes have not been realized.

## Geographical Distribution.

The genus Notonecta is distributed practically over the world, though its home seems to be in North America; it is very difficult to define any special regions, as waterbugs admittedly have no respect for such limitations. N. glauca is distributed throughout Europe, N. Africa, Siberia, Persia, N. India, and probably Brazil; the allied species, $N$. undulata, N. americana and N. varia-bilis occupy practically the whole of America, while N. mexicana and N. inssulata occur plentifully in North and Central America and in the northern states of South America; $N$. montandoni has been found in China and Burma.

Only one species, $N$. lactitans, has been found as yet in Africa south of the Sahara, but it extends from Guinea to the Cape of Good Hope.*

Throughout this paper the localities derived from specimens seen by myself are alone given, unless otherwise stated.

## Specierum Tabula.

1 (2) Pronoti basis latitudo pronoti longitudine duplo atque dimidio major ; metanotum scutello fere duplo longius. (America bor. et merid.) 1 mexicanu, Am. Serv.
2 (1) Pronoti basis latitudo pronoti longitudine duplo atque dimidio minor (plerumque fere duplo major); metanotum scutello paullo longius.
3 (4) Vertex synthlipsi amplius quinquies latior.
(America bor.) 11 uhleri, Kirk.

[^43]4 (3) Vertex synthlipsi minus quinquies latior.
5 (10) Notocephali margines laterales subrectæ atque fere parallelæ.
(6) (7) Corporis longitudo haud minus quam 13 mm . ; abdominis dorsum plus minus coccineum.
(America bor.) 3 insulatu, W. Kirb.
7 (6) Corporis longitudo minus quam 13 mm . ; abdominis dorsum haud coccineum.
8 (9) Forma longiuscula, tenuis. (Africa merid.) 5 lactitans, Kirk.
9 (8) Forma breviuscula, robusta.
(America bor. et merid.) 7 americum, Fabr.
10 (5) Notocephali margines laterales plus minus curvata, necquaquam parallelæ.
11 (22) Vertex synthlipsi amplius duplo atque dimidio latior.
12 (19) Species magnæ, robustæ; amplius 12.5 mm . longitudine.
13 (18) Vertex synthlipsi triplo (aut minus) latior.
14 (15) Caput magnum, vertex quam oculi alteriusutrius latitudo latior . . (China, Birmania) 14 montandoni, Kirk.
15 (14) Caput mediocre; vertex quam oculi alteriusutrius latitudo nec latior.
16 (17) Caput brevius, oculi majores ; pronoti margines laterales subrectæ . . (America bor.) 15 irrorute, Uhl.
17 (16) Caput longius, oculi minores ; pronoti margines laterales mediatim retrorsum subito ampliatæ.
(Japonia) 13 triguttata, Motsch.
18 (13) Vertex synthlipsi fere quadruplo latior.
(China) 12 chinensis, Fallou
19 (12) Species parvæ ; minus 12 mm . longitudine.
20 (21) Pronotum duplo (aut fere duplo) latius quam longius.
(America bor. et merid.) 10 variabilis, Fieb.
21 (20) Pronotum duplo atque triens latius quam longius.
(America merid.) 9 bifasciatu, Guér.
$\because 2$ (11) Vertex synthlipsi minus duplo atque dimidio latior.
23 (24-25) Notocephali margines laterales curvatæ sed non sinuatæ (vertex atque synthlipsis subæquales); abdominis dorsum haud coccineum.
(America merid.) 4 shooterii, Uhl.
$24(25-23)$ Notocephali margines laterales subrectr ; abdominis dorsum subcoccineum.
(America centr.) 2 monte:uma, Kirk.

25 (23-24) Notocephali margines laterales curvatæ et sinuatæ ; abdominis dorsum haud cocciueum.
26 (31) Species magnæ, robustæ.
27 (28) Posterius ampliata; membranæ lobi inæquales.
(Europa) 18 lutea, Müll.
28 (27) Posterius haud ampliatæ ; membranæ lobi subæquales.
29 (30) Caput, pronotum, scutellum uitida nigra (hemielytra rubronigra) . . . . (Brasilia) 17 nigra, Fieb.
30 (29) Caput, pronotum, scutellum non omnino nigra.
(Regiones palæarctica tota, orientalis in parte)
16 glauce, L.
31 (26) Species parvæ, subrobustæ.
32 (33) Pronoti basis subrecta.
(America bor. et merid.) 8 undulata, Say.
33 (32) Pronoti basis aperte concavocurvata.
(Australia) 6 hendlirschi, Kirk.

## 1. Notonecta mexicana, Am. Serv.

Notonecta mexicana, Am. et Serv., 1843, Hist. nat. Ins. Hém., p.453, pl.viii., fig. 7; Herr.-Schïff., 1853, Wanz. Ins., ix., p. 43, pl. 294, fig. 903 ; Uhl., 1886, Checklist Hem.-Het. North Amer., p. 28.
N. klugii, Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 474.

Head narrow at base, parallel for a short space, then sinuately diverging ; vertex from three to four and a-half times as wide as synthlipsis. Pronotum very transverse, about two and a-half times wider than long, lateral margins slightly sinuate, humeral margins gently and elongately curved, posterior margin not sinuate; humeral angles acute, accentuated. Metanotum not quite half as long again as scutellum, black (dark vars.) or violet-brown, margined with luteous (pale vars.). Hemielytra varying in colour, membrane-lobes subequal. Alce semitransparent, smoky, nervures brown (pale vars.), or semitransparent smoky black, nervures blackish-brown (dark vars.). Abdominis dorsum black (dark vars.), or rufoluteous with paler genital segments (pale vars.). Abdiominis venter varying from black to testaceous.

Long. 11-14 mm., lat. $4 \cdot 5-4.8 \mathrm{~mm}$.
Hab. America: Western United States; Mexico; Costa Rica; Colombia.

The types of $N$. mexicana and N. lilugii appear to be lost.

## Varieties.

The hemielytra are usually rich scarlet, with black membrane, but the latter hue often extends beyond the apical margins of the clavus and corium ; the scarlet also varies much in shade, graduating in one direction to pale greenish-white through pale yellow, pale olive-green, deep yellow, orange and pinkish, and in the other through crimson and violet-red to deep violet-black, though, in the last, the sutares of the hemielytral divisions are usually narrowly violet-red; in some specimens the apex of the corium is black, from the base of the membrane to the margins of the hemielytra in a straight line, and the rest of the hemielytra are rich crimson. The herrielytra are rarely maculate, occasionally the centre of the clavocorial suture has a more or less pronounced black smudge about the centre. It may be convenient to propose the varietal names ceres for the pale coloured forms and hades for the southern violetblack race. Herrich-Schäffer (l. c., p. 43) notes a variety with a large ochreous central stripe on the scutellurn, while Fieber (l. c., p. 475) describes among the varieties with red hemielytra: (1) "Schild schmutzig-gelb mit braunem Grund," and (2) "Schild braun, mit gelblichem Rand "-these three varieties I have not seen.

The crimson forms are well distributed over the Western United States, Mexico, and Colombia; the pale forms I have seen from Lower California, Mexico, Costa Rica, and Colombia; the melanochroic forms are much rarer and more local, though occurring in the same localities as the pale forms.

This is the most aberrant species of Notonecta, differing. from all the others in the proportions of the pronotum and scutellum; it is wider in proportion to its length, and the humeral angles are more accentuated. It shows affinities in several details to Enithares, and is perhaps nearer in structure to the primitive Notonectid than any other existing species of its genus.

## 2. Notonecta montezuma, sp. n.

Head narrow at base, similar to that of N. mexicana, notocephalic lateral margins fairly straight, diverging from the base, vertex two and a-half to three times as wide as synthlipsis.

Hemielytret orange-red, suffused (especially marginally) with crimson, and sparingly and irregularly marked with black ; membrane bluish-black, apex brownish-black, lobes subequal. Pedes: coxæ brownish-black, intermediate tibial spur small, rather blunt. Aldominis dursum: segment 1 black, 2 sordid testaceous, suffused with crimson and margined with black. Venter black.

Long. 13•5-14 mm., lat. 4•7-5 mm.
Hab. America, W. Mexico, f, \&. (Hope Mus. Owford.)
"Nord de l'Inde" [? error] (Paris Mus.).
Type. © . Hope Mus.
Very similar to, and perhaps an aberration from, $N$. insulata, but differing by the structure of the head. Not unlike $N$. mexicana, but larger, more elongate, and differing by the pronotal structure.
3. Notonecta insulata, W. Kirb.

Notonecta insulata, W. Kirb., 1837, in Richardson's Faun. Bor. Amer. Ins., p. 235 [reprint 1878, Canad. Ent., x., p. 216] ; Uhl. 1886, Checkl., p. 28.
N. impressa, Fieb., 1851, Abh. böhm. Ges. Wiss. (5) vii., p. 475 ; Uhl., 1886, Checkl., p. 28. Syn. nov.
N. rugosa, Fieb., 1851, l. c., p. 476.
? N. fabricii, Towns., 1891, Pr. Ent. Soc. Wash., ii., p. 56 (nec Fieb.).

Heud : notocephalic lateral margins fairly straight and nearly parallel, very slightly constricted near the base; vertex little wider than synthlipsis, which is about one-fourth less than the width of the base of the eye. Lateral and humeral margins of the pronotum sinuate. Scutellum varying slightly in length, but occasionally reaching and usually nearly reaching the base of the metanotum, black [Fieber, in N. rugosa, records two varieties (cordigera and basalis) with yellowish scutellum, hut I have not seen them]. Hemielytice variable in pattern and colour, the principal variations being :-

1. Fusco-flavous (or sordid testaceous), with a faint blackish spot or streak here and there; indistinguishable from some forms of the hemielytra in N. glauca [? N. fabricii, Towns.].
2. Rufofuscous ; the base of the membrane, an irregular blotch
on the corium and one at the base thereof, black ; apex of membrane testaceous.
3. Apical half of hemielytra black, basal half orange-brown, or deep rich crimson-red (in some individuals assuming almost a purple hue), which may be more or less clouded with black. [? N. impressa, Fieb.]
4. Black ; except the basal half of clavus and a small spot near the submargin (about the centre) of the exocorium, which are roseo-testaceous, and a searlet irregular (usually pentagonal) spot on the apical margin of the corium ; the exocorium spotted regularly with brownish crimson ; apex of membrane sordid testaceous.
5. When living, "clear ivory white, with irregular dark spots on the hemielytra, and the large spots at base of corium . . . conspicuous, greenish white" (Uhler in litt.) ; but "fter death, much tarnished, the white changing into pale dirty bronze green.

Alce : basal nervures crimson, the others yellow brown. Pcles: coxæ black, intermediate tibial spur small, slender, not tipped with black. Abdom. dorsum: segment 1 black, 2-6 brilliant scarlet, 7-8 reddish-testaceous.

Abd. venter black, connexirum and central carina green.
In all five varieties, the membrane lobes are subequal.
The ordinary pale forms may be known as var. odara, the fifth variety as var. geala, while Fieber's "impressa" " may be retained as a varietal name for the crimson and black forms.

The disposition of the scarlet colour of the dorsum abdominis, and its actual shade, vary greatly: in some examples the second segment is suffised with black, the third to the sixth being more or less scarlet, while in others only the central parts of these segments are thus coloured; the hue varies from orange-red to deep crimson. It is curious that this colour has not, as I believe, been previously noted.

Long. 13-1.5 mm., lat. 4.9-5 mm.
Types. ?.
Hab. America. Prof. Uhler (1875, Wheeler's Exped., xii., p. 841) writes: "It seems to extend entirely across the continent [i.e., of N. America], north of the fortieth parallel, and on the Pacific side extends as far south as San Francisco ;" in a recent letter he adds: "distributed from the upland cold water of Maryland all the way north to British America, and across Canada to
near the Pacific Coast, down which it spreads to Lower California and the highlands of Mexico." It seems, further (from what Prof. Uhler writes) that while $N$. undulata, Say (q.v.), is a Notonecta of the plains more especially, in warm ponds and streams, $N$. insulata is an insect rather of the hills, in cold pools. "The pond [i.e., where N. undulata was abundant] is exposed to the sun's rays, and the water becomes mostly warm. At the western end, however, the pond is supplied with cold, spring water, and at that end lives the Notonecta insulata." And again: "It seems to belong to the foot-hills and high plateaux of the Rocky Mountains west of the Mackenzie River; but it was not brought in from the plains." From the specimens I have examined, the very ruddy examples seem to occur principally in California, Colorado and Mexico, while the paler and rather larger forms come more frequently from the Eastern States. Fieber (l. c.) records N. rugosa from Brazil.

Very like $N$. glauca, but at once distinguished by the structure of the head. There are (as in N. glauca) two somewhat dissimilar forms of eye in this species. Usually the notocephalon is short and the eyes are small, curving away from the vertex suddenly; occasionally, however (and especially in var. geala), the eyes are more quadrilateral and larger, and the notocephalon is longer.

In Signoret's collection there is a specimen labelled "N. rugosa" by him, from Canada, which I cannot satisfactorily place in any species. It has the cephalic structure of N. lutea, Müll., but is rather less robust posteriorly and has the ruddy dorsum always present in $N$. insulata; the membrane lobes are unequal, as is usual in leucochroic individuals, and the hemielytra are greyish yellow-green. It seems best, till further evidence is obtainable, to regard it as an aberration from the present species.

## 4. Notonecta lactitans, Kirk.

Notonecta lactitans, Kirk., 1897, Ann. Mag. N. H. (6), xx., p. 58.

Head: notocephalic lateral margins almost parallel, vertex about a fourth wider than synthlipsis; base of the eye about half as wide again as synthlipsis. Pronotal humeral margin well sepa-
rated; scutellum nearly as long as metanotum. Memielytra: clavus and corium yellowish-brown, with a broad dark-brown band along the base of the latter, and sometimes with a narrower blackishbrown line along the scutellar and sutural margins of the clavus; exterior margin of exocorium narrowly pale. Alar nervures yellowish-brown. Pecles: intermediate tibial spur small and rather blunt. Abdominis dorsum shining black, genital segments blackishfuscous margined with green. Venter black.

Long. 12-12.5 mm., lat. pronot. $3 \cdot 4-4 \mathrm{~mm}$.
Hab. Africa: Guinea (my coll.) ; Gaboon (Vienna Mus.), Cape of Good Hope (Paris Mus.).

T'ype. Coll. mea.
This species has no very close affinities with any other Notonecta; its long and slender form and rather stout hemielytra will at once separate it, while the structure of the head places it near N. insulata.

Var. nov. stygica.
Smaller and rather more slender ; hemielytra black, exterior margins of clavus broadly dark stramineous and interior half of apical margin of corium stramineous; membrane sordid white, except the smoky basal part of the apex of the exterior lobe.

Hab. ? Africa (British Mus.).
5. Notonectce shooterii, Uhl.

Notonecta shooterii, Uhl., 1894, Pr. Calif. Ac. Sci. (2), iv., p. 292.

Head short, notocephalic lateral margins slightily diverging from the base and slightly converging towards the vertex, which is about one-third wider than the synthlipsis. Pronotum large, rather longer in proportion to its width than in the other species, lateral and humeral margins sinuate. Scutellum small, nearly one-third shorter than the metanotum; black, base purple-brown. Sterna sordid rufotestaceous, hair-tufts black. Hemiclytra black; clavus (apex excepted) dull ivory-white, corium more or less concolorous, forming with the clavus a blotch of varying extent, and usually with a whitish spot along the apical margin, the claval and corial markings very similarly disposed to those of $N$. triguttutu; apex of membrane smoky. The hemielytra vary, however, very much, being quite violet-black, in some individuals (melena, var. nov.), while in others they are concolorous pale luteous. Membraue-
lobes always subequal in ordinary forms; generally unequal in the leucochroic varieties (ochrothoe, var. nov.), and rarely subequal (tearca, var. nov.). Alar nervures rich brown. Pedes: intermediate coxæ black, tibial spur small, rather blunt. Albdominis dorsum: segment 1 black, $2-5$ violet-brown (the fifth apically black), 6 blackish, genital segments greenish-testaceous, all the segments more or less dull blackish laterally. Tenter varying from green to black, carina and cilia black.

Long. 8-13 mm.,* lat. pron. $4-4.7 \mathrm{~mm}$.
Type. Uhler coll.
Hab. America, "exclusively Western" (Uhler in litt.) ; California (Uhler's and my coll.) ; Mexico (Paris and Stocl:holm Mus., Nouallier coll.); Colombia (Paris Mus.). Var. melæna: Mexico (Nouallier coll.).

This species cannot be mistaken for any other; the small, short head, the flat eyes with the anterior margins receding much as in typical $N$. insulata, the robust pronotum and the structure of the notocenhalon at once distinguish it.

Allusion has already been made to what I suppose to be concolorous varieties of this species. There are, as indicated above, two forms; those with subequal mem-brane-lobes, differing from the type only in the colour, which is (except the eyes, unguiculi, segment-junctions, \&c.) entirely pale luteous. 'This form 1 have seen only from Mexico (in the Stockholm Mus. and in the Paris Mus., where it was labelled "americana," by Fallou). The other forms, also luteous, differ from the type in that they have unequal (both in width and length) membranelobes, and are much commoner (being noted from Mexico and Colombia). They furthermore differ among themselves in the shape of the pronotum. In nearly every case the lateral margins are almost perpendicular to the apical and basal margins and parallel to one another, while the humeral margins are not separable from the posterior margin. 'There are, however, gradations to the usual shape. Prof. Uhler informs me that in the U.S. National Museum there is a specimen of this species pure ivory-white, and the above-mentioned lateous examples are probably this colour when fresh.

[^44]Here should probably be referred two handsome Notonectæ from Guanajuato in Mexico (Dugès in Mus. Paris).

Pronotum: humeral margins longer aud more sinuate than in type. Scutellum bluish-black, thickly furnished with short white pubescence. Hemielytra bluish-black, a pinkish-brown band along the basal half of the claval exterior margin and a similarly coloured spot on the basal third of the corium ; apical half of membrane same colour.

Long. 11 mm ., lat. $4 \cdot 2 \mathrm{~mm}$.
'Ihis may, however, prove to be a distinct species.

## 6. Notonecta handlirschi, sp. n.

Heal similar in shape to N. lutect, Müll., vertex not quite as wide as synthlipsis, notocephalic lateral margins fairly straight ; base of an eye about half as wide again as synthlipsis. Pronotum similar in general shape to that of N. gluucu, L., but posterior margin sensibly concave. Hemielytrue : clavus and claval margin of cozium dark castaneous, rest of corium and membrane (except apical margin) lurid ; exocorium anteriorly lurid, posteriorly castaneous. Pedes: intermediate tibial spur small and blunt. Metanotum and dorsum abdominis rufotestaceous. Whole ventral surface black.

Long. $10-10.5 \mathrm{~mm}$., lat. pron. $3.5-4 \mathrm{~mm}$.
Hab. Australia (" Post., A. Fischer, 1878," Vienna Mus.).

Something like N. americana, Fabr., but with the colourand pattern very obscure. I have great pleasure in dedicating this species, the first true Notonecte from Australia, to Dr. Handlirsch of the Vienna Museum.

## 7. Notonecta americana, Fabr.

Notosecta americana, Fabr., 1775, Syst. Ent., p. 690, \&c.; Ol., 1811, Enc. Méth., viii., p. 389 ; Uhl., 1886, Checkl., p. 28 ; 1894, P.Z.S. Lond., p. 222.

Head rather large, notocephalic lateral margins straight, not very divergent from the base; vertex varying from one and a-half to twice as wide as the synthlipsis. Scutellum rather shorter than
in N. undulutu, Say. Ifemielytra variable: (1) fulvous or dark stramineous, with a broad black fascia near the apex, occupying the basal two-thirds of the membrane, and the apex of the corium. This seems to be the original $N$. cmericana, F'abr. (2) Varying from bluish-black to violet-brown; the corial margins of the clavus, and a broad irregular blotch about the middle of the corium, fulvous or dark stramineous. Otherwise like $N$. undulatu, Say.

Long. 10-11 mm., lat. $3 \cdot 5-3 \cdot 6 \mathrm{~mm}$.
Hab. C. and S. America, Mexico (Paris Mus.; Noualhier and my colls.) ; Chili, Valdivia (Hamburg Mus.) ; Cuba (Paris Mus. ; my coll.). It probably extends over Mexico, the Antilles, and the greater part of S. America.

This species has been compared with $N$. undulata, Say, instead of the reverse, as, through the kindness of Prof. Uhler, I have had plenty of fresh material in the latter species, whilst in the present species I have only seen two fresh specimens (from Prof. Uhler). Fabricius says " alis nigris"--but the few examples I have been able to examine have transparent, colourless alæ with nervures coloured as in N. undulata, though Prof. Uhler writes me that he formerly possessed at least two specimens with the exterior margin of the alæ black. Hoping that the Copenhagen Museum might possess Fabricius's missing type, one of the above examples was sent to Dr. Meinert, who wrote that he had compared it and found it to accord with a specimen labelled " $N$. americana" which was undoubtedly seen by Fabricius, though it is not the type. This and the two following species Prof. Uhler considers as most probably conspecific, and it is probable that future researches will show this to be so ; for the present, however, it seems best to regard them as distinct. In his $N$. americance Fabricius probablyalso included N. undulata, Fieber's N. variabilis undoubtedly included $N$. americana and $N$. undulata, while Say's $N$. undulata included N. americana and probably N. variabilis; and the references given to all three species must therefore be taken as the best possible under the circumstances. N. americana, Herr.-Schäff., is clearly N. undulata, from the figure, and $N$. variabilis, Guér., is the same species, according to the specimens labelled by him in his collection (Paris Mus.).

## 8. Notonecta undulata, Say.

Notonecta undulata, Say,? 1832, Descr., Het. Hem. N.Am., p. 38 ; Complete Writ., 1869, i., p. 368 ; Uhl., 1875, Bull. U.S. Geol. Surv. (2) v., p. 239, pl. 21, fig. 33 ; 1886, Checkl., p. 28 ; Comst., 1888, Introd. Ent., i., p. 186, fig. 157; Weed, 1889, Bull. Ohio Agr. Sta., Techn. ser., i., p. 12, pl. ii., fig. 3.
N. americana, Gmel., 1789, in Linn. Syst. Nat., ed. xiii., p. 2118; Herr.-Schäff., 1853, Wanz. Ins., ix., p. 44, pl. 294, fig. 902 (nec Fabr.), syn. nov.
N. punctata, Fieb., 1851, Abh. böhm. Ges. Wiss. (亏) vii., p. 476 ; Uhl., 1886, Checkl., p. 28, syn. nov.
N. variabilis, Fieb., 1851, l. c., 477 (in part); Guér., 1856, in Ramon de la Sagra's Cuba, Hist. Nat., vii., p. 176.
N. virescens, Blanch., 1852, in Gay's Chile, Zool., vii., p. 233; Atlas Zool. Ins. hémipt.,' pl.ii., fig. 16, syn. nov.
N. pallipes, Leth., 1881, Ann. Soc. Ent. Belge, xxv., p. 13 (nec Fabr.).

Heal diverging curvedly (varying in degree) from the synthlipsis, which is not quite two and a-half times less wide than the vertex. Pronotum very similar to that of N. glauca, L., but the humeral margins as a rule not distinct. Scutellum not quite one-fourth shorter than the metanotum, varying in colour from pale luteous to black, with divers intermediate arrangements of the two colours ; similar hemielytral markings occurring with dissimilarly coloured scutella and vice-versa. Metanotum varying from luteous to black, with three or more dark castaneous stripes, scutellar margin luteous. Hemielytra exceedingly variable, giving rise to a number of well-marked varieties, though these are linked together by intermediate forms.

Var. 1, maculatu, Fieb. Pure moonlight colour (or occasionally very pale greenish-yellow), either immaculate or with a rich sienna-brown spot at the base of the membrane. Scutellum, metanotum, and abdominal segments pure golden-yellow.

This is also (according to the specimens labelled in his handwriting, from Lethierry's collection now in the collection of M. Maurice Noualhier and Prof. Montandon) N. pallipes, Leth.

Var. 2, unduluta, Say. The common variety, varying from pure ivory-white to pale luteous or stramineous, with an undulatory subhorizontal blackish fascia, which is sometimes a mere thin line, but generally a broad band extending between the exterior lateral margins of the hemielytra, practically covering the base of the membrane, exteriorly encroaching on the corium, interiorly on the membrane. The fascia never acute or furcate at its extremities.

This variety is, in part, N. variabilis, var. scutellaris, Fieb.

Var. 3, charon, nov. The preceding variety (2) but with clouded hemielytra.

This tendency to melanochroism increases (more particularly in Central and South American individuals) until a peculiar chequered (black and luteous, or dark red-brown and brunneo-testaceous) appearance is assumed; finally, some forms are entirely bluish-black or purple-brown (or both), excepting only a whitish or pale luteous fascia of varying width, on the clavus, this form being somewhat similar to $N$. glauca, var. marginata (furcata). This variety is N. undulata, var. c., Say.

Var. 4, punctutu, Fieb. The largest forms, with more prominent and quadrilateral eyes, bearing the same relation to ordinary undu lata that insuletu, var. geule does to typical insulata, are (according to Prof. Uhler) punctuta, Fieb. They vary in colour and pattern like the other forms. The alar nervures are golden-yellow ; the abdominis dorsum varies from clear luteous to black; the venter varies from sordid-whitish to black (viî whitish-blotched with black).

Long. (of vars. 1-4) $10.5-12 \mathrm{~mm}$., lat. $3-4 \mathrm{~mm}$.
Var. 5 , virescens, Blanch., is indistinguishable save by the more minute size, from N. undulata, but it seems to be confined to Chili.

Long. 9-9.3 mm., lat. $3-3 \cdot 2 \mathrm{~mm}$.
Unfortunately the figure in the Atlas of Gay's work is not quite correct, either in structural details or in colouring. The antennæ in the figure represent those of an Enithares, while the body is unduly depressed, and the proportions inaccurate. There are two forms, in both of which the dorsum abdominis is black: (a) Concolorous luteous (Paris Mus.); (b) hemielytra black; clavus
(except the wide black sutural margin) and a small blotch on the corium, dirty white ; apical portion of membrane, and a large spot about the middle of the apical margin of the corium, castaneous. Scutellum black (Paris, Stockholm, and Vienna Mus.; Montandon's coll.).

Types. N. undulata, Say, punctata, Fieb.? N. virescens, Blanch., Paris Mus.

Hab. N. and C. America; S. America, North of Patagonia. Antilles.

Var. 1. New Jersey and Maryland (my coll., Prof. Uhler), Guadeloupe (Nouthier and Montendon colls.), Colombia (Paris Mus.).

Var. 2. Canada (Pror(tucher), Winnipeg, Valley of Mackenzie River, etc. (Uhler in litt.) ; the whole of the U.S.A.; Mexico ; St. Bartholomew, Jamaica ; Cuba (Paris Mus.) ; Colombia, etc.

Var. 3. Most of the U.S.A., but local; Cuba ; Mexico; Colombia (Paris Mus.) ; Peru (Hamburg IIus.).

Var. 4. Baltimore (Fiebrr), Sabillasville, nearly 2003 feet above sea level (my coll., Prof. Uhler), South States (Uhler); New Orleans (Puris Mlus.).

Var. 5. Chili.
"This species inhabits the foulest pools, and in the dirty slush occasioned by the drainage of slaughterhouses, and in the slimy ponds attached to some of our brickyards, it revels as if in full enjoyment of the filth" (Uhler). Prof. Uhler also writes to me: "Water of high temperature (i.e., exposed to the sun's continuous rays) gave me $N$. undulata, Say, in many conditions." (See also N. insulatı for further notes.) This species is very similar to N. glauca, L., and it is difficult to differentiate them by words. N. unculata is always smaller and more triangular, and (though this is not always the case) the humeral margin does not seem to be so distinctly separated from the posterior margin of the pronotum as in N. glanca; the base of the pronotum thus acquires a more convexly curved and rounded appearance. The luteous examples of var. 3 are labelled in several collections " noveboracensis, Forst." There is, however, no Notonecta noveboracensis, Forst. Gmelin (1789, in Linn. Syst. Nat. xiii., p. 2119) by error substituted this name for N. lineata, Forst. (1771, Nov. Spec. Ins., i.,
p. 70). From the description, the latter is evidently a Corixa, as, presumably, is also N. noveboracensis, Gmel.

The variations in $N$. undulata in the colour of the abdominis dorsum and venter are irrespective of hemielytral pattern and coloration ; the variations in the colour of the scutellum are, to a certain extent, regular. Var. 1 has a luteous scutellum always; vars. 2 and 3 luteous, black, or variegated ; vars. 4 and 5 only black ; var. 6 lateous or black.

## 9. Notonecta bifasciata, Guér.

Notonecta bifasciata, Guér., 1835, Icon. R. Anim., p. 354.
N. polystolisma, Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 477; Berg., 1879, Ann. S. Cient. Argent., viii., p. 75 (reprint, p. 198).

Hertl: notocephalic lateral margins diverging curvedly from the narrow base, vertex about three times as wide as synthlipsis. Pronotum : humeral angles acute, accentuated, humeral margins sinuate, about subequal to lateral margin, posterior margin sinuate, width about two and one-seventh times as great as the length of the pronotum. Hemielytra varying much as in N. undulata. Alar nervures pale golden yellow. Pedes : intermediate tibial spur small. Abdominis dorsum black, genital segments testaceous. Abdominis renter castaneo-testaceous spotted with black.

Long. $8 \cdot 6-9 \mathrm{~mm}$., lat. $3-3 \cdot 2 \mathrm{~mm}$.
Types : bifasciata, Guérin-Ménéville colln. (Mus. Paris), polystolisma?

Hab. S. America. Apparently distributed over the greater part of Brazil, and the Argentine and Uruguaian Republics. I have given a very brief description of this species, as I am uncertain of its limits, and have had very little material to work on. Guérin's type (possessing violet-black hemielytra with a broad ivory-white band along the whole of the corial margin, and two orange spots near the apical margin of the corium) is stated by Guérin-Ménéville himself to be the same as $N$. polystolisma, Fieb., and accords well enough with the description. The type bears two written labels, the first and older, "Notonecta bifasciata, Guér., Ic. R. A. Plata
trans. ent. soc. lond. 1897.-part iv. (dec.) 28
(type) Maldonado"; the second and newer, "Notonecta polystolisma, Fieb., p. 53, Maldonado bifasciata, Guér., Ic. R. A. (type)."

## 10. Notonecta varialilis, Fieb.

Notonecta variabilis, Fieb. (in part.), 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 477; Berg (in part.), 1879, Ann. S. Cient. Argent., viii., p. 74 (reprint, p. 197).

Heall: as in N. bifasciata. Pronotum: width of posterior margin not quite twice as great as the length of the pronotum. Hemielytra very variable. Alar nervures pale golden yellow. Pedes and abdomen as in $N$. undulutu, Say.

Long. $8 \cdot 6-10 \mathrm{~mm}$., lat. $3 \cdot 2-3 \cdot 7 \mathrm{~mm}$.
Type. ?.
Hab. America. Apparently distributed over the greater part of the United States, Brazil, and the Argentine and Uruguaian Republics.

There are two well-marked forms, which may be distinct species. The first, which occurs more commonly in N. America (and is considered by Prof. Uhler to be a variety of $N$. undulata), is long and slender, approaching N. uhleri in shape both of head and hemielytra; the latter are usually whitish or yellowish immaculate. The second, which is found occasionally in N. America, but commonly in Uruguay and Argentine, is exceedingly like N. undulata, Day, both in appearance and hemielytral markings. It differs, however, in the shape of the head and generally in the much smaller size. It is the N. variabilis, Berg (according to specimens kindly lent to me by Mr. Distant). As regards the individual labelled "Type" in M. Noualhier's collection, I am unable to recognize it as the true type, although it may well act as one, inasmuch as it is apparently the only authentic specimen of Fieber's in existence. It is undoubtedly from Fieber's collection, having passed from Lethierry's possession to that of M. Noualhier. Nevertheless, Fieber (l. c., p. 477) distinctly mentions the Vienna, Berlin, and Halle Museums as the collections wherein were his original specimens.
11. Notonecta uhleri, Kirk.

Notonecta uhleri, Kirk., 1897, Ann. Mag. N. H. (6), xx., p. 58.

Heuld: notocephalon in the form of an inverted wine-decanter, margins greatly curved, widely diverging towards the vertex, which is six to eight times wider than the synthlipsis, at which point the eyes are almost contiguous; breadth of the eye about ten times as great as that of the synthlipsis. Pronotum: humeral angles acute, accentuated, lateral margins sinuate, humeral margins little separate from the posterior margin. Metenotum dark purple-brown. Hemielytra varying from dark brick-red to rich orange-yellow; a large, irregular black blotch at the base of the corium extending transversely and non-acuminately from the apex of the clavus to the golden-yellow exocorial lateral submargin; membrane dark red-brown, apically black-this tint encroaching more or less basally. Alar nervures brown. Pedes: coxæ blackish ; intermediate tibial spur blunt, subcylindrical. Abdominis dorsum: first and second segments rufotestaceous, deeper marginally, the remainder flavotestaceous, lurid marginally; this latter tint encroaching inwards more and more apically. Abdominis venter. rufotestaceous, densely provided with greenish-black ciliæ.

Long. $\hat{\beta}$. $11-11 \cdot 4 \mathrm{~mm}$., lat. $3 \cdot 5-4 \mathrm{~mm} . ;$ long. 아, $12 \mathrm{~mm} .$, lat. 4 mm .

Type $\hat{\text { on }}$. Uhler coll.
Hab. N. America, Massachusetts (Uhler, Montandon, and Brit. Mus. colls.), New Orleans (Paris Mus.), Florida (Uhler coll.).

Allied to $N$. variabilis (northern form) and probably representing the extreme limit of the $N$.americana series, viz. : N. americana, Fabr., N. undulata, Say, and N. virescens, Blanch.,N. bifusciata, Guér., N.variabilis, Fieb., and $N$. uhleri, Kirk.

Easily separated from all the other Notonecter by the structure of the head.

## 12. Notonecta chinensis, Fallou.

Notonecta chinensis, Fallou, 1887, Le Naturaliste, p. 413 ; Bergr., 1894, Rev. Ent., xiii., p. 164 (redescription).
N. sinica, Walk., 1873, Cat. Hem.-Het. Brit. Mus., viii., p. 204 (nec Stål), syn. nov.

Head very narrow at the base, from which the notocephalic lateral margins keep almost parallel for a little space, then slightly
diverge; vertex more than three times as wide as synthlipsis; breadth of the eye nearly five times as great as that of the synthlipsis. Pronotum and scutellum similar to those of N. triguttata (No. 13). Hemielytra varying from orange-red to red-brown, with an undulatory bluish-black fascia (occasionally represented by scattered spots) exteuding from suture to lateral margin, near the apical margin of the corium, but diverging from that as it approaches the lateral margin; membraue bluish-black. Aler nervures brown. Abdominis dorsum black, some of the middle segments being at times somewhat suffused with violet-brown. Abdominis renter black.

Long. $13.5-16.7 \mathrm{~mm}$., lat. $5 \cdot 2-6.2 \mathrm{~mm}$.
Type. Fallou coll. (Paris Mus.).
Hab. China: Pekin, Kiang-Si,* Se-Tchouen, Chen-Si (Paris Mus.), Kin-Kiang [?Chin-Kiang], Foo-Chan (Brit. Mus.), Fo-Kien (Fallou and Bergroth colls.), Ngan Hoei (Montandon and my colls.). Well distributed over the Chinese Empire.

To this species I have referred four specimens in the Paris Museum (from Chen-Si, Se-Tchouen, and Kiang-Si), which seem sufficiently distinct to bear a varietal namekiangsis, var. nov.

Hemielytric sordid luteous with a dark-brown irregular mark extending in a zigzag from the apex of the clavus to the base of the membrane (along the suture), thence to the exocorial submargin and finally along the apical third of the latter. There is also a small dark-brown crescent on the exterior membrane lobe. Membrane rufoluteous.

Long. 14 mm ., lat. 5 mm .
In Ann. Mag. N. H. (6), xx., p. 58, the type was referred to as being in the possession of Dr. Bergroth. That specimen was certainly from Fallou's collection and is that from which the redescription was drawn up by Dr. Bergroth. There is, however, an example from FoKien in the Fallou collection (Paris Museum), labelled in Fallou's writing, " Notonecta chinensis. Type. Fallou, Le Naturaliste, 15, ii., 1887," so that this latter speci-

[^45]men must be regarded as the type, Dr. Bergroth's example and the other individuals in Fallou's collection (Paris Mus. and my coll.) being entitled to rank as syntypes.

## 13. Notonecta triguttata, Motsch.

Notonecta triguttata, Motsch., 1861, Etudes ent., x., p. 24.

Heall wider at base than in $N$. chinensis and not so markedly divergent; notocephalic lateral margins sensibly curved and the vertex a trifle more than two and a-half times as wide as the synthlipsis, which is about a-third of the width of the eye. Pronotum: lateral and humeral margins sinuate, the former suddenly broadening towards the humeral angles (which are acute), the pronotum thus having somewhat the appearance of being subconstricted mediolaterally. Hemielytra variable in pattern, black or bluishblack, with three fascir or blotches, varying in size and extent, the anterior generally flavous, the postreme rufous or castaneous: the flavous bands sometimes widely separate and slender, causing melanochroic specimens, at other times uniting so that nearly the whole of the clavus and the anterior half of the corium form a single extensive blotch ; the postreme spot situated along the apical margin of the corium. Lateral margins of exocorium and membrane narrawly flavescent. Alar nervures yellow-brown. Pedes: coxæ black. Abdominis dorsum black, occasionally slightly reddishbrown laterally. Abdominis venter black.

Long. 13-14 mm., lat. 5 mm .
Type. ? Moscow.
Hab. Japan, Yokohama (Budapest, Noualhier and my colls.), Seso (Paris Mus.).

Very common in Southern Japan.
Very similar at first sight to some forms of $N$. glauca, L., but readily distinguished by the cephalic structure.

## 14. Notonecta montandoni, Kirk.

Notonecta montanảoni, Kirk., 1897, Ann. Mag. N. H. (6), xx., p. 56.

Head: very similar to that of N. triguttata, but altogether larger, wider both at the vertex and synthlipsis; notocephalic lateral margins much straighter; vertex about twice as wide as synthlipsis, which is about a-third of the breadth of an eye.

Pronotum much as in N.. triguttuta. Hemielytra dark crimson-lake, irregularly marked with black; as a rule, the membrane is entirely black; in some specimens there are scarcely any spots on the clavus and corium, in others a broad undulatory band runs across the corium ; exocorium either entirely concolorous with the ground colour of the hemielytra, or blotched with black. Aler basal nervures crimson, the rest brown. Pedes: intermediate tibial spur very small. Abdominis dorsum black. Abdominis center black, except the sordid testaceous (? green) connexivum.

Long. $16-16.7 \mathrm{~mm}$., lat. 6 mm .
Type: Montandon colln.
Hab. China: Kiang-Si (Paris Mus.), Ngan-Hoci (Montandon and my collns.), Mou Piu, Tibet (Paris Mus.).

Var. nov., violacea.
Slightly more robust than the type, notocephalon a little shorter, hemielytra immaculate violet, except the slightly infuscate exterior membrane lobe.

Long. $17 \cdot 2 \mathrm{~mm}$., lat. $7 \cdot 5 \mathrm{~mm}$.
Type. Montandon colln.
Hab. Burna: "Catcin Cauri" (Fea Ag.Nov. 1886, Montandon and my collns., Hamburg Mus.). In its entirety, therefore, $N$. montandomi varies in length from 16 to $17 \cdot 2$ mm ., and in breadth from 6 to 7.5 mm .; its distribution embraces the major portion of the Chinese Empire (including Tibet) and Burma.

## 15. Notonecta irrorata, Uhl.

Notonecta irrorata, Uhl., 1878, Pr. Bost. N. H. Soc., xix., p. 443 ; 1886, Checkl., p. 28.
N. ornata, Fitch MS. (Sign. coll.).

Heal small, notocephalic lateral margins diverging widely, vertex a little more than three times as wide as synthlipsis; width of vertex and of the eye subequal; eyes rather larger proportionately than in N. triguttatu, etc. Pronotum much wider basally than apically, lateral margins not sinuate, humeral angles acute, humeral and posterior margins sinuate. Hemielytro rich black, irrorated (especially on the clavus) with refulgent yellow-brown, interior lohe of membrane and apex of exterior lobe smoky. The irrorations vary greatly in different individuals; in some the corium and membrane are almost immaculate, in others the whole of the clavus and corium is irrorated, imparting a chequered appearance, while in others the clavus is rich (almost metallic) yellow-brown with
faint, distant, narrow black lines. Alar nervures brown. Pedles : intermediate tibial spur small. Abdominis dorsum: first to fifth segments black, sixth, seventh, and eighth sordid greyish-brown. Abdominis renter black.

Long. 13-14 mm., lat. 4-4. mm .
Hab. N. America.
Widely distributed throughout the United States of America, but local. Prof. Uhler writes me with regard to their occurrence in the environs of Baltimore, "Quite local and lives in shaded ponds of cool water. In this case the water came from springs that empty into old quarries of Phyllite slate, into which the roots of willows grow in thick mats and stain the water somewhat brown."

## 16. Notonecta glauca, L.

[Var. 1] Notonecta glauca, Linn., 1758, Syst. Nat., ed. x., p. 439 ; Fabr., 1794, Ent. Syst., iv., p. 57 (type of genus) ; Dougl. \& Scott, 1865, Brit. Hem., i., p. 587, pl. xx., fig. 4.
Nepa Notonecta, de Geer, 1773, Mém., iii., p. 382, pl. xviii., figs. 16-28.

Notonecta octopunctata, Gmel., 1789, in Linn. Syst. Nat., ed. xiii., p. 2119, syn. nov.
N. Fabricii, var. glauca, Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 473.
N. Fabrici, var. glauca, Fieb., 1861, Europ. Hem., p. 101.
N. glauca, var. fulva, Maria, 1807, An. Soc. Españ., p. 130.
N. secunda, Schäff. [1766], Icon. Ins. Ratisb., i., pt. 1, pl. 97, fig. 1. Excl. syn.
[Var. 2] N. marmorea, Fabr., 1803, Syst. Rhyng., p. 103.
N. prima, Schäff. [1766], l. c., pl. 33, figs. 5 \& 6. Ercl. syn.
[Var. 3] N. glauca, var. nov. canariensis.
[Var. 4] N. marginata, Mïll., 1776, Zool. Dan., p. 104. N. obliqua, Thunb., 1787, DD. Ac. Mus. Upsal., p. 61, syn. nov.
N. furcata, Fabr., 1794, Eut. Syst., iv., p. 58 ; Coqueb., 1799, Illustr. Icon., i., p. 38, pl. 19, fig. 2; Haworth, 1812, Trans. Ent. Soc. Lond., i., 98.
N. melanota, Risso, 1826, Hist. princip. prod. Europ., p. 215.
N. glauca var. furcata, Saund., 1892, Hem.Het. Brit. Isl., p. 328, pl. 31, fig. 2.
[Var. 5] N. maculata, Fabr., 1794, Ent. Syst., iv., p. 58; Coqueb., l. c., i., p. 38, pl. x., fig. 1 ; Curt., 1824, Brit. Ent., i., pl. x.; Herr.-Schäff., 1848, Wanz. Ins., viii., p. 23, pl. 256, fig. 797; Dougl. \& Scott, 1865, Brit. Hem., i., p. 588.
N. variegata, Risso, 1826, l. c., p. 21 Ј.
N. umbrina, Germar MS.
N. Fabricii, var. umbrina, Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p 474.
N. glauca, var. umbrina, Put., 1880, Synops. Hem.-Het. France, p. 217.
N. marmorea, Frey-Gessn., 1891, MT. Schweiz. Ent. Ges., iii., p. 319 (nec Fabr.).
Hearl diverging slightly and curvedly from the base, curving slightly inwards towards the vertex, which is from two to two and a-quarter times as wide as the synthlipsis ; the latter is about half the width of the eye. Scutellum, metanotum, and hemielytra very variable in colour; lobes of membrane subequal. Alar nervures variable in colour. Pedes: spur on intermediate tibiæ mediocre, apically black, rather blunt. Abdominis dorsum variable in colour. Venter black.

## Varieties.

1 (8) Scutellum and metanotum black. Abdominis dorsum black (in immature specimens often pale violet-brown) ; genital segments often sordid greenish-white.
2 (3) Alar nervures brownish-black; hemielytra black or bluishblack, two diagonal luteous stripes on clavus and corium.

3 marginata, Müll.
3 (2) Alar nervures brown or yellowish-brown ;
4 (5) Hemielytra purple-black, irrorated with obscure castaneous. 4 cunuriensis, Kirk.
5 (4) Hemielytra not purple-black.
6 (7) Hemielytra varying from greenish-yellow to yellow-brown, either almost immaculate or spotted and marked with brownish-black; connexivum black . . 1 glauca, L.
7 (6) Hemielytra yellowish-brown marbled with darker and richer colour ; connexivum dorsally greenish-testaceous.

2 marmorea, Fabr.

8 (1) Scutellum black or luteous. Metanotum orange-yellow with a large blackish blotch close to the scutellar margins. Abdominal dorsal segments : first orange-yellow, second to fourth black (the fourth narrowly orange-yellow apically), fifth to eighth orange-yellow (the fifth basally blackish). Alar basal nervures orange-yellow.
${ }_{5}$ maculata, Fabr.

## Var. 1, glauca, L.

Hemielytra varying in colour from pale sage-green or stramineous to rich dark castaneous, either practically immaculate [when castaneous presumably var. fulca, Maria] or varyingly maculate with irregular blackish mottlings and spots. Alar nervures pale yellowish-brown.

I have taken small examples of this variety in brackish water near Gravesend (England) in company with marine Crustacea. From Maie-Nousky, Erzerum (Vienna Mus.), I have seen two specimens resembling in colour and disposition of the apical hemielytral fascia, the typical form of $N$. americana, Fabr.

Var. 2, marmorea, Fabr. (glauca, var. $\beta$, Leach).
Rich yellow-brown hemielytra with dark mottlings ; connexivum greenish testaceous.

This var. has been confused with maculata, Fabr., and I have received a number of the latter labelled " marmorea," indeed, as regards the hemielytral pattern and coloration, some forms of each variety are quite indistinguishable from each other. This has been fully discussed in the Revue d'Entomologie, xvi., p. 222 (1897).

Var. 3, marginata, Müll. (furcata, auctt.).
Hemielytra bluish-black or dull black ; clavus luteous except at the sutural margins; a longitudinal luteous fascia, varying in length, at the base of the endo- and mesocorium ; in many individuals there are one or two ferruginous spots near the apical margin of the corium (furcutu, var. $\beta$, Leach).

Among the intermediate forms between vars. 1, 2, and 3 , may be mentioned:
(a) specimens from Sind Valley, Kashmir (Budapest and Stockholm Muss.).

Not unlike $N^{r}$. irroruta, Uhl., in hemielytral pattern, very pubescent, hemielytra dull black; clavus yellowish-brown or castaneous, mottled or faintly striped with blackish-brown, corium black obscurely irrorated with castaneous. Notocephalon a little wider at the base than in other forms.
$(\beta)$ specimens from L. Kharak, Persia (Paris Mus.), and Transcaspia ( $m y$ coll.), which are not unlike some forms of $N$. insulata in hemielytral pattern.

Clavus and basal half of corium luteotestaceous ; exocorium, apical half of corium ferruginous, spotted and blotched with black.

Var. 4, canariensis, nov.
Notocephalon a trifle narrower than in the other forms. Hemielytra purple-black, obscurely irrorated with dark rich castąueous, margins of hemielytral areas narrowly the same colour ; anterior half of exocorium rich castaneous blotched with black, posterior half black. Membrane black. Pedes rufotestaceous, suffused with rich green.

Resembling somewhat a very dark, elongate $N$. irrorata. By far the most ornate Notonectid I have seen.

Var. 5 , maculata, Fabr.
Hemielytra orange-red or orange-yellow irrorated with brownishred and blackish-brown, varying greatly in shade. Alar basal nervures orange-yellow, rest brown.

I have discussed this var. under var. marmorea.
A specimen from Barbary (Paris Mus.) is almost chocolate, while the hemielytra of one from Algiers (Vienna Mus.) are scarcely maculate.

In Fabricius's original description, the scutellum is said to be "album " which Herrich-Schäffer deems a misprint for "atrum ; " there are, however, in the Paris Museum African examples (presently to be described) with luteous scutellum, and in any case it is a matter of no importance having regard to the variability of this feature in so many species. Through the kindness of Prof. Bouvier and Prof. Joanny Martin, I have been able to examine the type in the Bosc collection (Paris Museum) in which the scutellum is black. Under the name "var. umbrina"

Dr. Yuton has had the kindness to send me specimens from Sicily, entirely according with the type above mentioned.

The forms with luteous scutellum have been labelled in several collections "lutea," but they differ by being darker and less robust and by the structural characters diagnostic of the two species (vide Analytical Table). They are (with the exception of the unguiculi, \&c.) dark luteous as a rule, but in a few individuals, the hemielytra are incipiently brunneomaculate.

Long. $13 \cdot 4$ ( $12 \cdot 2$ exceptional) $-17 \cdot 2 \mathrm{~mm}$., lat. $4 \cdot 5-6 \mathrm{~mm}$. ; glauca, $13 \cdot 4-16 \mathrm{~mm}$., and $4 \cdot 5-5 \cdot 5 \mathrm{~mm}$. ; marmorea, $14 \cdot 7-16 \mathrm{~mm}$., and $5-5 \cdot 5 \mathrm{~mm}$. ; marginata, $14-17 \cdot 2 \mathrm{~mm}$., and $5 \cdot 2-6 \mathrm{~mm}$. ; canariensis, 14.5 mm. , ; and maculata, 12.2 (exceptional) -15 mm ., and $5-5.5 \mathrm{~mm}$. ; maculata (leucochroic) $13.5-13.7 \mathrm{~mm}$., and 4.6 mm .

Types : glanca, ? Upsala ; marmorea, Mus. Sehestedt (sec. Stul); Nepa notcnecta, Stockholm Mus. (sec. Reuter) ; maculata, Bosc coll. (Paris Mus.) [?"type"; rather "syntype"]; canariensis, Vienna Mus.; marginata?.

Hab. Europe ; Asia, S. W. region, Siberia, N. India; Africa, palæarctic portion; Canary Isles.
N. glauca and marmorea; practically the whole of Europe, Amurland (Brit. Mus.), Transcaspia, Persia, Yarkand (Distant), and the whole of palæarctic Africa.
N. marginata: practically the whole of Europe (but rather local and apparently not a constant variety), Kashmir.
N. canariensis: Teneriffe, Barenco Nidalgo (O. Simony, 1888, Vienna Mus.).
N. maculata: the whole of Europe (but local) and palæarctic Africa; the leucochroic form seems confined to Africa.

In Pr. Ent. Soc. Lond., 1897, p. xxxv., I noted the presence of this species in North America. I was then under the impression that Prof. Uhler was responsible for the record of its occurrence in Michigan and Kansas ('Townsend, 1891, Pr. Ent. Soc. Wash., ii., p. 56), but this appears to be a mistake, and it is probable that the specimens belong to $N$. insulata, while Shepherd's record (1848, Ann. Mag. N. H. (2), i., p. 158. Source of the Mississippi under $18^{\circ}$ ) applies to $N$. insulata or $N$.
undulata. Prof. Uhler writes that he has not seen any authentic examples from North America.

This species seems to be almost confined to stagnant water, though I have captured a single specimen in a running stream. This, however, appears to be unusual. It may be of interest to note here the colour changes after the final larval instar, which I have observed in two varieties, viz. : glauca and marginata.

In both, the imago leaves the ultimate larval skin, immaculate dead-white in colour. In the course of development, the hemielytra become pure ivory-white, while the scutellum early assumes a clear pale green colour, the golden-yellow pubescence being then noticeable. In glauca, the hemielytra very gradually change to their normal hue, the scutellum remaining greenish somewhat longer. In marginata, the hemielytra pass through the yellowish-green stages, then becoming pale purplish-brown, and thence to the final bluish-black, the abdominis dorsum passing through very similar stages. The claval and corial fasciæ, and the spots at the apical margin of the corium are ivory-white during the purplishbrown stage, the apical spots shortly turning yellowish and during the final development, the spcts become castaneous and the fasciæ luteous.

## 17. Notonecta nigra, Fieb.

Notonecta nigra, Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 473.

I have little to say upon this species; there appear to be only three specimens in collections, two in the Vienna Museum and one (labelled "Type," but upon which I can only offer an opinion similar to that on N. variabilis) in the collection of M. M. Noualhier. It appears structurally identical with $N$. glauca, and formerly, when I believed that N. glauca inhabited North America, it seemed probable that this was only a var. of that species.

Long. 16 mm ., lat. 5.5 mm .
Hab. Brazil.
I have nothing further to add to Fieber's description.

## 18. Notonecta lutea, Müll.

Notonecta lutea, O. F. Mïll., 1776, Zool. Dan., p. 103 ; Fieb., 1851, Abh. böhm. Ges. Wiss. (5), vii., p. 473 ; Flor, 1860, Rhynch. Livl., i., p. 774 ; Fieb., 1861, Europ. Hem., p. 100 ; J. Sahlb., 1875, Not. Sällsk. Faun. Fenn. Förh. xiv., p. 274 ; Duda, 1891, Klub. prírod. Praze, p. 13, pl. iv., fig. 1.
N. unicolor, Herr.-Schäff., 1835, Nomencl. Ent., p. 63; 1848, Wanz. Ins., viii., p. 23.
N. tumida, Germ. MS.

Head large, notocephalic lateral margins slightly diverging from base, vertex two to two and a-quarter times as wide as synthlipsis. Entirely luteous (except the dark claret eyes, occasional dark-brown markings along the sutures of the clavus, \&e., the bronze-brown sternal hair-tufts, the black unguiculi and venter). Scutellum a third wider than long. Exterior lobe of membrane only about half the size of the interior lobe, and obviously not so long. Alar nervures luteous. Pedes : spine on intermediate tibia, large, acute, black-tipped.

Long. 13-17•1 mm., lat. pron. $4 \cdot 5-5 \cdot 5 \mathrm{~mm}$.
Type lost. The description has been drawn up from specimens kindly sent by Dr. J. Sahlberg.

Hab. Europe, Tammati in Finland (my coll.), Bohemia (my coll.) ; Asia, Siberia (Brit. Mus.).

Very similar in structure to N. glauca; it has, however, a more arched appearance, is stouter and more robust, especially postero-lateraliy, the apical margin of the pronotum is straighter and the scutellum is shorter. The intermediate tibial spur is also much longer. The head is larger and flatter, the notocephalon is rather wider basally and vertically, and the lateral margins straighter. Duda's figure represents a Bohemian specimen; these are generally less robust posteriorly than the northern forms. He has made the usual mistake of providing the posterior tarsi with long unguiculi.

Var. scutellaris, J. Sahlb.
Dr. Sahlberg has exhibited to the Societas Fennica some interesting varieties of this species, one of which he
has generously added to my collection. There is, in these, a decided reversion from leucochroism. The greater part of the apical margin (base auctt.) and the centre of the scutellum are dark brownish-black, and the hemielytra are much more marked (though rather obscurely) with brownish-black than the typical forms. It is most interesting that the membrane lobes of this var. are unequal, as in the type-forms.

Hab. Finland, Tammati (Salll. coll.) and Jaakkina (my coll.)

## Unrecognized Species.

1. N. alba, Forskål, 1775, Descr. Anim. Orient., p. xxiii. Alexandria. ? Anisops producta.
2. N. atomaria, Pallas, 1771, Reise Russ. Reichs, i., p. 469 ; Gmel., 1789, in Linn. Syst. Nat. Ed., xiii., p. 2119. Volga at Novgorod. ? Plea minutissima.
3. N. australis, Ol., 1811, Encyc. Méth., viii., p. 389. Australia (Bose colln.). ? Anisops.
4. N. grisea, Ol., 1811, l. c. San Domingo. ? Anisops ; ? N. undulata.
5. N. unifasciata, Guér., 1858, Bull. Soc. Zool. Acclim., iv., p. 581. Mexico. ? N. undulata.

I had hoped to give an account in this paper of the metamorphoses of $N$. glauca, L. Unfortunately my attempts at rearing this species from the ova during two seasons have been only partially successful. I have, however, reared three larval instars from ova deposited in captivity, and am aware of two more, so that Notonecta has at least five larval instars. In the ultimate and perhaps also the penultimate larval stage, the species can always be determined by the structure of the head; in the first three, however, the shape of the head and eyes does not resemble the adult at all, but is more akin to that of Corica, and the entire form of the insect in these stages is very different from that of the adult.
l hope to be able to give fuller particulars at a later date.
XIX. The Butterflies of Aragon. By Mrs. M. De la B. Nicholl. Communicated by Sir George F. Hampson, Bart., B.A.
[Read Nov. 17th, 1897.]
So few English collectors are acquainted with the Lepidoptera of the uplands of Aragon, that a short account of an excursion in that district, during June and July last, may be interesting.

The ancient kingdoms of Castile and Aragon are bounded by a mass of rocky mountains, in which three large rivers rise, viz., the Tagas, flowing westwards to the Atlantic, and the Jucar and the Guadalaviar, flowing eastwards and southwards to the Mediterranean. From the northern slopes of the Sierra de Albarracin the streams run northwards and join the distant Ebro. It will, therefore, be apparent that these mountains form one of the principal watersheds of Eastern Spain ; they extend for about seventy miles from Cuenca on the west, to Teruel on the east. Both of these towns are about 3000 feet above the sea, and all the intervening country is considerably above that level, the mountains averaging about 5000 feet, and attaining a height of nearly 6000 feet on the higher summits. Albarracin is in the midst of these sierras, but much nearer to Teruel than to Cuenca, from which it is separated by about sixty miles of forest and mountain-a beautiful and interesting country, well wooded, thinly inhabited, with barren mountains, smiling valleys, and wide grassy hollows, all rather less known to the Englishman than Japan or Newfoundland.

There is much variety of geological formation; the higher ridges are mostly mountain limestone or lias, and the main valleys are cut through some kind of sandstone or softer rock. There is one large mass of porphyritic formation, north of Albarracin, extending about ten miles

TRANS. ENT. SOC. LOND. 1897.-PART IV. (DEC.)
from east to west, and six or seven from north to south, a beautiful wild country, well watered, well wooded, and well pastured. Albarracin itself is built on a precipitous lias rock, overhanging the Guadalaviar, which flows for many miles through lias gorges-which we found very good ground for insects.

Arriving at Cuenca with Mr. E. Witty, of Barcelona, on the 14th of June, we presented our introductions to Señor Don Ventura Prosper, Professor at the Cuenca University, and were most kindly received by him. He gave us much useful information, and also an introduction to Canon Zapater, of Albarracin, which afterwards proved most valuable to us, as the Canon is a well known entomologist, and the original discoverer of Erebia zapateri and Satyrus prieuri and uhagoni. We stayed at Cuenca for a week, but were unfortunately too late for Zegris eupheme, which must have been just over. It is common at Cuenca in May, and is taken more or less abundantly throughout the Albarracin country. We then made an excursion of two days to Lago d'Una, a charming little lake about eighteen miles up the Jucar valley, and a good place for butterflies. We got Thecla roboris there, $A$. hecate, $A$. ino, and many other insects. Returning to Cuenca, we started thence on mules for Albarracin, first following the Jucar right to its source, then crossing the Upper 'lagus valley, and striking the source of the Guadalaviar, we descended that river to Albarracin, where we arrived on June 30th, after four days of most enjoyable travelling. We took, on our way, P. apollo, just out; Erebia evias, in very bad order; Lycæna arion, scarce and in bad order; Melanargia ines, M. iapygia, and M. lachesis, just out, and Cononympha iphioides, flying over a wet field in the Tagus valley, in some numbers. This was described by Dr. Staudinger as a variety of C.iphis, W.V. (= amyntas, Poda, which is the older name); it differs, however, from C. amyntas in having the ocelli on the underside of the hindwing evenly disposed, whilst in that species the ocellus above vein 3 is displaced iuwards; also there are no white blotches on the inner side of the series of ocelli; these differences seem perfectly constant, and there can be little doubt that it is a distinct species. It is also closely allied to C. leander, Esp., from Russia and Hungary, but differs from it in having an orange terminal line on the underside of the forewing, and in having a silvery line on
the inner side of the terminal orange line of the hindwing instead of on the outer side.

At Albarracin we were kindly welcomed by Canon Zapater, who gave us a copy of his valuable Catalogue of the Lepidoptera of the Province of Teruel. This was of infinite use to us; it supplied us with much local information, and we found it entirely reliable in every respect. The Canon also told us that Erebia zapateri was not to be looked for before July 21st, at the earliest -so we had three weeks before us in which to explore the country. We first went to Bronchales, in the porphyritic mountains north of Albarracin, then eastwards to Teruel, and on our road there (in the hot gorge of the Guadalaviar) we took Satyrus prieuri for the first time. Later on, we found this handsome butterfly very plentiful in these lias valleys, and we were lucky enough to get several specimens of the rare female variety uhagoni. We observed that this variety appeared to be singularly attractive to the males; in fact the crowd around uhagoni several times attracted our notice to her. And on one occasion she escaped, leaving three of her admirers in the net!

From Teruel we went southwards to the Sierra Camarena, and ascended the Javalembre, oj000 feet high, where we got plenty of E.evias, but in very bad condition. We also took a fine $P$. apollo, with orange spots. Returning to Teruel by Villel, we took plenty of S. ficlia and S. actæa, but no S. prieuri till we got back to the lias above Teruel. P. podalirius, var. feisthameli was very common around l'eruel, and we had a very good day along the Albarracin Road, getting Lycæna admetus, L. telicanus, and Syrichthus proto besides the $S$. prieuri, which swarmed. Then we tried Bronchales and Noguera (in the porphyritic group of mountains) for Erebia zapateri, but in vain. We could only find an isolated specimen here and there, though we quartered the district as carefully as pointers do the turnips in September. We began to despair of it, and our time was running out, when, at last, on the 29 th of July, it appeared in numbers, and we took over a hundred specimens in three days. It is the most beautiful of Erebias, and rather peculiar in its habits, flying slowly and lazily about the bushes of grouseberry (Arctostaphylos uva-ursi), which form the
undergrowth of the thin pine woods, and it is very shy of windy or cloudy weather. If by any chance it gets blown away from the grouseberry bushes, it seems completely lost and will not settle anywhere, letting the wind carry it at pleasure. It is then very hard to catch. I append a description of this little-known insect.

Expanse, $1 \cdot 50$ to $1 \cdot 75$. Upper side of all the wings dark reddish-brown, with a distinct blue gloss. F. W. with broad trianguiar ante-marginal band, broad at costa and tapering to a point at inner margin, containing two small white-pupilled spots near the apex. This antemarginal band is sometimes continued half-way across the hindwings; but generally the hindwings have no yellow markings. Underside of forewings brown, much tinged with red, ante-marginal band and spots as above. Underside of hindwings rather paler brown, with faint grey ante-marginal band edging the wing rather evenly. No eye spots on hindwings.

Another scarce Erebia is common in the Albarracin country, viz.: E. epistygne, which appears in abundance on the higher pastures in April and May, directly the snow melts. The only other Erebic to be had is E. evias, which appears in May or June, and is not very plentiful. The Satyrus family are well represented, and we took eight species besides var. uhagoni. S. prieuri is probably a lias insect, as we never took it on any other formation. P. apollo is very common on all the higher mountains, and shows much variation; some specimens have the spots white, some more or less orange, and some $\frac{q}{}$ specimens are very dark, with three conspicuous red spots on the upper side of the forewings. L. beetica swarms everywhere; L. telicanus is not so abundant. L. admetus is not scarce in the Guadalaviar valley, and $L$. amandus is to be had in the porphyritic country, whilst L. arion is very scarce and very early, but generally distributed over the higher valleys. Thecla roboris is plentiful on the Cuenca side, but rare about Albarracin. Argynnis hecate and A. pandora are common everywhere. $A$. chlorodippe replaces the typical form of $A$. cudippe all through Aragon. Melitra deione is to be had, but not very commonly, the same remark applying to M. trivia. M. aurinia, var. desputainii, is common, but was nearly over. The Melanargias are well reprosented. MI. lachesis swarms, so does M. iapygia, and its variety
cleanthe is to be had. M. ines we only took near Cuenca-never on the Teruel side of the watershed. Of the genus Syrichthus, S. proto is common in the valleys, $S$. carthami in the mountains, and a very wellmarked variety of $S$. ulveus, probably var. cirsii, is taken in plenty about Noguera. It occurred to us that the country had been far more thoroughly worked around Cuenca and Albarracin, and in the Noguera and Bronchales group of mountains, than around Tragacete, the Muela de San Juan, and Lago d'Una. Professor Max Korb spent much time at Bronchales during the summer of 1896, searching for the larva of the rare Saturnia isaleella, and he has probably taken everything worthy of notice in those forests. He has also hunted the country around Cuenca pretty thoroughly, and the whole Albarracin district has been constantly worked by Canon Zapater for many years past. But from Tragacete, a large prosperous village within an hour's walk of the source of the Jucar, and within reach of the Tagus valley, there is a great extent of mountain and forest country, many boggy uplands and hot gorges, which deserve to ke explored. Travelling is easy on mules, the people are remarkably honest, civil, and hospitable, and the climate delightful.

There are excellent inns at Cuenca, Albarracin, and Teruel ; no guide books are of much use; and no good maps are to be had. The mountain inns are no worse than they are in other countries, and the food decidedly better than in out of the way parts of Italy or Ireland.

I append a list of the species of Rhopalocera to be had in the district-partly derived from Canon Zapater's Catalogue, those recorded for the first time being marked *:-

Papilio sinon, Poda (podalivius, L.); also var. feisthanveli, Dup. (common) ; P. machaon, L.

Thais rumina, L., scarce-we only took one.
Parnassius apollo, L., common-and pretty varieties to be had.

Aporia cratragi, L., common.
Pieris brassicre, L., common; P. rapr, L.; P.napi, L.; P. daplidice, L.

Anthocharis belemix, Esp., very rare; A. belia, Cram.,
rare; and var. ausonia, Hübn., not uncommon; A. cardamines, L. ; and A. euphenoides, Staud., common.

Zegris eupheme, Esp., tolerably plentiful in some years, always common about Cuenca.

Leucophasia sinapis, L., not very common.
Colias hyale, L.; C. edusa, Fabr., and var. helice, Hübn., very common.

Rhodocera rhamni, L. ; R. cleopatra, L.-very common.
Thecla spini, Schiff., and T. ilicis, Esp., common; T. roboris, Esp., not so common; T. rubi, L., very plentiful.

Thestor ballus, Fabr., common at Cuenca.
Polyommatus alciphron, Rott., var. gordius, Sulz., and P. phlxas, L., very common; var. eleus, Fabr., also common.

Lycæna batica, L., in swarms; L. telicanus, Lang, rarer ; L. argus, L., and var. hypochiona, Ramb., common; L. zephyrus, Friv., rare (we caught none, being too late for it) ; L. orion, Pall., rare ; L. baton, Bergst., rather common; L. lysimon, Hübn., very rare; $L$. astrarche, Bergst., and vars. æstiva and montana, common; L. icarts, Rott., common; L. escheri, Hübn., L. bellargus, Rott., L. corydon, Poda, L. argiolus, L., L. sebrus, Boisd., all common; L. corydon, Poda, var. albicans, Herr.-Schälf., var. syngrapha, Boisd., and var. hispana, Herr.-Schäff., rare; L. hylas, Esp., and var. nivescens, Kef., not very common; L. admetus, Esp., not very common; L. damon, Schiff., rare; I. minima, Fuessly, rare; L. semiargus, Rott., not common; $L$. cyllarus, Rott., rare ; L. melanops, Boisd., very rare ; $L$. arion, L., very rare; L. amandus, Schneid., local, probably recorded in Zapater's list as $L$. iolas, Ochs.

Limenitis camilla, Schiff., common.
Vanessa C.-album, L., not rare; $V$. polychloros; L., common ; V. urtica, L., V. atalanta, L., and V. cardui, L., very common; $V . i o$, L., scarce ; $* V$. egea, Cram., very rare.

Melitra aurinia, Rott., the typical form replaced by var. desfontainii, Godt; M. phoele, Knoch., M. didyma, Ochs., and M. parthenie, Borkh., very common ; M.trivia, Schiff., and M. deione, Hübn., not very common; $M$. athalia, Rott., very rare.

Argynnis lathonia, L., A. adippe, L., var. chlorodippe, Herr.-Nchiiff. (which replaces the type), A. aflaia, L., A
pandora, Schiff., all common ; A. hecate, Esp., A. ino, Esp., and A. paphia, L., all tolerably common.

Melanargia lachesis, Hübn., M. iapygia, Cyr., and var. cleanthe, Boisd., M. ines, Hoffsgg., all common; *M. galathea, L., very rare.

Erebia evias, Godt., and E. epistygne, Hübn., tolerably common; E. zapateri, Oberth., common in the Sierra Albarricin only.

Satyrus alcyone, Schiff., S. circe, Fabr., S. briseis, L., S. prieuri, Pierr., S. semele, L., S. statilinus, Hufn., S. fidia, L., and S. actra, Esp., all common; S. arethusa, S. V., and S. prieuri, var. uhagoni, Oberth., rare.

Pararge meone, Esp., and P. megæra, L., common; P. egeria, L., rather rare ; P. mæra, L.

Epinephele lycaon, Rott., E. tithomus, L., E. pasiphæ, Esp., very common ; E. ianira, L., and E. ida, Esp., not so common; E. ianira, var. hispulla, Hübn., not common.

Coenonympha arcania, L., and C. dorus, Esp., common; C. iphioides, Staud., C. pamphilus, L., and var. lyllus, Esp., rather scarce.

Spilothyrus lavateræ, Esp., common ; S. althæx, Hïibn., and var. beeticus, Ramb., and S. alceæ, Esp., rather rare.

Syrichthus carthami, Hiibn., S. alveus, Hübn., var. fritillum, Hübn., and var. cirsii, Mey., S. malvæ, L., and S. sao, Hübn., common; S. proto, Esp., not so common.

Nisoniades tages, L., not uncommon; var. cervantes, Grasl., rare.

Hesperia lineola, Ochs., common ; H. comma, L., not very common.

I cannot end this paper without some notice of Saturnict isabella, Graells, which is found chiefly in the pine forests of the Albarracin. The caterpillar feeds on the upper branches of the highest pine trees, from which it very seldom descends. It is hatched at the end of June and is full fed about the end of July; the beautiful green moth emerges in September. I am told that it is not easily taken, and the caterpillar is reckoned a great prize on account of the height at which it feeds. It is not very easy to rear, but the British Museum possesses some beautiful specimens, bred at the Zoological Gardens.

I imagine that the moth might be taken without difficulty at night in September, which appears never to have been attempted. It is not rare at Noguera and Bronchales. I believe Prof. Korb obtained over 200 caterpillars last year, but did not meet with much success in rearing them. Another very rare insect, peculiar to the Albarracin, is Bombyx (or Albarracina) lorbi, Staud., discovered by Prof. Korb in 1881, very rare at Albarracin and unknown elsewhere in Europe. Canon Zapater's list of moths is long and interesting; but these do not come within the scope of this paper.
XX. New or little-known Sphegidæ from Egypt-a Correction. By the Rev. F. D. Morice, M.A., F.E.S.

In my paper, published in these Transactions (1897, pp. 310-316), I unfortunately described one of the new species under the name of Tachyspluee (?) integer (p. 308). 'Ihis name is not available, having been applied by Kohl to another species (Ann. Hofm. Wien, vii., p. 216, 1892). I propose therefore to call my insect, instead, Tachysphes (?) holognathus-this name referring (as my former name was intended to do) to the entire mandibles, which form so striking a characteristic of the insect in contrast with the notched mandibles of cther species belonging to the same genus.

## PROCEEDINGS

OF THE

## ENTOMOLOGICAL SOCIETY

OF

## LONDON

For the Year 1897.

## February 3rd, 1897.

Mr. Roland Trimen, F.R.S., President, in the Chair,
Donations to the Library were announced, and the thanks of the Society voted to the respective donors.

> Appointment of Vice-Presidents.

The President briefly returned thanks for the honour conferred upon him by his election, and announced that he had appointed as Vice-Presidents The Rev. Canon Fowler, M.A., F.L.S., Mr. R. McLachlan, F.R.S., and Professor Meldola, F.R.S.

Election of Fellous.
Mr. F. Bates, of 417, High Road, Chiswick; Mr. Dudley D'Auvergne Wright, M.R.C.S., L.R C.P., of 55, Queen Anne Street, W.; and Mrs. E. Brightwen, of The Grove, Great Stanmore, were elected Fellows of the Society.

Eahibitions, etc.
Mr. Champion exhibited an extensive series of Coleoptera collected by Mr. R. W. Lloyd and himself in July last in the Austrian Tyrol, chiefly at Mendel, Campiglio, and Cortina.

The collection contained about 45) species, including 35 Longicornia, about 20 Otiorrhynchus (the most characteristic beetles in the places visited), and many interesting Carabidæ, Elateridæ, etc.

He also exhibited about 85 species of Coleoptera from Cintra, Portugal, collected by Col. Yerbury, during the early spring of 1896, the most interesting of these being Carabus lusitanicus, F .

Also, on behalf of Mr. W. H. Harwood, two specimens of the rare Zeutfophora flacicollis, Marsh., from Colchester.

Mr. Tutt exhibited for Mr. H. B. Prince some Lepidoptera from the Cheshire coast, and read the following notes:"These insects were captured on the Wallasey sandhills. Nyssia zonaria.-The examples are uniform at first sight, and yet, when carefully examined, exhibit considerable variation. In some specimens the darker portions of the wings are but faintly developed, and the specimens have a very pallid and unicolorous appearance. At the opposite extreme the transverse basal line is continued up to the costa, and the space between this and the next transverse line is filled in with dark grey shading, forming a more or less distinct band. In other specimens the basal transverse line is almost or quite obsolete, and leaves the whole area from the discoidal lunule to the base of the wing with only the two darker longitudinal neurational markings. On the hindwings there is an equal range of rariation, the palest specimen having scarcely any trace of the three transverse bars which are very distinctly marked in the darkest specimens. The apterous females show no marked variation. Triphenu orbona (comes).-A moderately variable series with nothing approaching the range of variation found among the Scotch specimens. The colour aberrations appear to cover the usual range reached in our southern and midland English counties. Noctuu ranthoyrapha.-Among these we get the usual range of variation, extending from the pale grey ab. coluesa, H.-S., to a form approaching the ab. obscura, Tutt, without reaching the range to which the Scotch specimens often attain. Triphana rromba.-This series comprises some of the more usual forms but, taken as a whole, it tends to the darlier
aberrations. Mellinia circellaris.-The series is composed of about half each of the greyish-ochreous type (circellaris) and the redder ab. ferruyinea, Esper. The suffused ab. macilenta, Hb , is not represented. Orthosia lota.-These are a most uniform series. Of the thirteen examples, twelve are quite of the typical coloration, whilst one shows a slight tendency to approach the ab. rufa, Tutt.
"The two following species sent by Mr. Prince did not rome from the Cheshire sandhills. Ematurya atomaria.These were captured on Thurstaton Common, by the river Dee, in May, 1896. They are rather smaller than our southern form and more nearly approach in size and their dark fuscous coloration the specimens from the northern moors. Hypsipetes ruberata.-Captured at Flaybruck Hill, near Bidston, in May, 1896. These are an interesting series, somewhat smaller than the Wisbech specimens. Most of the individuals show the transverse markings fairly well, whilst only two examples exhibit the pale central band so conspicnous in the two allied species-H. trifasciata and $H$. furcata (sordillata)."

Mr. Tutt then exhibited some typical specimens of $\begin{aligned} & \text { Zy!cua }\end{aligned}$ ochsenheimeri, Zell., from Piedmont, and also some hybrid Zygænids, obtained by crossing Z. ochsenheimeri with Z. filipendule, and read the following notes:--"It is in the memory of you all that Mr. W. H. B. Fletcher has bred hybrids between Zygena loniceres and $Z$. filipendulce and between $Z$. lonicere and $Z$. trifolii (the progeny of the latter proving fertile for four generations). In my 'Notes on the Zygænidæ,' I re-described two very distinct Zygæenids which had been united by Staudinger under the name of $\angle$. trifolii var. dubia. There were Z. medicayinis, Led., and Z. ochsenheimeri, Zell.; the former a five-spotted species, closely allied to, but larger than, $Z$. lonicera, the latter a six-spotted species closely allied to Z. filipendulte, aberrations of which have been erroneously referred to this species. In 1894 , Dr. Chapman sent eggs of $Z$. ochsenheimeri from Courmayeur (Piedmont), to Mr. W. H. B. Fletcher. These duly hatched, and when the imagines emerged a of $Z$. ochsenheimeri was paired with a $9 Z$. filipendulde from the Sussex Downs (Lewes
or Shoreham). Eggs were obtained, and a part of the moths resulting from the cross I now exhibit. Mr. Fletcher adds that the hybrids paired inter se and the larvæ duly hatched.
"The true $Z$. ochsenheimeri shows considerable sexual dimorphism, the male being smaller than the female, the sixth spot (i.e., the lower of the outermost pair of spots) being almost obsolete, with a distinct concavity on the outer margin of the hindwing, the concavity being largely accentuated by the widening of the rather broad black margin at this area. The females show the same peculiarities, but less markedly, than the males.
"The males of the cross exhibit very markedly the characters of the male of $Z$. ochsenheimeri, the sisth spot in all but two of the male specimens being much reduced, and in a majority of the specimens the hindwing is like that of $Z$. ochsenheimeri. On the other hand, the females, with two exceptions, strikingly resemble $Z$. filipendule, and the hindwing character is almost entirely lost.
"I It is evident that the theory that allied species are not fertile inter se does not hold good for the genus Zyyfona, unless we are to unite all the Zygrenid species into one, which is absurd."

Mr. Tutt also showed, for Mr. J. B. Hodgkinson, a number of obscure British Micro-lepidoptera, many of which had been regarded as new species. The validity of the determinations. was questioned by Lord Walsingham, Mr. B. A. Bower and others, and the first-named speaker strongly deprecated the practice of positively recognizing or describing such obscure forms, particularly when British, from single or worn specimens. A suffused aberration of a Gelechiid, taken at Witherslack, and described under the name of Lita intermediella (Ent. Rec., ix, p. 36), was referred to Lita fraternella.

Mr. Barrett showed specimens of the true Platyptilia tesseradactyla, L. ( $=P$. fischeri, Zell.) new to the United Kingdom, and taken in Co. Galway by Mr. W. F. de V. Kane and the Hon. R. E. Dillon. The species was widely distributed in N. and Central Europe, often occurring at a considerable elevation, and was said to feed on Gnaphalium.

Mr. Tutt stated that he had found it to be common in the

Alps among Petasites; and Lord Walsingham spoke in support of the identification.

Mr. McLachlan exhibited cooked locusts (Schistocerca peregrina) received from the Rev. A. E. Eaton and sold in the market of Biskra, Algeria, under the name of "Jarâd." They were cooked whole, but the abdomen only was eaten.

The President, Mr. Barrett, and Mr. Blandford made some remarks on the subject.

Mr. Blandford, Hon. Sec., suggested that it would be greatly to the advantage of Fellows if notices of Exhibits of general interest, and likely to lead to a discussion, were sent to him beforehand, as was the case with kindred societies. If this were done, and the notices were accompanied by the names of Fellows likely to be specially interested in the exhibition, he would endeavour to send out intimations to them of the date fixed. As the plan was suggested for the convenience of Fellows, and was not provided for by the Society's bye-laws, he must reserve the discretion in every case as to whether such notices should be acted on or not.

The President and Mr. Merrifield, Hon. Sec., also spoke in favour of the proposal.

## Paper.

A paper was communicated by Dr. A. G. Butler, F.L.S., on "Seasonal Dimorphism in African Butterfligs." He contested the views of Mr. Guy A. K. Marshall (Tr. Ent. Soc. Lond., 1896, pp. 551-566) as to the distinctness of certain forms of Acras, and maintained that one part of Africa cannot and does not represent the entire range of a species with its extreme dry- and wet-season forms, and that the dry-season form of a moist district may be the intermediate or a wet-season form of a drier district. The author also stated that the black apical patch of the forewings in Acraa was not of specific value, inasmuch as all grades existed between the broadest apical patch and no patch at all ; it was probably only a seasonal development or a mere variation. Many of the species recognized as distinct by Mr. Marshall were merely varietal, and were linked together by intermediate forms in the collection of the British Museum. Such
trie Acraca pudorina, Staud., A. acrita, var., Trim., A. acrita, Hew., and A. chceribula, Oberth.

The paper led to a long discussion, chiefly on the so-called "dry-season" and "wet-season forms," between the President, Mr. Jacoby, Mr. Tutt, and Mr. Merrifield. The latter speaker stated that he had been unable experimentally to modify the colour and markings of Lepidoptera by variations in humidity. Mr. Tutt believed that Mr. Doherty had obtained "wet-season forms" of Oriental species by keeping the pupa in a moist atmosphere.

## February 17th, 1897.

Mr. R. McLichlan, F.R.S., Vice-President and Treasurer, in the Chair.

Donations to the Library were announced, and thanks voted to the respective donors.

## Exhibitions.

Messrs. Champion and Jacoby exhibited the collection of Phytophagous Coleoptera made by Mr. H. H. Smith in Grenada and the Grenadines for the West India Exploration Committee of the Royal Society and British Association.

Mr. F. C. Adams exhibited rare Diptera taken in the New Forest during the preceding year, and read the following notes:-
"Tipula, sp. n.; a small species taken in my garden at Lyndhurst, May 28th, and submitted for identification to Mr. Austen, who regarded it as probably new.
" Platyura marginata, Meig. It is doubtful whether this should be called rare, but I have not yet found it common in the New Forest, and it was unrepresented in the British Museum Collection.
" Nephrocerus flavicornis, Zett. This very rare fly has only been taken twice in this country, on both occasions by myself. The first, taken on June 16th, 1894, in Park Ground Enclosure, is in the National Collection; the second was taken in my garden, not more than two hundred yards from the same spot.
"Syrphus guttatus, Fall. One female taken in my garden, June 22 nd . Originally recorded by Mr. Coryndon Matthews from South Devon in 1893. Mr. R. C. Bradley recorded two females last year as well as three S. flarifrons, Verr., which he believes will prove to be the male of this species.
" Callicera enea, Fabr. Taken on water-mint at Butts Lawn, near Brockenhurst, on August 13th.
"Mr. Verrall mentions four specimens recorded up to January, 1889 ; since then one has been taken also at Lyndhurst. This brings the record up to six, of which three have been taken in the County of Hampshire. Nothing I believe is known of the larva, but from the circumstance under which I took the fly, I think it may prove to be aquatic.
" I'lysocephala ni!rra, De G. Judging from old collections, this fine Conops seems to have been more plentiful in bygone years, but only a few captures have been recorded of late. My specimen was taken in Rhinefield Enclosure on the 29th May.
" Stevenia maculata, Fall. This is the Elesina maculata, Fall., of Verrall's List, and seems to be very spasmodic in its appearance, single specimens being the general rule.
"Acanthiptera inanis, Fall. This does not appear in Mr. Verrall's List unless under the name of Sphecolyma inanis, Fall., one of the Dexidæ. The venation however is distinctly that of the Anthomyiidre, and Dr. Meade places it just before Pegomyiu. It has been bred from wasps' nests, which seem a very strange habitat for so frail an insect to select, considering how fond wasps are of preying upon Diptera, especially those belonging to the family Muscidæ.
"Hydromyza licens, Fabr. Several taken 29th July at Brockenhurst Bridge, running on leaves of Nuphar lutea. This insect was quite common, but difficult to capture, and I should not have exhibited it as rare but for the fact that Mr. Verrall, in his list, considers it as doubtfully British. It stands in the old collection at the British Museum, and was figured and described by Curtis as Cordyluru licens, Fabr."

Mr. M. Burr showed an example of Locust (Acrydium ry!ptium, L.) taken in the Post Office at Bedford Street, Strand, and six new species of Acrydiidæ belonging to the
genera Gelastorrhinus, Brauer, from Japan; Duronia, Stâl, from the Cameroons; Phleoba, Stâl, from Penang; Hyalopteryp, Charp., from Bolivia; Catantops, Schaum, from the Cameroons; and Dichroplus from Bolivia.

The Secretary exhibited a Cicada larva from which a fungus, probably Cordycels sobolifera, was growing, which had been sent to the Society from Venezuela, with an enquiry as to its real nature. He mentioned that such Cicada larvæ, with the out-growing fructifications of this fungus were among the best known cases of insects attacked by Entomophthorea, and had been familiar for many years from the West Indies, under the name of the "Vegetable Fly." Judging from the description and figures of the fungus given by Mr. Cooke in his "Vegetable Wasps and Plant-Worms," the one sent from Venezuela appeared to be identical with the West-Indian species.

The Rev. Dr. Walker showed a series of Coleoptera, Hymenoptera, and Diptera, collected in the Orkney Islands during the previous season.

Mr. Tutt exhibited some very extreme forms of Spilosoma Iulvicipela ab. zatima, in which the black suffusion of the wings was exceptionally heavy, and in one of which the fringes also were black. The specimens were bred by Mr. Young, of Rotherham, Yorks. In reply to Mr. McLachlan, Mr. Tutt said that the species occurred on the Continent as a somewhat rare aberration, Heligoland being the best known locality. For at least twenty years a M. Deschange had interbred the form on the Continent and advertised the pupæ in the Continental magazines for sale. There was considerable doubt as to how the species had been introduced into England, for it was probably not indigenous, but it was certainly being sold by a professional dealer living in this country before the now well-known strain from Yorkshire had been established. There was, however, no reason to suppose that it was deliberately introduced for sale as a British variety.

Mr. C. G. Barrett also spoke on the origin of the British strain, and said that the parent example was bred from one of a large number of pupæ from different sources. The origin of this pupe was unknown but it possibly came from the

South of England and the larva might have been accidentally imported in market produce.

Mr. Tutt also showed an exceptionally fine specimen of Taniocampa populeti ab. ocularis, Frr., bred by Mr. Young, from a larva taken in the neighbourhood of Rotherham.

> Paper.

Mr. Jacoby and Mr. Champion communicated a "List of the Phytophagous Coleoptera obtained by Mr. H. H. Smith in St. Vincent, Grenada and the Grenadines, with descriptions of new species," the Crioceridæe and Galerucidæ being dealt with by Mr. Jacoby, the Hispidae and Cassididæ by Mr. Champion. The paper was in continuation of those contributed by Messrs. Gahan and Champion and by Prof. Williston on the insects collected in these islands under the auspices of the West India Exploration Committee of the Royal Society and British Association. Forty-six species, of which twentyone were new, were enumerated in the first two families, and seven species in the last two families.

## March 3rd, 1897.

Mr. R. Trinen, F.R.S., President, in the Chair.
Election of Fellows.
Mr. George W. Bird, of the Manor House, West Wickham, Kent ; Mr. Alfred H. Martineau, of Solihull, Warwickshire ; Mr. Hubert C. Phillips, M.R.C.S., of 83, Shirland Gardens, W.; Mr. William A. Vice, M.B., of 5, Belvoir Street, Leicester ; and Mr. Colbran J.Wainwright, of 147, Hall Road, Handsworth, Birmingham, were elected Fellows of the Society.

> Exhibitions, etc.

The Secretary announced that the Committee appointed to consider the question of the protection of British insects in danger of extermination, had unanimously resolved that it was desirable to form an Association, the members of which should agree to discourage, by their own example and by their influence, the excessive collecting of all those species
of Lepidoptera which from their habits appeared to be in danger of extermination; that this resolution had received the approval of the Council, who would refer the matter back to the Committee, in order that definite proposals for the formation of such an Association might be drafted, and it was hoped to lay these prcposals before the Society for discussion upon April 7th.

Mr. Champion exhibited, on behalf of Messrs. Godman and Salvin, a portion of the Elateridæ, and the Cebrionidæ and Phipidoceridæ recently worked out by him in the "Biologia Centrali-Americana." The Elateridie included 531, the Cebrionidæ 29, and the Rhipidoceridæ 14 species, a large proportion of which were described as new. He stated that his labours had been much facilitated by the free access to the very extensive collection of Elateridæ formed by the late E. W. Janson, and by the loan of many types from Dr. Candèze, who had lent valuable aid. He called attention to the excessive rarity of the males in the Elaterid genera Chalcolepidius and Semiotus (the contrary being the case in the genus Scaptolenus of the Cebrionidæ, and also in many Elateridæ), and to the fact that the sexual characters of Semiotus had been misunderstood, the supposed males being really females. In the "fire-flies," Pyrophorus, a genus containing a large number of extremely closely-allied forms, important specific characters were detected in the genitalia of the males. One species, Meristhus scobinula, Cand., was common to Central America and China.

He also exhibited a specimen of E'ulectus giraudi, Redt, found by himself at Mendel, in the Austrian Tyrol, in July last. This is a rare European species of Staphylinidæ, a black variety of which ( $E$. whitei, Sharp) had once been found in Scotland, on the summit of Ben-a-Bhuird.

Mr. Jacoby showed a Halticid beetle, taken in Mashunaland by Mr. G. A. K. Marshall, and remarkable for a prolongation of the hind tibia beyond the tarsal articulation into a very long serrated process.

Mr. Elwes showed a series of Papilionidæ of the Machaon group, from North America, including $P$. machaon and $P$. orejonia from British Columbia, P. brucei, P. bairdii, and
P. zolicaon from Glenwood Springs, Colorado, and the latter species from British Columbia. He stated that there was a tolerably complete gradation from $\Gamma$. oreyonia ( $=$ machaon) through $I^{\prime}$. brucei to $P$. aolicuon, that none of the characters which had been relied on for separation were of real value, and that the structure of the genitalia afforded no assistance. Although $I^{\prime}$. bairdii appeared to be very distinct in appearance and habits, it was associated with the other forms in Colorado, and Mr. W. H. Edwards stated that he had bred both $l^{\prime}$. bairdii and $I^{\prime}$. orefonia from eggs of the same female of either of the two forms.

The working-out of the synonymy and specific differences (if any such existed) between the N. American Papilios of this group was one of the most difficult problems offered by the Butterflies, and one which was well deserving of an exhaustive study.

Mr. J. J. Walker mentioned that he had bred $P$. allicaon from larve found on Sium, at Esquimault, Vancouver Is., and that neither larva nor pupa was distinguishable from that of $P$. machaon.

## Papers.

Mr. O. H. Latter read a paper on "The prothozacic gland of Dicranura cinula, and other notes," in continuation of his previous communications on the subject. A fresh use of the formic acid secreted by the larva was described; it was employed to alter the silk secreted in spinning the cocoon, in order to convert it into the well-known horny mass. If the acid was prevented from acting, as by supplying the larve with bits of blotting paper soaked in an alkali to be utilised in making the cocoon, the silk thus protected from the action of the acid retained its usual fibrous structure.

Prof. Meldola spoke in appreciation of Mr. Latter's work on this larva, which he characterised as being physiologically one of the most remarkable insects known. The most singular feature which Mr. Latter had discovered was its power of secreting free potassium hydrate, and it was of great importance to ascertain if possible the metabo'ic processes whereby this was effected.

Sir George Hampson communicated a paper on "The Classification of two subfamilies of Moths of the Family Pyralidæ-the Hydrocampince and Scopariance."

## March 17th, 1897.

Mr. Roland Trimen, F.R.S., President, in the Chair. Election of a Fellow.
Mr. Henry Hague, care of the Clydesdale Bank, 30, Lombard Street, E.C., was elected a Fellow of the Society.

Exhibitions, etc.
The Secretary read the following letter addressed to the President by the President of the Royal Society :-

> " Royal Society, Burlington House, " London, W.
> " February 22nd, 1897.
"Sir,-Upon the invitation of the President and Council of the Royal Society, the Presidents of scientific Societies in London met the President and Officers of the Society on February 9 th to consider whether any, and, if so, what, steps should be taken on the part of men of science to commemorate the present 60th year of the reign of Her Gracious Majesty the Queen, a period so rich in scientific discoveries. At that meeting, which was a very representative one, it was unanimously resolved :-
"That a fund, to be called the Victoria Research Fund, be established, to be administered by representatives of the various scientific Societies, for the encouragement of research in all branches of science.
" To raise a Fund of such a kind worthy of the occasion, the active co-operation of all the scientific Societies of the Empire is imperatively necessary; for the Fund, to be so worthy, must be a very large one.
"It is not to be expected that scientific Societies would in general contribute out of their corporate funds, though some might be willing to do so; but rather that the several Societies should exert themselves to collect subscriptions to the Fund.
"Nor is it to be expected that men of science would themselves furnish the required sum. It is to be hoped that they would contribute so far as each felt able. But the chief gifts are to be looked for from the public, from these who are not themselves engaged in scientific inquiry, and especially perhaps from those whose wealth has been the direct or indirect result of the scientific progress of the Victorian era.
"So many demands are at the present moment being made in so many ways upon the purse for the purpose of commemorating the present year, that it may be worth while to point out that, the object of the proposed Victoria Fund being a lasting one, it is not necessary that the whole Fund should be raised at once. The Fund once established might be increased by subsequent additions, and contributions might be spread over many years, or might not be called in until some future time, so that the burden in the present year might be lightened.
"It is proposed that the income of the Victoria Fund should be applied to the advancement of all branches of science in all parts of the British Empire. Should therefore the project of the Fund be approved, and the Fund established, its administration will necessitate an organization, the details of which will need most careful consideration in order that the Fund may be used in the best way in all future times; but such details may be left for the present.
"Meanwhile, the first step to be taken is to ascertain whether the proposal meets with such general acceptance among men of science as to justify the President and Council in proceeding further in the matter.
"I have therefore been requested by my Council to ask you to be so good as to bring the subject before your Society at your earliest convenience, in order to ascertain whether the proposal is approved or not, and at the same time to give the Royal Society the benefit of the advice of your Scciety upon the whole matter.-I am, faithfully yours,

> (Signed) "Lister,
> " President of the Royal Society.
> " To the President of the Entomological Society."

proc. ent. soc. lond., il., 1897.

It was moved by Mr. Merrifield, seconded by Mr. Tutt, and unanimously agreed to " That this Society approves generally of the proposals contained in the letter from the President of the Royal Society of the 22nd February, 1897, for establishing the 'Victoria Research Fund.' "

Mr. Butterfield, present as a visitor, exhibited a series of 33 male and 6 female I'hi!ylia peduria, taken near Bradford, Yorkshire, on Feb. 14-17, 1897.

21 males were typical in having a greater or less development of the four transverse bars. The remaining 12 were without bands, and varied in colour from black to a smoky olive ; they were decidedly less in point of size, ranging from $1 \frac{5}{12} \mathrm{in}$. to $1_{1 \frac{7}{12}} \mathrm{in}$., as against $1_{1 \frac{7}{12}} \mathrm{in}$. to $1_{1 \frac{1}{2}} \mathrm{in}$. in the banded forms, and were also poorer in scales and slightly deformed. He had only met with this variety once before in the last twenty years, and suggested that the eruption of small, black, and depauperized forms might have been produced by dryness and want of food in the larval conditions, the trees having been extensively defoliated in the preceding year. These dark forms appeared in the first emergence of the species.

Mr. Tutt agreed with this view, in the course of the subse $_{1}$ uent discussion. Mr. Porritt said that the melanic variety had occurred to his knowledge for several years in the Bradford district, in some years 8 per cent. of the specimens being of this variety, whereas in the present year only 4 per cant. were melanic ; similar varieties, e.g., in $A$. betularia, showed no signs of depauperisation.

Mr. Kirkaldy exhibited an example of the rare macropterous form of Velia currens, Fabr., taken by Mr. Burr at East Grinstead, and one of Cicadetta montana, Scop., from Brockenhurst.

Mr. Burr exhibited a series of grasshoppers with red and blue hindwings of the family Edipodidæ, to show the remarkable variation in colour seen in this group; and read the following notes :-
"The few specimens exhibited are intended to show the peculiar coloration of the hindwings which is found in certain Edipodida. The remarkable colour-rariations, however,
which occur throughout the family can only be fully seen by means of a longer series. The first two species, Psophus stridulus, Linn., from Savoy and an undetermined species from the United States show red lindwings, of which the colour does not vary to any great extent. The third species, (Eidipold miniata, Pall., from Italy, has two forms, one, the type-form, red wings as shown here, the other blue. The latter is due to a failure of the pigment and is therefore a form of albinism, as Brumer has suggested. The first bluewinged species exhibited is the common 'langoute,' or (Ledipoda carulescens, Linn., which is normally blue. There is, however, a yellow form, var. sulfurescens, found in Algeria, of which a specimen is shown. It is a curious thing that this yellow form is never found in Europe, where the blue form is abundant; its existence is also due to a failure of pigmentation, produci, g albinism, which here takes the form of an insipid yellow colour, whereas albinism in (E. miniata converts the red colour into a blue. The synonymy of these two species is very confused as the different colour-varicties were regarded as distinct species. Later they were all united into a single species until Brunner in his 'Prodromus der europaïschen Orthopteren' succeeded in seprating them on structural characters. Together with the yellow form a fine species, (Edipoda fuscocincta, Luc., of which a specimen is shown, is found in Algeria.
" In Celes variabilis, Pall., of which I have no specimen here for exhibition, no less than three colour-varieties of the lindwings are found, red, blue (more or less faint) and quite colourless. The blue species from America affords a striking example of another variation that is ccmmon in the species of this group, in the position of the black band or fascia on the lindwings. This form of variation seems to be dependent on geographical circumstances. According to Brumner, in the specimens of CEdipodide from the Northern Pyrenees and from the Jura and the Northern Alps, i.e., Alpine forms, the whole of the apex of the wings is black: in specimens from Central Europe the black band reashes the outside edge of the wing at the second sinus, while in the southern specimens, i.e., from southern Dalmativ or Greecs, the band fi:st reaches the edge
of the wing at the fourth or fifth sinus. Here we have a transition towards Edipoda gratiosa, Serv, and $\boldsymbol{E}$. charpentieri, Fieb., in which the band is entirely within the wing and never reaches the edge. A specimen of a red CE. gratiosa, from Ephesus, is shown.
"In Bryodema tuberculata, Fabr., from Mongolia, a curious form of venation is seen, some of the veins being greatly thickened in the genus. The species is different in habits from the majority of the Orthoptera, being a very high and sustained flyer, and ascending in the air until it is almost lost to sight. In flying, like certain other insects of this order, it produces a continual buzz with a metallic sound, especially in the male."

## Papers.

Mr. Champion communicated a paper on the Elateridæ and Rhipidoceridæ collected by Mr. H. H. Smith at St. Vincent, Grenada, and the Grenadines, and exhibited the specimens.

Dr. Forel also communicated a paper on the Formicidæ collected by Mr. Smith in the same islands.

## April 7th, 1897.

## Mr. Roland Trimen, F.R.S., President, in the Chair.

## Exhilitions, etc.

The following Memorandum of an Association for the Protection of Insects in danger of extermination, which had been drawn up by a Committee appointed for the purpose and approved by the Council, was laid before the Society and signed generally by those present: "We, the undersigned, being desirous of protecting from extermination those rare and local species of Insects which are not injurious to Agriculture nor to Manufactures, do bereby agree, by our own example and by the exercise of our influence over others, to discourage the excessive collection and destruction of those species of Insects which from their peculiar habits are in danger of extermination in the United Kingdom.
"We further agree to accept for the purposes of this

Association such list of species in need of protection as shall be drawn up and, if necessary, from time to time amended by the Committee of the Entomological Society of London appointed to that end."

The draft of alterations and additions to the Society's Byelaws, recommended for adoption by the Council, in accorr'ance with a notice received under the provisions of Chap. XXJ. of the Society's Bye-Laws, and signed by the following Fellows: Sir George Hampson, Bart., Messrs. R. McLachlan, F.R.S., F. Merrifield, W. F. H. Blandford, G. C. Champion, Herbert Goss, Martin Jacoby, and J. W. Tutt, was read for the first time.

Mr. McLachlan showed, on behalf of Mr. Gerald Strickland, a magnified photograph of 1irachycerus apterus, obtained by direct enlargement in the camera, and extremely clear in definition and detail.

Mr. Tutt exhibited some of the silk used by Tephrosia bistortata to cover its ova. His attention was first drawn to it by Mr. T. Baty, but directly afterwards the slide containing the silk was received from Dr. Riding, who stated that the silk was contained in a pouch at the extremity of the abdomen, between the upper part and sides of the vaginal sheath and the abdominal walls, being packed in the form of dense bundles about 2 mm . long, and resembling in miniature locks of wavy flaxen hair. A detailed account of the working of the ovipositor and the placing of the silk was given by Dr. Riding (Ent. Rec., ix., No. 5). The importance of the discovery lay more particularly in the suggestion it afforded, that the material with which several Lasiocampids and Liparids covered their eggs, which had often been described as consisting of scales from the anal segment, might most probably prove to be analogous with that described by Dr. Riding, and to be secreted in the same way. The presence of such glands had hitherto not been suspected in the imago. Attention was drawn to the very different appearance presented by the material used to cover the eggs in such species as Porthesia similis and Leucoma salicis, the saliva-like appearance of the egg-covering in the latter species being very remarkable.

## Papers.

Papers were communicated by Prof. Miall, F.R.S., on "The Structure and Life-history of Phalacrocera whlicata," and by Messrs. Godman, F.R.S., and Salvin, F.R.S., on " New Species of Central and South American Rhopalocera."

May 5th, 1897.
Mr. Roland Trimen, F.R.S., President, in the Chair.
Election of a Fellor.
Mr. C. H. Peers, of Harrow Weald, was elected a Fellow of the Society.

Fxhibitions, etc.
The draft of alterations to the Society's Bye-Laws was read a second time.

Mr. J. J. Walker exhibited an earwig, Apterygita arachidis, Yersin, of wide distribution, but new to Britain and recently found in large numbers in chemical works at Queenborough. It had been probably imported among bones. Mr. Burr also showed a complete series of the British species of Forficulidæ. Of these, Chelisoches morio, Fabr., was an Oriental species, very widely distributed over the Pacific Islands, Malay Archipelago, Burmah, Ceylon, Mauritius, etc. It had been taken at Kiew Gardens, having been imported from Mauritius in sugar-cane.

Mr. Enock showed eggs of Stenopsocus cruciatus, L., laid on ivy in the autumn of 1896, and containing larvè of Alapitus fusculus, Hal. The first male parasite emerged on May 4th, 1897, and was of a somewhat different character from the rest; he thought it would probably prove to be Alaptus minimus, Hal. The males remained under the Psocid's web until the females emerged, when pairing took place immediately, the males dying soon afterwards.

Mr. Merrifield exhibited some further results of temperature experiments on pupæ of Pieris daplidice from eggs obtained at Hyères in March. Four were forced at $70^{\circ}$ to $80^{\circ}$ F., emerging in seventeen to eighteen days; all were
of the ordinary summer type. Seven others cooled at about $52^{\circ} \mathrm{F}$. for from five to six weeks, and then at normal outdoor temperature, where they were from five to eight weeks before emerging, were all of the spring form bellidice. A Colias edusa pupa cooled for four weeks had the ordinary markings ill-defined and the black discal spot much reduced. Of two Melitca didyma forced at $94^{\circ} \mathrm{F}$. and emerging in five to six days, one a male, was abnormally fiery in colour, and two that were cooled at about $51^{\circ} \mathrm{F}$. for four weeks, had a great extension of the black markings on the undersides of the hindwings. Some Saturnia carpini, from North Italy, forced in the late winter and early spring were much paler, ruddier, and less richly marked than those kept out of doors. A number of fresh pupæ and larvæ of Vanessa urtica, var. polaris, from Lapland, kindly brought by Dr. Chapman and Mr. W. E. Nicholson, were subjected to the usual different temperatures, from about $102^{\circ} \mathrm{F}$. to $34^{\circ} \mathrm{F}$., and exhibited a wide range of effects, but not so wide as those from Central Europe. S. carpini is interesting as one of the few winter pupæ which have been found to be affected. The others previously recorded by him were Drepana falcataria, the three Selenias found in England, and Zonosoma punctaria. Mr. Merrifield had not found time to work out all his results, but he thought the changes produced by temperature were mainly of three kinds, viz.: (1) General change, often striking, in the colouring, without material alteration in the pattern or form of the markings, but often with much enhancement or diminution in their intensity; (2) change caused by the substitution of scales of a different colour, either singly and generally distributed so as to be scattered, or so grouped as to cause a material change in pattern; (3) change in general appaarance, caused by imperfection in the development of scales or of their pigment. No. 1 seemed a direct effect of temperature not affecting vigorous development. Under No. 2 were to be ranged the most radical changes in pattern (as in the extreme case of Araschnia levana-prorsa, which had been explained on the theory of reversion to an earlier form). In No. 3 the wings were often somewhat reduced in size, the scales were scanty,
irregularly placed, and often misshapen and deficient in pigment, the membrane of the wing showing between them, so as to give the insect a shining "greasy" appearance. Of course the three were more or less combined in many cases. Also he thought that in general the principal changes were produced along the margins and at the base and apex, and often along the nervures of the wings; perhaps there was some connexion between this and the fact ascertained and lately published by Mr. Mayer, that these were the parts of the wings in which the pigment was the last to develop. In conclusion, he called attention to the experiments of Mr. E. Fischer, of Zürich, and particularly to the considerable effect caused by brief exposure to a very low temperature, one gradually reduced from about $20^{\circ} \mathrm{C}$. $\left(68^{\circ} \mathrm{F}\right.$.) to $2^{\circ} \mathrm{C}$. ( 28.4 F .), where pupæ of I. urtica were kept for brief periods, causing more than half of the butterflies from them to be materially changed in appearance.

Mr. Tutt exhibited a long series of insects, including specimens of Ascalaphus, collected by Dr. Chapman at Cannes during March, and by himself at Digne during April, 1897, and remarkable for their early emergence.

## Paper, Exhibitions, and Discussion on Mimicry.

Dr. Dixey read a paper on "Mimetic Attraction." He began by pointing out with the aid of diagrams that the process of mimetic assimilation might start from a given point and proceed along several divergent paths. For example, from an ordinary non-mimetic form of neotropical Pieris, such as Pieris pherloe, not one only but several divergent series of mimetic modifications could be traced; each passing through a graduated series of closely-allied forms until it terminated in a Pueris or Mylothris bearing a more or less intimate relation with some protected form or forms of entirely different affinities. Such were the series leading through $P$. calydonia to $P$. demophile $\circ$, a mimic of Aeria agna; the series starting from $I^{\prime}$. demophile and passing into forms such as $I$. lucusta $\circ$, which was in mimetic relation-
ship with Heliconius atthis; the series represented by P.par.dosia and I. leptalina, which approached Napeogenes inachia; the series dealt with in a previous communication (Trans. Ent. Soc. Lond., 1896, pp. 65-79), which led up to forms associated with Heliconius numata; and lastly, a series derived from the one last-mentioned, which ended in Mylothris alethina $\circ$, a mimic of Tithorea tarracina.

In all these instances, the model towards which the series tended did not present an isolated scheme of colour, but was a member of a larger or smaller group of forms, associated in external features; such as were shown in the series to be exhibited by Mr. Blandford. These mimetic groups were no doubt mainly of the "Müllerian" kind, that is, they were associations between inedible species of various affinities. Reasons were given for attributing great importance to the operation of the Müllerian principle in producing such a facies as that of the neotropical fauna, and for assigning to Batesian mimicry a comparatively subordinate position. Stress was laid on the facts (1) that Batesian mimicry could exist only when the numbers of the mimic were insignificant compared with those of the model, whilst a Müllerian group was strengthened by every fresh accession; and (2) that the attractive power in Batesian mimicry acted only from the model towards the mimic, whereas in Müllerian association it was mutual, and tended to produce reciprocal changes. For this mutual modification of characters the term "reciprocal mimicry" was suggested. A relation of the latter kind appeared to exist, e.!., between Pirris locusta むे and Heliconius cydno, and it must therefore be concluded that the Pierid was inedible, a conclusion previously reached in the case of other Pieridæ on more than one kind of evidence. A consequence of the keen competition for life in such a region as the neotropical was that scarcely any conspicuous form was completely isolated. If edible, it would generally be a Batesian mimic; if nauseous, it would be drawn into the vortex of one of the great Müllerian groups. The force exerted by these latter was well exemplified by the facts dwelt upon at the beginning of the paper, which showed the steps by which the members of a single genus such as l'ieris, and sometimes even the sexes of a
single species such as $P$. locusta were drawn apart into more or less intimate relationships with separate Müllerian groups.

Mr Blandford then exhibited and described the series of Neotropical butterflies from the Godman-Salvin collection, which were shown by him on a previous occasion (Proc. Ent. Soc. Lond., 1896, p. xxxviii.) ; he stated that he used the term "homœochromatism," originally employed in the "Biologia Centrali-Americana," in preference to Dr. Dixey's term "reciprocal mimicry," to denote the phenomenon exhibited by " Müllerian " groups, because it gave a sufficient indication of its nature without assuming any theoretical consideration as to its origin. The series shown were :-

## I. Hcmeochronitism between Patred Species of the same Genus.

| Heliconius yalanthus and H. luce. | Guatemala. |  |
| :--- | :--- | :--- |
| H. chioneus | and $H$. sapphn. | Panama. |
| H. cylno | and $H$. eleuchia. | Colombia. |
| H. clithea | and H. primularis. | Ecuador. |

Each pair was closely alike on the upper-side; the undersides were different, there being common types for the righthand and left-hand members of the pairs respectively. There was also a progressive modification in the patterns of the upper-side in proceeding from North to South.
II. Homeochromatism between Paired Species of different Genera.

Tithorea hiemboldti and Helicomius cassandra. Colombia. Tithorea candollei and Heliconius sp. Antioquia. (with these associated Epicalia chromis, \&). Tithorea bonplandi and Heliconius hecuba. Colombia. Tithorea paronii and Heliconius atthis Ecuador. (with these associated Pieris locusta, of).
III. Geographical modifications of Homeochronatic Species of the samie Genus.
Heliconius thelxiope and H. vesta.
a. Parallel varieties of both species in Cayenne, inosculating with $H$. melpomene at one end of the series,
and extending to typical $H$. thelxiope and $H$. vesta at the other end ; the varieties occuring without reference to geographical distribution.
$b$. Fixed geographical paired races of both species from British Guiana, Lower Amazons (Para), Upper Amazons (Pebas), Ecuador and Bolivia, and accompained in the first three localities by homœochromatic races of $H$. aede.
c. Intermediate forms connecting $H$. resta with $H$. plyylis in Bolivia.
IV. Extensive Homeochronatic (Müllerian) Groups.*

1. North Central-American Type.-Guatemala to Nicaragua.
Lycorea ateryatis. Heliconius telchinia.

Melinea imitatu. Eueiles zorcaon.
Tithorea sp. Eresia philyra.
Mechanitis doryssu: Protogonius cecrops.
Ceratinia dionca. Dismorphia praxinoe.
C. fenestella. Mylothris malenka.

Intermediate between Groups 1 and 2.
Melinca scylax.
Heliconius clarescens.
Mechanitis lycidice.
Napeoyenes tolosa.
Ithomia heraldica.
2. South Central-American Type.-Costa Rica to Panama.

Thyridia melantho.
Tithorea helicaon. T. duemna. T. pinthias. Mechanitis isthmin. Ceratinia decumana.
C. callispila.

Napeogenes tolosa.

Heliconius auleika.
H. formosus.

Eueides rulyiformis.
Eresia nimripennis.
E. peeillina.

Anca jansoni, ${ }^{\text {of }}$
Ithomeis imitatrix.
Archonias lyceas, ㅇ.

* The genera in the left-hand columns of the list, except Lycorea, a true Danaid, belong entirely to the Heliconioid Danainæ (Neotropinæ). Of those in the right-hand columns, Heliconius and Eueides belong to the Heliconiinæ: Eresia, Ancea and Protogonius to the Nymphalinæ ; Archonias, Mylothris and Dismorphia to the Pierinæ; and Ithomeis to the Erycinidæ.

Dircenna relata． Callithomia hezia． Hyposcada adelphina． Peronymia notilla． Hypoleria libera．

Dismorphia deione，$甲$ ．
D．sororna，$甲$ ．
Mylothris malenka，$\uparrow$ ．
Papilio zalates．

Colombian modification of 2 ．
Tithorea hecalesina．
Napeoyenes peridia． l＇teronymia picta．

Heliconius hecalesia．
Eresia ithomioides．
Anca panariste，子．
3．East Brazilian Type．
（a．）The apical spots on the forewing yellow．

Lyyorea halia．
Melinesa ethra．
Tithorea sp．
Mechunitis nesica．
Napeoyenes ranthone．
Ceratinia laphria．

Heliconius dryalus． E＇ueides dianasa．
Eresia esora．
Eresia sp．
Dismorphia astyonome．
（b．）The apical spots on the forewing white． Mechanitis lysimnia．Heliconius narcera． Napeoyenes euryanassa． Ceratinia llacta．

4．Guiana Type．
Lycorea ceres．Heliconius numata．
Melináa meme．
Tithorea harmonia．
Mechanitis polymnia． Ceratinia philidas．

5．Upper Amazons．
（1．Ega Type．
Lycorea cinnamomeana．Heliconius pardalinus．
Melinaa pardalis．Protogonius castaneus．
Tithorea harmonia．Insmorphia egeana．
Mechanitis egaensis． Ceratinia fluonia．
b. São Paulo Type.

Lycorea cinnamomeana. Heliconius isabellinus.
Melincea cydon.
Mechanitis olicencius. Ceratinia tigrina.

## c. Lower Rio Napo Type.

## Melinea sp .

Mechanitis sp.
Callithomia sp.
Ceratinia sp.

Heliconius sp.
Eueides sp.
Eresia sp.
6. Ecuador Type.

Melinca cydippe.
Mechanitis mothone.
Ceratinia semifulca.
Napeofenes sp .

Heliconius aristiona. Eueides acacetes. Acrea acipha.
Eresia ithomiola. Protogonius semifulrus. Papilio bacchus.
7. Central Colombian modification of 6.

Melinaa messenina. Heliconius messene.
Mechanitis menophilus.
Napeogenes sp.

The greater part of these groups, which also contained a few moths belonging chiefly to the genus Pericopis, consisted of species of the Heliconioid Danainæ or, as they had been recently called, Neotropinæ; one or more species of Heliconiidæ were constantly present, and the associated forms of iteliconius might conveniently be regarded as representatives of the respective colour-types. A few Nymphalinæ, Pierinæ, l'apilioninæ, and in one case an Erycinid, had been drawn into the vortex. The colour-types which they represented ere so far diagnostic of the geographical distribution that i) strange specimen belonging to one or other of these groups, which were a few only out of many such that could be put agether, could be unhesitatingly assigned by its facies to its
original habitat in Tropical America.* But whereas certain groups, such as $1,2,3$, and 4 , were of extensive geographical range, others, such as the Ega group, 5a, with its peculiar suffused brown coloration, or the Rio Napo group, 5 c, were restricted to a comparatively small area. This was intelligible in the Andean region, where every valley had its own special set of forms and where isolation played the same part as in thie evolution of insular faunas, but, as Bates had pointed out, it was a very remarkable phenomenon in the Amazon valley, throughout which the physical conditions were very uniform. He did not propose to dispute either of the thoories of mimicry which were associated with the names of Bates and Müller, but they rested very largely on hypothesis and were in want of further support from observation and experiment, which would afford a large if arduous field of work to the enterprising naturalist; the difficulties of the subject did not appear to him to be fully overcome by these theories, which should not be pushed so far as to lead to the disregard of other factors which might have influenced the genesis of these groups. One difficulty was that of distribution. As before mentioned, the groups of the Upper Amazon valley were often of limited range ; but if they were genetically connected and the conditions of their enviromment were constant, the causes which brought about association under a common type, if prohibiting deviation therefrom under penalty of destruction, should have operated to extend the limits of a group as widely as possible by acting as a check to variation on its outskirts. If it were assumed that one form were so far dominant as to drag its associates with it in any given direction, it must be also recollected that the principle on which these large "Müllerian" associations were supposed to be based was prohibitive to variation of any component species, either as a whole, or in any part of the

[^46]range of the system. The logical tendency of such a group would be to extend its limits indefinitely and not to give rise to repeated changes of the colour-type.

Another difficulty was presented by the very close resemblance, at times amounting to identity in external characters, between certain pairs in these groups, a resemblance to which Brunner's epithet, "hypertelic" might be applied. Existing theories postulated a selective elimination by insectivorous birds, etc.; but the birds' discrimination of members of a "Müllerian," i.e., protected group must be in relation to its distinctness from the other insects co-existing in the same region. If, as was frequently the case, such a group was immediately recognisable by its broad features as protected and inedible, such further discrimination between its members as would be necessary to bring about the intimate likeness found, e.g., between many species of Melinua and Heliconius was not adequately accounted for by Müller's hypothesis.

With regard to "convergence," which had been put forward as a necessary phenomenon in Müllerian mimicry, the possibility of parallel variation ought not to be excluded. To take the case of $H$. thelxiope and $H$. vesta, the "typical" forms might be assumed, $+x$ hypothesi, to be the most ancestral, and to have acquired their common resemblance by convergence; but from these forms' were derived, as the series exhibited showed, a number of paired varieties which were progressively modified in relation to their distribution. There was nothing to show that either species had been influenced in its variation by the other, and that it would not have followed the same course if it had been isolated. And it was conceivable that the causes, in most cases unknown, which brought about modifications in the colour and markings of a species in association with its geographical range, might have produced identical results in two species of the same genus, with a common facies, under common conditions.

Prof. Poulton : He congratulated Dr. Dixey on his careful work, and on the deep interest of the results he had obtained. It was a great source of satisfaction to him that this research had been conducted in the Hope Department of the Oxford University Museum.

He then exhibited a further series of neotropical butterflies from the Godman-Salvin collection, illustrating the various members of the group which had been formed round Methona confusa, Butl., and Thyridia psidii, L. ; the best known moths (of the genera Castnia and Hyelosia) which fell into the group, were supplied by specimens from the Hope collection. This group which, as regards most of its members, had been originally described by H. W. Bates, occupied a very wide geographical area, and was of special interest, not only on account of the number of forms which entered into it, but also because of the perfection of the resemblance.

Further, he exhibited the smaller group which convergcs around Ituna lamira, Latr., and species of Olyras, Thyridia, etc., the specimens being selected from the Godman-Salvin collection; he also showed several groups characteristic of Honduras. Surinam, Eastern Brazil, etc., the specimens having been recently acquired by the Hope collection for the purpose of illustrating the principles of Warning Colours and Mimicry. Many of these specimens possessed the special interest that they were captured by one collector nearly at the same time, and in one locality. In fact, in the case of the Honduras insects (presented by Col. Swinhoe), examples of several different species and genera had been sent in one set of papers as a single species. Thus in the case of these groups evidence was actually forthcoming that the separate species do live together intermingled, and are liable to be confused, at any rate by a human collector.

The term "homœochromatism" was criticized on the ground that it was a mistake in science rigidly to exclude theory and interpretation. A theory might be a good guide to discovery, even if it turned out in the end to be imperfect or wrong. And in this case it was contended that the theories of Mimicry and of Warning Colours had by no means been proved to be wiong, but remained as the only hopeful interpretation of the facts.

He also objected to Dr. Dixey's phrase, "reciprocal mimicry," inasmuch as the resemblances alluded to were those of specially defended insects, and not of forms which, being themselves harmless, lived on the reputation of their
better defended neighbours, as in mimicry proper. Protective Mimicry had been defined by the speaker as "False Warning or Deceptive Warning Colours" (pseudaposematic), while, according to Dr. Dixey's contention, there was nothing false about the warning colours of the insects described.*

It was contended that the peculiar local groups, such as those of Ega and the Rio Napo do not offer any difficulty to the theory. The ordinary laws of variation continued to operate after the formation of a group, only in this case the change which so often occurs in a species with a wide geographical range, ultimately splitting it up into subspecies and true species, would draw the associated forms after it by the operation of the very principles by which the group was originally formed. If this process were sufficiently gradual no principle of Müllerian association need be violated. Or the facts might be reasonably explained in another way: the dominant (a word which here implies only the commonest and best known, in fact, the most widely advertised of the specially defended Lopidoptera of the district) form might have inhabited the region in question, and assumed its peculiar aspect before the formation of the

[^47]group, and may have then separately "converted " each newcomer as it arrived in the district. The tendency of a group was certainly, as Mr. Blandford maintained, to extend its limits indefinitely-a tendency which had operated with great success in certain cases. But the spread of species always encountered opposing forces which in many cases acted as effective barriers.

With regard to Brunner's "Hypertely," he maintained that one knew far too little of the details of the struggle for existence to justify the conclusion that it was incompetent to produce such effects. What little was known confirmed the belief that very minute differences might serve to turn the scale. The differences between extremely perfect resemblances and those which were less perfect or only very rough, were probably to be explained by the relative age of the association in the former, or the more complete and rapid operation of natural selection on account of a special reliance on this among other modes of defence possessed by the species. One was compelled to believe that every perfect resemblance began as an imperfect resemblance, and then passed through stages in which the likeness was gradually increased; and it was only to be expected that examples of all such stages should exist at the present day among the numberless forms which exhibited mimicry and common warning colours.

Gradual changes in the geographical distribution of the constituent species along the borders of groups would tend from time to time to bring certain of them within the influence of other groups, and so begin a change in another direction. Furthermore, there was no reason for concluding that the detached members of Müllerian groups must become extinct, as in the case of the Batesian or true mimic. In the presence of other dominant members of a group, any tendency towards resemblance might well be of selection value: in their absence it was by no means necessary to assume that a species, which, ex hypothesi, was specially protected in some way, must become extinct, although any further advance towards the likeness would be checked, and the ground gained in the past lost after a longer or shorter interval. To enter
the area of another group would tend towards a rapid modification of the old appearance.

The suggestion that parallel variation assisted in the formation of these resemblances was strongly opposed by the fact that the superficial characters were alone affected, and that the closeness of resemblance bore no relation to degree of affinity. For instance, the resemblance between a Melinat and a Heliconius was frequently much closer than that between the former and a Mechanitis, or the latter and an Eucides, in the same groups. Although the interesting facts brought forward by Mr. Blandford with regard to Helicomius thelxiope and H. vesta, etc., would, taken alone, seem to support his suggestion of parallel variation, yet when they were considered as part of the whole phenomena of Müllerian warning colours, as exhibited and as at present known and understood, in the Neotropical Rhopalocera, one was led to believe that one set of principles had been at work, and that natural selection, which, he contended, offered the only hopeful solution in the vast majority of cases was the true explanation of the others also.

Further strong support for this conclusion and further difficulty in the way of any other interpretation as yet offered was to be found in the similar behaviour of the groups which in other tropical countries represented the Danainæ, Nectropinæ, and Heliconiinæ of S. America. Thus unmistakable indications of Müllerian association were to be found among the Acreinr of Africa and among the Danainæ and Euplæinæ of the Oriental Region. It was impossible to contend that these representative groups possessed the monopoly of parallel variation, or of change under direct influence of the environment.

The President : In treating of the Müllerian associations of species closely resembling each other-many of which were so well illustrated by the admirably arranged series of TropicalAmerican Lepidoptera exhibited by Mr. Blandford-there was always, in his opinion, great risk, in the case of species of the same genus or even of nearly allied genera, of mistaking for mimicry the similarity really due to close affinity in blood. It also occurred to him that in these Müllerian com-
panies, where each component species is admittedly protected, some certainly and the rest presumably, by offensive and distasteful secretions, there did not apparently exist the same necessity for exact imitation as was demanded in the case of the Batesian mimicries, when the very existence of the unprotected edible individual and species depended on the closest simulation of the protected inedible form. The opinion had been expressed that in the latter cases mimicry had sometimes been carried to an exactness in minutire quite unnecessary ; but he thought that no one, who considered the life conditions under which these mimicries had been brought about-the intensity of competition, the overwhelming fertility, the complex inter-relations of organisms, so characteristic of tropical regions, could seriously conclude that these special modes of protection could by any possibility be too perfect. We might rest assured that imitations so complete as many of them are would certainly not exist if they had not become necessary.

In the discussion of these extremely interesting phenomena it was only too evident how great was the need for prolonged and continuous systematic study of the living forms in their natural environment. The collector in tropical regions, however able and enlightened, and however desirous of contributing to the elucidation of these and kindred problems, was too much hampered by the hindrances and interruptions incident to his main occupation to admit of his undertaking such a series of observations as was essential. What was wanted were liological Stations dealing with the terrestrial fauna on the lines of late so successfully followed in marine biological research.

The discussion was then adjourned till June 2.

## June 2nd, 1897.

Mr. F. Trimen, F.R.S., President, in the Chair.
The President referred to the great loss which the Society had sustained by the death of Dr. Fritz Müller, one of its Honorary Fellows, and to his distinguished services in the
cause of entomological science, and especially in forwarding the theory of the Origin of Species.

The draft of the proposed additions and amendments to the Society's Bye-Laws was read a third time.

## Erhibitions.

Dr. Chapman exhibited the young larva of Eriocephala allionella. The egg was very similar to that of E. calthclla, which he had previously figured. The larva was also closely alike but the tubercular appendages were proportionately smaller. The ova were from moths taken near Cannes. He also exhibited the skin of a female imago of IIeterogyna penella, to show the muscles, which were well developed on a larval type in both the abdominal and thoracic regions.

Mr. Jacoby exhibited a fine example of the large Hepialid, Leto venus, from Plettenberg Bay, S. Africa. The President said that the insect afforded an interesting case of localised distribution, being confined to an area of about fifty by fourteen miles, whereas the larva fed in the wood of Tiryilia capensis, a common and widely-distributed leguminous tree. The insect was rery conspicuous and could not have been overlooked in other localities.

Mr. Burr showed a pair of gynandromorphous earwigs, Chelisoches morio, Fabr., from Java, with ordinary males and females for comparison. In both specimens the right branch of the forceps was of the male, and the left branch of the female form. De Bormans had recorded a similar case in Labidura pu!nax, Kirb., from Burmah (Ann. Mus. Civ. Gen. (2), xiv., p. 377), in which also the right branch was male and the left female. In the National Collection there was a Chelisoches morio, in which the left branch was male and the right female. According to Brumner this phenomenon was not uncommon in the Forficulariidæ, but the speaker had heard of no other cases.

The Hon. Walter Rothschild exhibited a series of specimens of Eutdomonia brachyura, Drury, and E. argiphontes, Kirby, to show the differences between these two West African Saturniid moths. The distinctness of the latter species had beeu doubted, as until recently it was only
known by the unique examples in the Dublin Museum, and the three published figures of these ware materially different from each other. A comparison of the sories exhibited showed the two species to be abundantly distinct.

Mr. Kirkaldy exhibited fifty specimens of Notonecta glauca, Linn., to show the extreme range in size and colour of this species, to which the Palæarctic N. lutea, Müll., was extremely closely allied, if not conspecific with it. The distribution of N. glauca was very extensive and included practically the whole of Europe, Palæarctic Africa, Teneriffe, Western Asia, Siberia, the Himalayas, and North America, the exhibitor observing that a Brazilian species was probably an extreme variety of this insect.

## Disussion on Mimicry, etc.

The discussion on Mimicry and Homœochromatism in Butterflies, adjourned from May 5, was then resumed.

Dr. Dixey: He wished to add his voice to the chorus of approval and thanks which had greeted the very fine exhibit arranged by Mr. Blandford from the collection of Messrs. Godman and Salvin. He thought that his own views were supported by the contents of the drawers shown, and that the series of examples contained therein were, in most instances, Müllerian associations of an extensive character.

He agreed that the term "homœochromatism" had an advantage in merely denoting the facts, without reference to any theory; but he thought that Mr. Blandford ought not to restrict it, if such were his intention, to Müllerian mimicry. It was equally true that Batesian mimies were homœochromatic with the models they represented.

He was not sure whether Mr. Blandford intended his remarks about the intimate resemblance existing between certain species included in these groups to be considered as a criticism of the Müllerian theory. The course taken by any species was a resultant of the various forces acting upon it, and the perfection of a mimetic resemblance would therefore stand in relation to the facility for its acquisition which was allowed by the other forces tending to modify the external appearance.

Professor Poulton had criticised the use of the term " mimicry" in the case of Müllerian resemblances. The speaker agreed that any ambiguity between these phenomena and latesian mimicry was to be avoided, but it had not occurred to him that his use of the term "reciprocal mimicry" was open to this objection. He had also been charged with saying that Müllerian mimicry was necessarily reciprocal. Possibly he had conveyed this impression; he did not, however, intend to assert that this form of mimicry must always so demonstrably act as to produce reciprocal alterations among species associated under its influence; but merely that it exercised a constant potential force, in some oases becoming actual and capable of demonstration, towards mutual convergence, whereas in Batesian mimicry the mimic was necessarily without any such influence on the model.

He was glad to hear Professor Poulton say that he was becoming convinced by the speaker's arguments that the Pierinæ were a protected group. Hэ should not himself, however, care to assert more than that much evidence pointing to this conclusion existed in respect to many members of the subfamily-for instance, the genera Delias and Mylothris; while in some cases the evidence for inedibility was considerably strengthened by the presence of reciprocal change.

Canon Fowler: Could anyone explain the existence of th3 "predominant partner" which was assumed in the explanation given of thesa groups? He could not imagine why one species should be stable and the others unstable and dependent upon the former for their characters.

Mr. Elwes: The society was much indebted to Messrs. Godman and Salvin for the loan and to Mr. Blandford for the arrangement and exhibition of these valuable specimens. He doubted if there ware any other collection in the world from which such an exhibit as that shown could be got together. To his mind the specimens were of infinitely greater scientific value in their present arrangement than they would be if dispersed throughout a collection in their proper systematic positions.

He therefore pleaded that when the question of their being
sent to their ultimate destination, the British Museum, arose, the possibility of their being kept permanently together might be considered, and their retention in the present arrangement stipulated for. The absence of any rare or unique examples from their proper places in the collection would be more than compensated for by the increased interest which would thus be secured, and the series would serve as a model to curators of other museums in the art of making butterfly collections interesting and instructive.

He had to speak that evening without the advantage of having heard the first part of the discussion, and what he had to say was therefore based mainly on the abstract which had been furnished of it. He thought, and his opinion was formed on personal experience gained in collecting in many countries, tropical and otherwise, that there was too much assumption about sither the Batesian or Müllerian theories of mimicry. In many supposed cases he doubted whether the so-called models were protected either by taste or smell, and he thought that the importance of birds as enemies of butterflies had been overrated. It seemed to him that the protection supposed to be given to the imago was of little account in the perpetuation of the species when compared with the destruction which took place in the larval or pupal stage by climatic influence, as well as by insect and other enemies.

However beautiful these explanations of the phenomena of mimicry were in theory they ought not in most cases to be treated as proved scientific axioms. He did not deny that there might be some truth in each of the theories which had been put forward, but it appeared to him that altogether too much stress was laid on them. Had any observations been made which would justify the statement that the members of a Müllerian group were inedible, as was asserted by Dr. Dixey in his quoted remarks?

He desired to call attention again to a passage in his Presidential Address on Geographical Distribution (Trans. Ent. Soc. Lond., 1894, pp. lxv., lxvi.). He had said: "What is most remarkable is the existence, at high elevations in various parts of the Andes, and at sea level in South

Chili and Patagonia, of several genera and species elsewhere unknown in the Neotropical region, and which are isolated from their congeners in North America by an enormous area of country.
"Among these Trifurcula huanaco is a remarkable species which occurs in the Andes of Bolivia, at 16,000 to 17,000 feet, and has a marvellous likeness to Baltia shari, found at a similar elevation in Ladak.
" Phulia, a genus of three or four nearly allied species also occurring at great elevations in the Andes and Chili, has a striking resemblance to Synchloe butleri, a species which accompanies Baltia in Ladak. If similar conditions of environment do not produce similar effects, how can these extraordinary cases of resemblance in remote and disconnected areas be accounted for?"

He hoped that entomologists who resided in places where any of the supposed instances of protective mimicry occurred would pay special attention to the life-history of the species affected by it, as such observation alone could prove or disprove the question.

Mr. Verr.al : Homœochromatism was not a phenomenon confined to the tropics. Homœochromatic resemblances existed even in Europe between Diptera and Hymenoptera, and it must be assumed that they stood in relation to the protective armature of the Hymenoptera.

Col. Swinhoe : A challenge had been held out as to whether the distasteful qualities of protected Lepidoptera had been experimented on. As an example of a species, of which such qualities were placed beyond doubt, he instanced Danais chrysippus, one of the most widely-spread protected models. This insect was so free from attack, owing to its nauseous character, that the protection extended even to dried examples. These would be found untouched in a box of insects, although the remainder of its contents had been destroyed by mites or Anthreni. He did not doubt that there were many other protected Lepidoptera, including many Pierine genera-for example, all the species of Teracolus appeared to be inedible.

Mr. Jacoby: If protected and inedible species were so proc. ent. soc. lond. hil, 1897.
widely distributed, why were they not universally imitated by unprotected insects? He did not think that sufficient proof had been given of the existence of protection.

Sir George Hampson, Bart. : In his personal experience in S. India he had found that it was quite an exceptional thing to see birds catch, or even attempt to catch, butterflies, whilst it was a matter of daily occurrence to see them taking other insects, especially moths, etc., started from a position of rest. In the cases he had witnessed the Euploce and Danaidae were caught as often as any others, but usually escaped eventually from the beak of the bird and flew away none the worse owing to the toughness of the integuments.

The only bird he had observed frequently to pursue butterflies was the common Indian Bee-eater, which he had seen hawking Pieridæ, and among them Teracolus, which Col. Swinhoe had expressly referred to as a protected genus.

He thought the cause demanded by these theories was inadequate to produce the results assigned to it.

The Hon. Walter Rothschild: It had struck him that it was much more conceivable that certain climatic influences, etc., had played a part in bringing about these resemblances, and he thought that these groups assumed the same appearance because one given influence was at work on them. Such a case as that of Papilio merope, and its various representative forms inhabiting Africa (except the Palæarctic North part) and Madagascar were inexplicable by mimicry alone. This l'apilio was monomorphic in Madagascar, the female being similar to the male both in colour and form of wings, while the representative found in Abyssinia had the hindwing tailed like the male, but possessed a decidedly " mimetic " pattern. In this respect it resembled the female forms of S. and W. Africa, which were, however, tailless. He contended that these geographical forms of Papilio merope had probably sprung up under the direct influence of the external conditions of the respective areas rather than in consequence of the direct selection of specimens with a more " mimetic" pattern.

Canon Fowler: There was too much assumption about the current theories.

Mr. McLachlan : A point that appeared to him to be a good deal overlooked in this matter was the possibility that two species might go on independently and yet apparently mimic each other by arriving at the same results in their modifications.

Prof. Weldon, F.R.S.: He did not intend to enter upon the details of mimetic resemblances or upon the theories which had been put forward, but, speaking as a visitor, he would like to take the opportunity, as he did whenever an occasion presented itself, of pointing out to entomologists that the truth or falsity of these theories was capable of being tested to a large extent experimentally, and especially by experiments which would give a basis for statistical determinations.

Thus, if one took a mimetic species distributed over a large area, homœochromatic with one species in one district, and with another in another district, such a species on theoretical grounds must be variable and susceptible to a moderately rapid selective action.

In any given area, although the examples caught might conform fairly closely with a common type, the species must still be variable and capable of selection; if the theories were true there should be evidence of continued selective destruction, and this could be ascertained by experimental breeding on a large scale from eggs of wild individuals. A comparison of the examples thus reared with an equal number of wild specimens from the same locality would show whether there was any greater variability among the bred forms. Assuming that sources of error had been excluded, such a result would be good evidence of the existence of continued selection tending to ensure conformity with the model.

Mr. J. J. Walker: He was unable to believe that birds were effective agents in causing mimetic resemblances. During all his experience as a collector in different parts of the world he had never seen a bird pursue and catch a butterfly but once. On the other hand, butterflies were often eaten when at rest by lizards, small mammals and monkeys.

Col. Yerbury: During his personal experience of many years in India and Ceylon he had hardly ever seen a bird

## ( xl )

touch a butterlly. Some years ago the question was raised by the Bombay Natural History Society, and he, with others, took notes on the subject. He recorded two cases only during three years' observing. It was significant that while the flocks of locusts and white ants were attended by vertebrates of all orders, the Hocks of butterflies in Ceylon (locally known as "snowstorms") were attended by one species only of bird, and that but seldom.

In his opinion the enemies of butterflies were chiefly, if not entirely invertebrate. In Czylon two protected species, Euplea core and Delias eucharis, were largely taken by a mantis, Gonyylus !ongyloides, while two of the large Asilidæ, Promachus maculatus and Scleropogon ambryon preyed largely on Danais limnace.

Mr. Blandford : In criticizing the term " homœochromatism " Prof. Poulton had, he thought, somewhat mistaken the speaker's attitude. He had no intention whatever of excluding theoretical considerations, even if he could not accept them at their full value. But it was obviously unjust that a class of facts, about which there could be no dispute, should be labelled with a collective name implying the asceptance of a theory which, however well it might stand criticism, had certainly not yet been established. He preferred to keep one terminology for the facts and another for the explanatory theory.

The wideness of meaning which he proposed to attach to the term "homœochromatism" required soma explanation. Certainly he conceded that it covered cases of Batesian mimicry; but if generally adopted, it would probably prove convenient to give it a more restricted and conventional meaning by their exclusion: such a conventional limit had constantly to be applied in terminology. In order to keep the nomenclature of these facts independent of speculation it seemed desirable to employ the words " mimic " and " model " without reference to the questions of Batesian or Müllerian mimicry, the essential character of a " mimic " being that of a wide departure from the general type of its genus or subfamily with a resulting likeness to a model which was not, or scarcely, modified thereby; in homœochromatism, as he
desired to limit the term, and as he lhad illustrated it, no such one-sided departure was manifest.*

The President had called attention to the risk, in the case of species of the same genus, or of nearly allied genera, of mistaking for homœochromatism a similarity due to bloodrelationship. Of course, the value of resemblances had to be estimated in relation both to the range of form existing in the genera or sections of a genus involved, and to distribution; and the speaker did not admit that such a mistake had been made in respect to any single species of his exhibit. As far as his knowledge went, instances of non-mimetic homœochromatism among Neotropical butterflies were entirely confined to the Neotropinæ, Heliconiinæ, and Hesperiidæ, although other subfamilies afforded mimetic forms.

He had brought forward certain difficulties attending the current theories; Prof. Poulton's epicriticism thereon was based largely on the assumption that each group possessed some dominant form. The speaker had already pointed out that the Minllerian theory was opposed to the existence of dominant forms, and he knew of no direct evidence that such actually were present-that was, species which could so far influence a group as to compel its components to change when they changed. His objections as to geographical distribution had been met by two counter-suggestions, one of which presupposed that a series of dominant forms had preoccupied the country and had influenced the appearance of the protected species which subsequently invaded it; but one could not bring oneself to believe without strong evidence that the groups of insects concerned, the Heliconiinæ and Neotropinæ, were not coeval in distribution. Prof. Poulton's comments on "hypertely" again presupposed the

[^48]existence of a dominant form in each group, the other components of which were capable of being arranged in a descending order of resemblance to it. That was scarcely borne out by the specimens. A group such as that shown from Panama presented several hypertelic pairs and did not support the idea that the species could be arranged in degrees of adaptation towards one particular model. Whilst the facts of geographical distribution afforded, in his view, a real objection to the Müllerian theory, he did not look to distribution alone as likely to have had a considerable share in the production of these groups.* It might have had some ; but their production might conceivably be due to a variety of causes, and not one alone.

He had certainly intended his remarks on hypertely to be taken as a criticism of the Müllerian hypothesis.

However effective a destructive agency might be in producing change, directly it became non-selective, the resulting change must stop short at the point reached; and his argument was that the process of discrimination by birds, the only available agents, would be limited to the recognition of a group of associated forms as an inedible whole, and being superfluous if carried farther would not be exercised so as to bring about such minute resemblances as were often met with. As an instance, he might mention the two Brazilian groups, differing in the white or yellow colour of the apical spots of the forewing. To use a rough illustration, a person whose object was to avoid the society of a policeman would betake himself off at the first sight of the familiar uniform and would not stop to decipher such minutiæ as the distinguishing number thereon. His view was strengthened by the President's admission that in Müllerian groups there apparently did not exist the same necessity for exact imitation as was demanded in the case of Batesian mimics; it practically conceded his point.

Every one who lrad listened to the discussion must, he thought, be struck with the amount of doubt thrown on the

[^49]bird-theory by speakers whose competence and opportunities for observation were quite beyond dispute. Further important evidence on this point had been lately given by M. Piepers (Congr. Internat. Zool., III., p. 460) who had studied the question in Sumatra and Java for twenty-eight years. In that time M. Piepers had seen four cases only of butterflies, two belonging to the "protected" genus Euplea, being attacked by birds; and his paper referred to the fact that neither Pryer, after twenty years' observation in Borneo, Skertchley nor Scudder had seen or accepted such a phenomenon. M. Piepers had arrived at the sufficiently striking result that mimicry had nothing to do with Natural selection.

The premisses necessary to support either theory of Mimicry had been unduly neglected. For example, though evidence existed to show that the models were protected and inedible, the proof of the edibility of mimetic butterflies had not received enough attention ; it was necessary to Bates's theory, and all the more so since Dr. Dixey's work on the "Müllerian" character of certain Pierinæ. These theories, indeed, were really working hypotheses, the object of which was to suggest experimental work tending to prove or disprove them ; they were not yet to be put forward dogmatically as true and as convincing proofs of Natural selection. To insist that these homœochromatic groups owed their origin merely to the educational requirements of birds had led, in his view, not so much to a development as to a stifling of broad speculation on and inquiry into the problem.

The facts presented by the Ithomice (s. lat.) had scarcely been touched upon in the discussion. Almost every colourtype among these insects, however insignificant in appearance, was represented by species of two or more of the genera into which the old genus Ithomia had been divided; so that the Ithomia might be said habitually to exist as homœochromatic pairs. The coloration of many of these pairs, consisting of nothing but a few black patches and a white or yellow patch on a transparent ground was far from exhibiting the striking features which one was led to believe were characteristic of warning colours.

Personally, he was not disposed to reject Bates's theory which, even if of less general application than was commonly supposed, was strongly supported by evidence from other orders of insects, but he was not yet able to accept that which had been called by the name of Fritz Müller. What was to take the place of the latter? At present, nothing. Until more information had been collected on the habits and variation of homoochromatic species, and on selective agencies, there were no data on which a new theory could be legitimately founded. But he desired to call attention to a significant passage in Bates's original paper on Mimicry (Trans. Linn. Soc., 1861, p. 501). Bates said therein: "The process of the creation of a new species I believe to be accelerated in the Ithomice and allied genera by the strong tendency of these insects, when pairing, to select none but their exact counterparts; this also enables a number of very closely allied ones to exist together, or the representative forms to live side by side on the confines of their areas, without amalgamating." Such a statement indicated the possibility that sexual selection, or the segregation of forms might take place as a direct act of perception on the part of the insects themselves. If such a phenomenon were shown really to exist, it would remove many of the difficulties which the present theories entailed, and in view of Bates's definite and repeated statements, some proof or disproof of them should be attempted before the Müllerian theory came to be regarded as more than a merely provisional suggestion.

The President: The point had been raised by Mr. Elwes that the destruction of species in the imago stage was of little importance when compared with the much greater destruction of larver and pupe which took place. As a matter of fact, he could bear witness that certain species at any rate of Dantis and Acreea were distasteful and protected in all stages. The larve and pupæ of Danais chrysippus and of five or six species of South-African Acrote were rejected by cage-birds and common fowls; they were highly conspicuous (especially the pupe of Acroea, which are white or yellowish-white with orange and black bars and spots, and suspended indiscriminately on green leaves, dark-brown bark of trees, tarred
palings, etc.) and all gave out an odour weaker than, but of the same character as, that emitted by the perfect insects.

With respect to the term " homœochromatism," it had this disadvantage, that it was at once too wide and too restrictedtoo wide, because it did not exclude cases of resemblance due to mere relationship, and too restricted, because it left out of sight the similarity in shape of wings or body, or of movement and habit which often made up part of a mimetic likeness.

He did not agree with Mr. Rothschild as to the case of Papilio merope, considering that cases in which the of alone was exactly modified in imitation of a protected form (or, as in the instance under notice, of three or four differing protected forms) were, by reason of the extraordinary contrast with the unmodified $\delta$, more striking and unmistakable instances of obvious and indisputable mimicry than even those in which both sexes were similarly modified. As regards the Abyssinian representative of $P$.merope named $P$. antinorii, which until recently was thought like the Madagascar and Comoro representatives ( $P$. meriones and $P$. lumbloti) to have the sexes alike, without any mimetic modification of the $q$, Prof. Kheil had described and figured in 1890 two forms of the $q$ (collected, with seven $\delta \delta \delta$ and two of of coloured like the $\delta^{*}$, at Lake Tana by the late Dr. A. Stecker) respectively closely imitative of D. chrysippus and Amauris niavius, but still retaining the conspicuous tails on the hindwings which all the other known forms of of of the allied species on the African continent have lost. There, it seemed to him, was a most interesting and conclusive case of mimetic modification still actually in progress, the of usually resembling the $₫$ in both colouring and pattern as well as in outline of wings, but also presenting two other forms, each profoundly modified in simulation of a protected Danaine butterfly, yet an incomplete mimicker in so far that the tailed outline of the hindwings remained unaltered.

He must admit that the capture by birds of butterflies was rare, but he had himself seen birds, especially the Drongo shrike, chasing butterflies.

Mr. Mansel Weale had recorded his having witnessed the capture of the o Papilio cenea (the S. African representative of $P$. merope) by the Fly-catcher, Tchitrea cristata; and Mr. T. Ayres has observed that the small King-hunter, Ispidina natalensis, fed almost entirely on butterflies.

The larger Madagascar Chameleons also ate butterflies, but appeared to show no discrimination. Lizards attacked them, but must necessarily see the undersides only, which were protectively coloured in many cases.

As regarded the known protected butterflies, it should be borne in mind that there was very little difference in colouring and pattern between the two surfaces of the wings in the Danaince and Acraince, so that warning indications of distastefulness were shown almost as conspicuously when at rest as when in flight. The importance of this as a means of protection was manifest, and was further evidenced by the fact that it was exhibiied very markedly by the mimicking forms as well.

The chief invertebrate enemies he had noticed were Asilidæ and dragon-flies.

It seemed to him impossible to explain except by the theory of mimicry such cases as that of Danais chirysipmus, a widely distributed and very common insect which was attended by a troop of mimetic species wherever it went.

Dr. Dixey: It was too late to deal fully with all the points which had been raised, and he must necessarily leave some unanswered for that reason, and not because he undervalued their importance.

He agreed with Canon Fowler as to the danger of making too much assumption upon a matter such as mimicry-it was a subject upon which he had no desire to dogmatise. His position was rather this :-Supposing the theory that stich and such forms were inedible seemed to supply a provisional explanation of observed facts, it was desirable to work out fully the logical consequences of such a theory, and then to make a fresh appeal to observers for verification.

Mr. Elwes had laid stress on the importance of getting more observations from naturalists resident in the country
where these phenomena existed; with that the speaker fully agreed.

With respect to Mr. Elwes's question as to the reason for concluding that the various members of a "Mïllerian" group were inedible; that was an inference which was drawn from several data, in some instances resting on direct observation, in others depending mainly on the accordance of the characters exhibited with the logical requirements of the theory. Cases of the latter kind awaited verification.

The suggestion made by Mr. Rothschild with regard to the similar results produced by a similar environment did not remove the difficulty ; for these effects were not uniform, and even closely allied species inhabiting the same region might differ widely in aspect.

## Special Meeting.

At the close of the discussion, the meeting was resolved into a Special Meeting for the purpose of considering the proposed amendments and additions to the Society's ByeLaws.

It was moved by Mr. Tutt, seconded by Mr. McLachlan, and unanimously carried, that the proposed amendments and additions as read at the meetings and contained in the Schedule circulated among the Society, be put to the vote collectively.

On the motion of Mr. Merrifield, seconded by Dr. Dixey, it was unanimously agreed that the said amendments, etc., should be adopted, and that the Bye-Laws as amended should be the Bye-Laws of the Society.

## October 6th, 1897.

The Rev. Cavon Fowler, F.L.S., Vice-President, in the Chair.

## Election of Fellovs.

Mr. W. H. Bennett, of 15 , Wellington Place, Hastings, and Mr. B. Tomlin, of 59, Liverpool Road, Chester, were elected Fellows of the Society.

Exhibitions.
Mr. Merrifield exhibited specimens of Aporia cratrefi, the pupæ of which had been subjected to high and low temperatures. In the former case the effect was slight, possibly the temperature up to $100^{\circ} \mathrm{F}$. had not been as high as they would bear, in the latter case the spreading and darkening of the dark parts were remarkable, especially in the male. He also showed some Arymmis paphia from larvæ obtained in the New Forest, the pupæ of which had been at high temperatures, ranging up to $103^{\circ} \mathrm{F}$. The males were of a lighter colour than the normal ones, and the dark markings were considerably reduced in area and intensity; in both respects they very closely resembled some males recently taken in the hot Rhone valley, which were exhibited for comparison. On the other hand, males, of which the pupæ had been at $33^{\circ} \mathrm{F}$. to $51^{\circ}$ F., had the dark markings much extended and darkened. Some females which had been subjected to similar differences of temperature seemed to show slighter* effects of a similar character, but there was no approach in them to the var. ralesina.

Mr. Tutt showed for comparison the extreme forms selected from some 500 examples of $A$. crateryi bred or captured in Kent between 1860 and 1868 , but none was so marked as those shown by Mr. Merrifield, which had been selected from 19, all that he had bred. Mr. A. H. Jones exhibited some A. paphia from the South of Europe, including some of the var. anar!yra from Corsica; the underside of some of those bred by Mr. Merrifield from heated pupæ approaches these in appearance.

Mr. Tutr showed a remarkable melanic aberration of Nemeophila plantayinis bred by Mr. A. Horne, in 1893, from one of three larve found on Scotston Moor, near Aberdeen; the other two moths were normal. Mr. Horne stated that he had bred hundreds of specimens from this locality, but had never before seen anything approaching the one exhibited. The specimen was of a deep solid black, due to the spread of the markings; the forewings were almost entirely black, the hindwings quite so. There was a not uncommon form of aberration of this species, in which the normally pale parts
of the hindwings were smoky black, but with the normal black markings easily traceable. This specimen had, however, lost all trace of the pale ground colour and dark markings.

Mr. Tutt also exhibited a series of Abraxas sylcata (ulmata) captured during the past summer by Mr. Dutton, 25 miles from York. Previously the occurrence of melanic aberrations had been rare, but the twenty specimens exhibited were a fair sample of a number captured this year. The most striking were the blue-grey forms, in which the ground colour was entirely suffused and melanochroic. Others had the outer portions of the wing suffused and the base normal ; others again had the suffusion irregular and placed asymmetrically on opposite wings. The tendency to form a very wide band was observable in some individuals with the ground colour normal, and it might be supposed that this suffusion was due to the spread of the grey patches on the wings which existed in normal specimens as lines and spots. That this was not so, was shown by the fact that these could be independently traced except in the most suffused specimens. Other examples were somewhat suffused with smoky-ochreous or dirty cream colour. These patches were particularly irregular, the suffusion of a single wing being common. Two specimens, however, were regularly suffused, and. were less strongly marked than usual with the normal chestnut and grey patches. In both cases the suffusion was of the same shade as the main colours of the ordinary wing markings, blue-grey and brown, but was formed independently and not by the spread of the normal spots. Mr. Dutton had stated that a large proportion of the aberrations were crippled, some having only two wings, and that all had the wings more or less folded and crumpled. He suggested that this points to mal-nutrition as the most probable cause.

He also showed for Dr. Riding and Mr. Bacot bred specimens of both broods of Teplurosia bistortata from Clevedon, Somerset, and bred specimens of T. crepuscularia and its ab. delamerensis from York. Reciprocal hybrids were exhibited between T. bistortata and T. crepuscularia, between the former and the form delamerensis; and hybrids of the second genera-
tion between the two latter crosses. The offspring of the first crosses were roughly divisible into two groups following the parent forms, those of the second tended to become quite different in appearance. Hybridization led to the production of continuous broods, and certain broods tended to produce males only. The coloration became more intense with increase in the duration of the pupal stage.

Dr. Diney drew attention to the experiments on hybridization recorded in Dr. Standfuss's "Handbuch der Paläarktischen Gross-Schmetterlinge." These had been continued for many years, and accounts of them had appeared from time to time in various foreign periodicals. They were now published at length, and it would be recollected that several of the hybrids themselves, together with interesting specimens of tempe-rature-variation, had, through the kindness of Mr. Merrifield, been exhibited during the past summer in London. Some of the chief conclusions derived by Standfuss from his numerous experiments in the crossing of macrolepidoptera were briefly summarized as follows:-

## A. The fertility of first crosses.

1. The intercrossing of two species may result in anything from complete sterility to the production of the normal number of fertile eggs. These extremes may even occur as the result of crossing different individuals of the same two species.
(Hence a cross must not be pronounced infertile on the evidence of a single failure.)
2. Individual differences in the structure of the genital apparatus may prevent effective crossing between some members of two given species, though other members of the same two species may pair freely.
3. Some crossings have resulted entirely in male, others entirely in female offspring. A third class has given both sexes in various proportions.

> в. The fertility of hybrids.
4. In no case observed by Standfuss or known to him has the female of a true hybrid been shown to be fertile. But the
occurrence of undoubted cases of fertility in male hybrids has been proved by crossing the male hybrids with the females of both parent-species, and in one case with the female of a third species.

## c. The relative strongth of hereditary influences.

(N.B. The three following conclusions rest on an elaborate series of experiments with certain species of Saturnia, and are prefaced in the "Handbuch" by a careful discussion of the evidence that exists respecting the relative phylogenetic age of the forms in question.)
5. The freshly-hatched hybrid larva closely resembles that of the female parent; but with the process of growth a resemblance to that of the male parent gradually increases.
6. The extent of approximation towards the male parent depends on the relative phylogenetic age of the two species; the older being able to transmit its properties, whether of structure or habit, better than the younger.
7. In reciprocal pairing, the male is able to transmit the characters of the species in a higher degree than the female. This influence, however, is less regular and potent than that spoken of in the preceding paragraph.
D. The result of crossing a parent species with a local race, or with an aberration of the same species.
8. When the normal form of a species (Grundart) is crossed with a gradually-formed local race of the same species, the result is a series of intermediate forms.

9 . On the other hand, when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

To the foregoing summary the speaker added the following comments :-

1. The experiments completely disprove the remarkable assertion of Escherich as to the non-occurrence of insect hybrids.
2. They afford fresh illustrations of the manner in which the physiological isolation of an incipient species may be brought about. ${ }^{\text {a }}$
3. They do not support the assertions of Haeckel and Quatrefages as to the possibility of Lepidopterous hybrids continuing their race apart from admixture with either parent form.
4. They show that the statement of Focke as to the great variability of the offspring resulting from the crossing of a plant hybrid with one of the parent species holds good in the case of insects.
5. What Standfuss speaks of as the prepotency of the phylogenetically older of the parent species is probably only another expression of the principle established by Darwin, that in many cases crossing causes reversion to a remote ancestor.
6. The general conclusion as to the prepotency of the male parent accords so far with one result of Mr. F. Galton's investigation of the late Sir E. Millais' breed of Basset hounds.
7. The result of crossing a parent species with a graduallyformed local race, though less in degree, is much the same in kind as that of crossing two distinct species.
8. The result of crossing the normal form of a species with a sporadic aberration of the same species appears to show that the latter stands biologically on an entirely different footing from the regularly developed rariety, even though it may indicate (as alleged by Eimer and by Jordan) the direction in which variation for that species is possible. With Standfuss's instances may be compared the well-known case of the " otter-sheep" (Darwin, "Variations of Animals and Plants under Domestication," 1868, vol. i., p. 100), which similarly, when crossed with a sheep of ordinary breed, gave no true intermediates.
9. Certain experiments with aberrations of this kind, of which exact numerical records have been kept for several

[^50]generations, are of special interest in connexion with Mr. F. Galton's law of heredity.*

In conclusion, Dr. Dixey observed that many points of great interest lad necessarily been left untouched in the present brief sketch of Standfuss's work. He hoped, however, that enough had been said to show the scientific importance of the researches that had cost their indefatigable author so much labour. It should be especially gratifying to entomologists that the present experiments afforded one more illustration of the aid which could be brought by entomological data towards the solution of some of the most difficult problems of biology.

Mr. Champion showed for the Rev. J. H. Hocking an example of the long-bodied moth, Tatosoma afrionata, ${ }^{t}$, from New Zealand; also one of Protopaussus walkeri, Waterh., found by Mr. Walker in China, the subject of a later communication; and specimens of the rare Emblethis verbasci, F., from the Scilly Isles.

Mr. Jacoby showed a Halticid beetle with a singular abnormality, the side-margin of the prothorax being split, and embracing a long process.

Dr. Chapaan exhibited some Spilozoma lubricipecla bred by Dr. Riding, who stated that the original of parent exhibited "was a selected variety, not a fair sample of the brood she belonged to. Mr. Hewett of York gave me the larræ, and had selected the parents from a series bred the year before from larve from Huli. There has been pure selection from normal broods, and no introduction of zatima blood. The か parent was a normal, though well-marked of, not kept. The specimens sent are picked specimens, but I have many more like the least marked ones, the proportion bred with similar variations being roughly about twenty per cent. They show

[^51]a gradually increasing amount of black markings in both sexes, and in some the costal black spots are becoming linear."

In one or two the principal row of spots was a continuous black band, broken only by the nerrures, and in several the costal spots met to form a continuous costal black line.

Dr. Chapman also exhibited a brood of Acronyeta psi, bred by Dr. Riding from a $q$ moth, sent from near Rochester, and illustrating well the permanence of varieties and races in this species. This dark form of $A$. psi was not met with at Hereford. He had placed in another box three series of A. psi, one of continental origin, the other two selected Hereford forms; though the differences between them were slight, they were constant throughout the series, and in the other specimens of the broods which he had not brought. He also showed a single specimen of a curious form of $A$. psi, of which he had reared a brood from a captured parent; its smooth aspect, rounded wings, white clouding, straight inner line, and almost entire absence of the central prong of both daggers, made it very distinct, especially in a series, and much resembling $A$. menyanthidis. This form he had called var. bidens.

Dr. Riding's series presented about thirty specimens very deep grey, like the parent, shading off in thirteen or fourteen specimens to about a dozen which were still dark, but not markedly so.

The Continental series were nearly as dark as the lightest of Dr. Riding's brood, but with a less grey tone.

One brood, bred from Hereford parents, with a very distinct white inner border to the subterminal line, showed this line more or less marked in all specimens, none being without it, as were several in the next series. These were from a $o$ selected for the shortness of the dagger mark; this did not affect the whole brood, but was marked in several specimens.

In further illustration he exhibited series of A. tridens; the usual form at Hereford, wherre they were fairly common, he had divided into two sets-a pink and an ochreous. These were not distinct races, so far as he knew. They might be so, as sufficient care was not taken to keep the broods separate, but he thought both forms were equally
common in broods both from captured females and from specimens paired in captivity. This form had eggs smaller than those of $A$. $p^{s i}$, and with about 38 ribs (37-44) (A. psi, 45-54).

On only one occasion had he taken in Herefordshire any other form, and that was a large dark specimen in August, 1892. Its eggs were indistinguishable from those of $A$. psi, and had 49-52 ribs. The progeny was exceedingly uniform, and all like the example shown. There was no difference in the larve of these two forms, although the eggs differed so decidedly, and of one the imago was so pale, and of the other dark as well as larger.

Mr. Burr exhibited a Mantis, Phyllocrania illudens, from Madagascar, with a close resemblance to the dead leaves among which it lived, some of which were shown with it; even the dried stem of the leaf was imitated by a curious twisted prolongation of the frons.

A new British coccid, Kermes rarieyatus, Gmel., from Kent, was exhibited by Mr. Waterhouse, who had found it on the twigs, near or on the buds of oak shrubs in a wood near Herne, Kent.

## Papers.

Mr. G. C. Griffiths read a paper on " The Frenulum of the Lepidoptera." Mr. Kirialdy communicated a "Preliminary Revision of the Notonectidæ, Part I." ; and Mr. Waterhouse the "Description of a new Coleopterous Insect of the family Paussidæ."

## November 3rd, 1897.

Mr. R. Trimen, F.R.S., President, in the Chair.
The President announced the death, on Oct. 15th, of Mr. J. W. Dunning, formerly Secretary and President of the Society, and referred to his constant interest in it and zeal for its welfare.

The Treasurer also spoke in appreciation of Mr. Dumning's repeated liberality towards the Society, especially at times of financial straits, and to his successful efforts in procuring the Royal Charter, the cost of which he had defrayed.

## ( lvi )

## Election of a Fellow.

Mr. Seliwyn Inage, of 6, Southampton Street, W.C., was elected a Fellow of the Society.

## Erlibitions.

Mr. J. J. Waleer exhibited specimens of Anisolabis ammulipes, Luc., an introduced species of earwig taken among bones at the chemical works at Queenborough, and of Brachysomus hirtus, Boh., a rare weevil, taken among dead leaves at Chatham, Oct., 1897.

Mr. Janson exhibited a variety of Melanaryia !falatea of a clear yellowish cream colour, without trace of the usual black markings. It was captured between Dover and Walmer in 1843 by Mr. Thos. Marshall, and was recorded in vol. ii. of the "Zoologist." It was still in excellent condition.

Lord Dormer showed a remarkable openwork cocoon of an unknown Japanese moth, constructed from the larval hairs.

Mr. Jacoby exhibited fine examples of both sexes of the Australian Hepialids, Charayria ramsayi, C. splendens and Hepialus daplnandri.

Mrs. Nicholl exhibited a selection from the butterflies collected by her this year, in June and July, in the Albarracin Mountains in Aragon, containing several additions to the list of the district published in Madrid by Don Zapater and Herr Max Korb. The species of greatest interest were Erebia zapateri, Oberth., Cenonympha iphioides, Staud., Satyrus prieuri, Pierr., and its fulvous female var. utiayonis, which was observed to be much more attractive to the males than the normal form was ; Ar!!mnis hecate, Esp., and Parnassius apollo, L., of which a female variety occurred with redcentred ocelli on the upperside of the forewing.

The Rev. H. S. Gorhays showed examples of the following rare beetles from the New Forest: Notiophiluts rufipes, Velleius dilatatus, four specinens, of which two were found in copula, Trichonyx sulcicollis, and a single example of Lytta cesicatoria from Shirley Warren, in the immediate neighbourhood of his residence.

Mr. Tutt showed a series of Noctur, taken at Romford by
the Rev. W. Claxton, all of aberrant forms, and including Anchocelis pistarina, ab. serinu, Esp., and ab. venosa, Haw.; Noctua .eanthoyraphen of the dark greyish-fuscous type form and its ab. cohuesa, Herr.-Schäff; Hadena protea of the yellowishgreen type form; Agrotis exclamationis, ab. picea, Haw., Sylopheasia hepatica, ab. characterea, Hüb., Miselia oryacenther, ab. caincina, Mill., and a fine mottled Halena thalassina. He remarked that the interest of these aberrations consisted chiefly in their being taken so near London, where the usual forms of these species ran in other directions.

He also exbibited for Mr. J. Merrin :

1. A diminutive specimen of Lyecena arion, taken on the Cotswold Hills in the middle of June after a dry spring, which probably led to the starving of the food-plant.
2. A specimen of Aylais urtica with a silvery costal spot on the underside of the forewings. It was bred among a number of others which showed no tendency to vary in the same direction.
3. Nelitac aurinia, taken in a swampy meadow near Gloucester during the last five or six years. The undersides showed considerable variation, some being of an uniform tint, i.e., without any creamy markings, others with the creamy basal spots reduced to a minimum, others in which they occupied the whole space and united with the central creamy band, leaving the fulvous only as small spots. One specimen had the underside of the hindwings with a wide creamy transverse band extending from the centre to the hind margin, the basal half being fulvous.
4. An example of Syrichthus malve, ab. taras, taken near Gloucester.

Mr. Kirfaldy exhibited a complete series of species of the genus Notonecta, L., specimens of the larva and imago of the very rare Pelinocoris macronyx, Mayr., from Arizona, and specimens of Antipalocoris marshalli, Scott, from Ceylon, previously recorded from Corsica alone; also both sexes of Metrocoris stili (Dohrn) from Ceylon, the male of which was noticeable as having the anterior femora incrassated, and of Diaprepocoris brachycephala, Kirk., from Australasia, a connecting link between the Corixinæ and Micronectinæ.

## ( lviii )

## Papers.

Papers were communicated by the President on "New or little-known Species of African Butterflies," and by Mr. E. Meyrick on "New Lepidoptera from Australia and New Zealand."

## November 17th, 1897.

Mr. R. McLachlan, F.R.S., Vice-President and Treasurer, in the Chair.

The Chairman referred with regret to the death, while serving on the Indian Frontier Expedition, of Capt. E. Y. Watson, Fellow of the Society, and well known for his writings on Oriental Rhopalocera.

## Election of Fellous.

Miss E. F. Chawner of Forest Bank, Lyndhurst ; Mr. F. N. Brown, M.R.C.S., of the Elms, Chobham, and Natal; Mr. Albert Harrison, F.C.S., of 72, Windsor Road, Forest Gate; Mr. Albert Norris of Church Lane, Napier, New Zealand; Mr. Stephen Pegler of Retford, Notts.; Mr. Ediward G. J. Sparke, B.A., of 1, Christchurch Villas, Tooting Bec Road, S.W.; and Mr. Wilmot Tunstall of Brook House, Meltham, near Huddersfield, were elected Fellows of the Society.

## Exhibitions.

Mr. Selfyn Image exhibited male examples of Fieris brassice, with a black spot on the dise of the forewings. They were bred from larve found feeding on Tropcolum at Lee, N. Devon, in the autumn of 1896, and six out of ten males showed this variation.

He also showed a dark variety of Vanessa urtica, taken at Copthorne in Sussex, and characterized as follows:

Foreuinys: the yellow costal blotches, and the yellow subdorsal blotch, absent; the second and third black costal blotches united; the white costal blotch become a mere tinge of bluish-grey shading into ochreous, and this into the black of the terminal fascia, which is somewhat broader, and far less sharply defined, than ordinarily, and without any blue
spots; the veins in the space between the united black costal blotches and the terminal fascia conspicuously traced in black ; the two black discal spots absent.

Hindwinys black, sprinkled with ochreous scales and covered with brown hairs towards the abdomen; the yellowish costal tinge absent ; terminal fascia represented only by blue and ochreous spots-elongated and somewhat obscure; ochreous edging of the wing specially conspicuous by contrast.
He also exhibited two fine specimens of Plusia moneta taken at valerian, near Balcombe, Sussex, on June 30th, 1897.

Mr. M. Burr exhibited three new species of Rumanian Orthoptera in illustration of a later communication.

On behalf of Mr. T. D. A. Cockerell of Mesilla, New Mexico, two specimens of Synciioe lacinia from that locality were exhibited to show the remarkable forms of variation found in individuals occurring at the same time and place and on the same flowers.

## Papers.

Mrs. Nicholl communicated a paper "On the Butterflies of Aragon," and Mr. Burr a "List of Rumanian Orthoptera."

Mr. Tutt read a paper entitled " Some Results of recent Experiments in hybridising Tephrosia bistortata and Tephrosia crepuscularia."

## December Ist, 1897.

Mr. R. Trimen, F.R.S., President, in the Chair.
Election of Fellows.
Mr. Hope Alderson of Hilda Vale, Farnborough; Mr. Arthur Horne of Ugie Bank, Aberdeen; Mr. Charles H. Pemberton of 4, Kent's Terrace, Torquay; and Mr. E. P. Stebbing, Indian Forest Service, were elected Fellows of the Society.

## Exhibitions.

Mr. Dudley Wright exhibited an aberration of Arrymnis euphrosyne, in which the, upperside was suffused with black,
and the silver spots of the underside of the hindwings converted into streaks.

On behalf of Mr. W. H. Tuck, Mr. Tutt showed examples of Metcecus paralorus, L., taken in nests of Vespa vulyaris near Bury St. Edmunds, together with some of the cells in which they were found. About a fifth of the nests examined were affected, some containing as many as 24,12 and 8 examples of the beetle ; the more usual number present was from two to four. The dates between which examples were taken in 1897 were from Aug. 2nd to Oct. 1st. According to Dr. Chapman the eggs were laid in the cracks of posts, etc., from which the wasps got the pulp to make their cells.

Combs were also exhibited from nests of $\mathrm{T}^{\dagger}$ espacala crabro and Vespa yermanica, in which Mr. Tuck had found larve of Velleius dilututus, Fabr., which, however, he had been unable to rear.

The Rev. A. E. Eaton exhibited a specimen of the singular Myodites subdipterus, Fabr., taken by himself at Biskra, Algeria, and a near ally of Metecus.

Mr. Blavdford called attention to a new instance of the destructive propensities of Dermestes rulpinus, Fabr. He had received examples found at Hong-Kong among flags made of bunting, which were presumably injured, although no details had been forwarded. This form of injury was analogous with the damage to woodwork recorded by himself and others; it had nothing to do with the feeding-habits of the insect, but was committed by the larve in their search for shelter in which to pupate. Probably the flags had been stored at some period in the neighbourhood of infested leather goods, or dried provisions. The only other case of damage to textile fabrics by Dermestes rulpinus which he knew of occurred in connexion with the case recorded by him (Proc. Ent. Soc. Lond. 1890, p. xxxi) ; a blue handkerchief spotted with white, left in the infested building, was found next day to have all the white spots eaten out.

In the ensuing discussion Mr. C. G. Barrett referred to the damage done by Agrotid larve to linen spread out to bleach on the hillsides near Belfast. Investigation showed that this did not take place except when the linen was
gathered up and brought into the warehouses without being shaken. The caterpillars which had taken shelter underneath it then ate their way through it, in order to escape in search of food.
I'apers.

Mr. Chaspron communicated papers entitled "Notes on American and other Tingitide, with Descriptions of two new Genera and four Species," and "A List of the Cicindelidx, Carabidæ, and Staphylinidæ collected by Mr. J. J. Walker, R.N., in the region of the Straits of Gibraltar."

## ANNUAL MEETING.

$$
\text { January 19th, } 1898 .
$$

Mr. Roland Trimen, F.R.S., F.L.S., President, in the Chair. Mr. A. Hugh Jones, one of the Auditors, read the Treasurer's Balance Sheet, showing a balance of $£ 10 \mathrm{~s} .1 \mathrm{~d}$. in the Society's favour.

Mr. W. F. H. Blandford, one of the Secretaries, read the following

## Report of the Council.

During the Session of 1897-98 the progress of the Society has been satisfactory.

In 1897 one Honorary Fellow, Dr. Fritz Müller, and six Ordinary Fellows have died. The latter are Mr. George Christopher Dennis, Mr. Joseph William Dunning, Mr. John B. Hodgkinson, Mr. Ernest sabel, Captain Edward Yerbury Watson, and Mr. Morris Young.

Five Fellows only have resigned, and twenty-four Ordinary Fellows have been elected, a number greater than in either of the two preceding years. It is gratifying to note that the falling off observed in 1896 has proved to be merely temporary, and that the applications for admission have lately been more spontaneous and derived from a wider circle of entomological workers than in the past few years.

The total number of Fellows now stands at 398, or twelve more than last year, the Society consisting of 9 Honorary, 52 Life, and 337 Fellows liable for the Annual Contribution. proc. ent. soc. lond., v., 1898.

On the initiative of the Council the Bye-Laws were amended at a Special Meeting held June 2nd, 1897, when the modifications which the experience of the past eleven years had shown to be desirable were unanimously adopted. Of these the most important are the increase of the Council from thirteen to fifteen Members; the simplification of the regulations for filling up chance vacancies in the Council or Officers, and for the removal of Fellows ; and the restoration of a former Bye-Law, that a candidate for election shall be proposed from personal knowledge.

The Transactions for the year contain nineteen papers, which are of somewhat shorter average length than usual, and form a volume of 434 pages. They are contributed by the following authors: Dr. Arthur G. Butler ; Mr. George C. Champion; Dr. Frederick A. Dixey; Dr. Auguste Forel; Mr. F. DuCane Godman, F.R.S., and Mr. Osbert Salvin, F.R.S. ; Mr. A. Radcliffe Grote; Sir George F. Hampson, Bart. ; Mr. Martin Jacoby and Mr. George C. Champion; Mr. George W. Kirkaldy ; Mr. Oswald H. Latter; the Rer. Thomas A. Marshall; Mr. Edward Meyrick (2 papers); Prof. Louis C. Miall, F.R.S., Mr. R. Shelford and Baron C. R. Osten Sacken; the Rev. F. D. Morice; Mr. Robert Newstead ; Mrs. M. de la B. Nicholl ; the Rt. Honble. Lord Walsingham, F.R.S. ; and Mr. Charles O. Waterhouse.

Of these papers, 15 are descriptive, systematic or faunistic, and relate: 3 to Coleoptera, 2 to Hemiptera, 3 to Hymenoptera, and 7 to Lepidoptera. Of the remaining papers, 3 deal with morphological and bionomical questions in Lepidoptera and Diptera, and one with Mimicry in Lepidoptera.

These Memoirs are illustrated by 11 plates, of which 4 are coloured. For the cost of Plates II. and III., and for a portion of the cost of Plates VIII.-XI., the Society is indebted to Dr. Holland and Prof. L. C. Miall respectively. That of Plates I. and VI. has been defrayed out of the income derived from the " Westwood Bequest."

The Council desire that some permanent token shall exist to mark the indebtedness of this Society to the constant solicitude and generosity of the late Mr. Joseph W. Dunning. They have decided, therefore, to present the Society with
his portrait, which has been satisfactorily drawn by Mr. W. Purkiss, from the only available photograph, as a frontispiece to the present volume of Transactions.

The Journal of Proceedings, containing an account of, and notes on, the Exhibitions and Discussions at the Meetings, extends to over 60 pages, of which a large proportion is occupied with the account of the discussion on Mimicry in Butterflies. The interest taken in this debate, of which there is ample evidence, encourages the hope that it may be possible from time to time to arrange for other special discussions on important subjects, with an equal measure of success.

The number of books, pamphlets, etc., added to the Library during the year 1897 and catalogued under the authors' names, amounts to 124 , in addition to Transactions and serial publications; 360 books have been borrowed from the Library. Attention may be called to the large number of catalogued "separata" in the Society's possession; these are comparatively little asked for, in spite of the manifest conveniences which papers in that form often present.

The amount received for current subscriptions has been somewhat less than in 1896, and the arrears are consequently greater. The Admission Fees show a very satisfactory increase. The sum to the credit of sales of publications is the smallest for the last ten years: it is hoped that this diminution is only of a temporary nature. No Life Composition has been received during the year, but that remaining over at the close of 1896 has been invested, so the financial position is stronger than a year ago, notwithstanding that only a nominal cash balance remains in hand. There are no ascertained liabilities.

The investments are now as follows:-£560 1s. 5d. Consols, costing £550 8s. 0d., and £239 12s. 4d. Birmingham Corporation 3 per cent. Stock, costing £250 (The "Westwood Bequest"). The present value of these investments should be about $£ 630$ and $£ 270$ respectively.

11, Chandos Street, Cavendish Square, W. 19th Jamuary, 1898.

The Secretaries having received no notice proposing to substitute other names for those contained in the lists prepared by the Council, the following Fellows constitute the Council for 1898 :-William Bateson, M.A., F.R.S.; Walter F. H. Blandford, M.A., F.Z.S.; George C. Champion, F.Z.S.; Thomas A. Chapman, M.D.; Sir George F. Hampson, Bart., B.A.; Martin Jacoby; A. Hugh Jones; Robert McLachlan, F.R.S.; Philip B. Mason, M.R.C.S., F.L.S.; Frederic Merrifield ; Osbert Salvin, M.A., F.R.S.; Roland Trimen, F.R.S.; James W. Tutt; George Henry Verrall; and Charles O . Waterhouse.

The following are the Officers elected :-President, Mr. Roland Trimen; Treasurer, Mr. Robert McLachlan; Secretaries, Mr. Walter F. H. Blandford and Mr. Frederic Merrifield ; Librarian, Mr. George C. Champion.

The Balance Sheet and Report of the Council having been unanimously adopted, the Address of the President, Mr. R. Trimen, was read on his behalf by Mr. Blandford, one of the Secretaries.

At its conclusion Lord Walsingham proposed a vote of thanks to the President for the valuable contribution to knowledge contained in his Address, and for his services as President. This was seconded by Mr. Godmax, and carried by acclamation.

The President having acknowledged the vote, a vote of thanks to the Officers and Council was moved by Professor Poulton, seconded by Colonel Yerbury, and carried. Mr. McLachlan and Mr. Blandford spoke in acknowledgment.

## ENTOMOLOGICAL SOCIETY OF LONDON.

## Balance Sheet for the Year 1897.

| Receipts. | Payments. |
| :---: | :---: |
| $\text { Balance in hand, 1st Jan., } \quad \text { £ s. d. }$ | Printing Transactions, \&c. 2161410 |
| 1897 - . . 10888 | Plates, \&c. . . . 42311 |
| Subscriptions for 1897 . 308140 | Rent and Office Ex- |
| Arrears . . . . 13130 | penses . . . . 162210 |
| Admission Fees . . 4860 | Books and Binding . . 2610 |
| Donations . . . 1056 | Investments in Consols . 1515 |
| Sales of Transactions, \&c. 5114 | Subscriptions in advauce carried to 1898 - 1515 |
| Interest on Investments:- Consols \&14 \% | $\begin{array}{cccc} \text { carried to } 1898 & . & . & 1515 \\ \text { Balance . } & . & . & 10 \end{array}$ |
| Consols . $£ 1467$ | Balance . . . . 10 |
| Westwood Bequest 6190 |  |
| Subscriptions in advance $\begin{aligned} & 15 \\ & 15 \\ & 15\end{aligned}$ |  |
| $£ 480 \quad 18$ | $£ 4801$ |
| A S S | TS. |

Investments:-

Cost of £239 12s. 4d. Birmingham Corporation 3 per cent. Stock (Westwood Bequest) $£ 250$.

> LIABILITIES, nil.

Robert Mclachlan,
Treasurer:

Audited and found correct,
Osbert Salvin.
A. Hugh Jones.
R. Wylie Lloyd.

## THE PRESIDENT'S ADDRESS.

## Gentlemen,

The Report of the Council which you have just heard read gives, I am glad to say, a very encouraging review of the Society's operations during 1897, and statement of its present position; so that we may look forward with confidence to progress generally during the new year on which we have entered. A very satisfactory feature of the Report is the number of new Fellows elected, which greatly exceeds that of the preceding year, and nearly touches the figure reached in 1894.

The "Transactions" are certainly of less bulk than usual, but, if the quantity is somewhat reduced, the quality of our publications has been fully maintained, and as a set-off the increased fulness and detail with which the most important of our discussions has been reported in our "Proceedings" is an improvement not to be overlooked.

It will be remembered that in the Presidential Address of last year, my predecessor made special mention of the formation of a Committee of the Society to deal with the question of aiding in the protection from threatened extinction of rare and local British insects. The Committee has held several meetings, and has been in correspondence with various local Societies and with individual entomologists on the subject; and as regards the Lepidoptera-the only Order which would appear to be unduly persecuted by excessive collectinga first or provisional list was drawn up of species held to
run most risk of extermination in this way, and therefore recommended to be sparingly collected. At the Society's meeting of April 7th a Memorandum prepared by the Committee and approved by the Council was submitted, and extensively signed by Fellows present, agreeing to associated action in discouraging by example and influence the destruction of such rare and local species of insects as might be designated by the Committee as standing in need of protection. There is good reason to think that the efforts made in this direction have been favourably received, and will not be barren of result.
Early in July the Officers and Council of the Society paid their second visit to Oxford at the invitation of the Hope Professor of Zoology, and were again most hospitably received and entertained by the Vice-Chancellor and by Prof. Poulton and other distinguished resident Members of the University. It was with no little, pleasure and profit that we renewed our acquaintance with the treasures of the Hope Collections, and noted the valuable and extensive augmentations they had received, and the important progress made in their classification and arrangement. The Hope Professor has given no less attention to the improvement of the accommodation for students, and the increased facilities thus afforded have largely furthered the prosecution of special study of different portions of the collections, as is well indicated by the appearance, under his editorship, of the first volume of "The Hope Reports," containing reprints of various memoirs based on researches carried on in this Department during the last four years.

## OBITUARY.

The losses from death sustained by the Society and by Entomology during 1897 have been heavy. The Society has lost one Honorary and six Ordinary Fellows ; and it is with no ordinary sorrow that we miss from our roll of members the distinguished names of Fritz Müller, Joseph William

Dunning, and Edward Yerbury Watson. Beyond the limits of the Society, it is with deep regret that we record the deaths of George H. Horn, Andrew Matthews, and Alois Friedrich Rogenhofer-men of distinction among eight entomologists of note who have passed away. With Mr. Dunning, our lamented colleague and President, I was well acquainted for many years, and I would add my testimony to his great ability, high personal character, and unequalled devotion to the interests of the Society.

Dr. Fritz Müller, Hon. F.E.S. This great naturalist, the correspondent and friend of Charles Darwin, was born on March 31, 1822, at Windisch-Holzhausen, in Thuringia. He was sent to school at Erfurt, and afterwards betook himself to the study of pharmacy, but abandoned it to become a pupil of Johannes Müller, the comparative anatomist, at Berlin. After taking his doctor's degree, he settled at Erfurt as a science teacher, an occupation which he temporarily relinquished for the study of medicine.

In 1852 political reasons caused him to emigrate to South Brazil, where, chiefly at Blumenau and on the island of Desterro, the remainder of his life was spent, partly as a farmer, partly as a teacher, always as an earnest student of nature. His zoological investigations, begun in Germany but interrupted by his emigration, were resumed at Desterro in 1857, from which date he published papers in rapid succession, chiefly in "Wiegmann's Archiv," on subjects of marine zoology, cœlenterates, annelids, and especially the transformations of Crustacea. These brought him into notice as a thorough and acute zoologist; but his real reputation dates from the publication of the "Origin of Species."

His own studies on the structure and habits of animals caused him enthusiastically to accept Darwin's great theory, and to support it by the unrivalled series of zoological and botanical observations contained in his numerous later writings. In 1865, he published "Für Darwin," a sketch of Crustacean development and phylogeny from the Darwinian standpoint, and his only work in book-form; its publication led to a regular correspondence with Darwin,
and several of Müller's letters, full of interesting and novel observations, were communicated by the former to "Nature."

Müller did not occupy himself with entomology till after his removal from the sea-coast, his earliest important memoir, on Termites, the real complexity of whose social system he was the first to appreciate, appearing in the "Jenaische Zeitschrift," in 1873. His subsequent contributions, mainly to " Kosmos," include papers on the relations of insects and flowers, dimorphism, the life-histories of aquatic forms, the case-making of Phryganeidæ, and especially on the " recogni-tion-characters" of butterflies and the more complex phenomena of mimicry among them. His well-known theory, which supplements that of Bates, is discussed in the following pages.

In spite of losses and misfortunes, Müller continued his work almost to his death, which took place on May 21 in the preceding year. His inestimable services to science brought him little gain or official recognition, and this Society conferred a real honour upon itself by electing him an Honorary Fellow, in 1884.

Many of his notes and papers, especially that on "Ituna and Thyridia," have appeared in our Proceedings as translations, chiefly by Prof. Meldola, F.R.S., who has done more than anyone to bring Müller's work to the notice of British entomologists.

He contributed papers to our "Transactions," in 1878, 1879 and 1895, the last, entitled "Contributions towards the history of a new form of larvæ of Psychodidæ (Diptera) from Brazil," being virtually written in 1881 ; the plates accompanying it are noticeable as beautiful examples of his powers of draughtsmanship. The number of his separate papers on all subjects is probably between 150 and 200.

George Christopher Dennis, F.E.S., was in business in York, but retired about two years ago to devote his whole time to natural history and outdoor pursuits. He was an excellent lepidopterist and made many lengthened excursions to different parts of the country for collecting purposes; quite recently he had taken up the study of Neuroptera and

Trichoptera with the intention of forming a collection for the York Museum, in which he was greatly interested. He was president of the York and District Naturalists' Society, was on the Council of the York Philosophical Society, and was a member of the Yorkshire Naturalists' Union, the presidency of which he had repeatedly declined. He died suddenly at York on Dec. 22nd, 1897, having been a Fellow of this Society since 1892.

Joseph William Dunning, M.A., F.L.S., F.E.S., was born at Leeds, on November 5, 1833. He was educated at Huddersfield under Mr. Peter Inchbald, an enthusiastic naturalist, from whom Dunning acquired his love for entomology, and afterwards at Paris. He entered at Trinity College, Cambridge, graduated in 1856, and afterwards became Fellow and Tutor of the College. In 1861 he was called to the Equity Bar, where he practised successfully as a conveyancer.

His interest in entomology began when a schoolboy, and to him is owing the rediscovery of Agrophila sulphuralis, at Brandon. In 1849, he joined this Society at the age of 16 , and afterwards helped to found the Entomological Society of Cambridge, which, in conjunction with that of Oxford, produced an "Accentuated List of British Lepidoptera." In this work Dumning took a prominent part, for which his classical knowledge and critical taste specially fitted him.

In 1862 he was elected one of the Honorary Secretaries of this Society, a post which he held until January, 1871. The Society was then not in a flourishing condition, and Dunning set himself steadily to work to improve its position and to further its welfare in every possible way.

An admirable man of business, he spared neither time nor trouble in the control of the Society's affairs. Moreover, whenever money was urgently required, he was a liberal and unostentatious donor to the funds, often making up a financial deficit at the end of the year, and supplementing his donations to the general funds by gifts to the Library and Publication Account, both of which have repeatedly benefited by acts of generosity known in many cases to but one or two of his colleagues. As recently as 1894, he presented the

## ( lxxi )

Society with the sum of $£ 45$, on the 45 th anniversary of his election as a Member.

He was elected President in 1883-84, and was mainly instrumental in obtaining the Royal Charter of Incorporation which has so materially raised its status, defraying the heavy expenses out of his own pocket. To the general regret, the Charter was not granted until the year after his term of office had expired.

Able as his published papers on Entomology are, they are few in number, the most important being on "The CoffeeBorer of Southern India" (Trans. Ent. Soc. Lond. 1868), and " On the Genus Acentropus " (id., 1872 and 1878).

In October, 1890, he had a paralytic seizure, from the effects of which he never fully recovered; a similar attack brought about his death in October 15, 1897, and deprived this Society of its greatest benefactor, to whom its present prosperity is largely owing.

James B. Hodgrinson, F.E.S., was born at Preston in 1823, and was an engineer, and later a manufacturer by occupation. An excellent and observant field-naturalist, he possessed an intimate knowledge of the Lepidoptera of the North of England, and added several new species to the British list. His collection of British lepidoptera was one of the finest in the country.

He published numerous collecting notes, but little or nothing of permanent scientific value. He joined this Society in 1890.

Ernest Sabel, F.Z.S., F.R.G.S., F.E.S., was in business in Cannon Street. He formed a large collection of European and exotic, chiefly African, Lepidoptera and Coleoptera, but had not collected personally for many years. At one time, however, he travelled in Africa, and probably formed the nucleus of his collection there. He published nothing on Entomology. He had been a Fellow of the Society from 1885.

Capt. Edward Yerbury Watson, F.Z.S., F.E.S., joined the North Lancashire Regiment as Lieutenant in 1884. Whilst in India, he collected and studied the Oriental Rhopalocera, on which he published several papers, his most important
being the valuable "Proposed Classification of the Hesperiidæ, with a revision of the Genera" (P. Z. S., 1893). While serving with the Tirah Expedition, he fell a victim, on November 8th, to a stray shot fired into camp, being shot through the head while strolling outside his tent. His connexion with the Society began in 1891.

Morris Young, F.E.S., late Curator of the Paisley Museum, was an accomplished naturalist and coleopterist, who added several species of beetles to the British list. He devoted himself to the care of the Museum under his charge, presenting his collections to it, and helping it generously with books and money, as his means allowed. He joined the Society in 1886.

Among the distinguished entomologists, not Fellows of the Society, whose deaths have been recorded during the present year are the following :-

The Rev. Peter Bellinger Brodie, M.A., F.G.S., although strictly a geologist, devoted much attention to British fossil insects, on which he wrote numerous papers. He is best known by his "History of the Fossil Insects of the Secondary Rocks of Britain," published in 1845.

Francisque Guillebeau, one of the last collaborators of Mulsant, and a member of the Entomological Society of France, was a coleopterist who did valuable work on certain obscure families, particularly the Phalacridæ, the European species of which he monographed.

Dr. John Hamilton, of Allegheny, Pa., U.S.A., published numerous papers on North-American Coleoptera, particularly on the distribution of species common to the Palæarctic and Nearctic Regions.

Dr. George H. Horx, President of the American Entomological Society, and since LeConte's death, the leading authority on North-American Coleoptera, was born April 7th, 1840. His life was almost entirely passed at Philadelphia, where he was in good practice as a physician. During the Civil War he was stationed in Arizona, where he collected insects for almost the only period in his life, for he had little aptitude for field-work. He was a great admirer of LeConte, with whom he became associated, and whom he assisted to
bring out his later works in a useful and handsome form. The chief product of this joint authorship was the enlargerl edition of the "Classification of the Coleoptera of North America," published in 1883. An excellent systematist, Horn chiefly devoted himself to the monographic revision of families and genera, being markedly averse to the description of isolated new species. His first paper appeared in 1860, in the "Proceedings" of the Academy of Natural Sciences of Philadelphia; and his work was almost entirely confined to the North-American fauma, the one important exception being his monograph of the Eucnemidæ in the " Biologia CentraliAmericana." He was a reserved man and a bachelor; but he made two voyages to Europe in order to visit collections and make the acquaintance of European entomologists, and he has been a welcome visitor at meetings of this Society.

About a year ago a paralytic stroke incapacitated him from work, and he died on November 25th, 1897.

The Rev. Andrew Matthews, Rector of Gumley, Leicestershire, was one of the most independent and original of British naturalists. Devoting himself at first to ornithology and the collection of Lepidoptera, he subsequently turned his attention to neglected groups of minute Coleoptera, especially the Trichopterygidæ, on which his extraordinary skill as a dissector and microscopist rendered him the first, and practically the only, living authority. He was an admirable fieldnaturalist, and added many rare species of Coleoptera to the British list, but, retiring as he was, and markedly averse to connecting himself with learned societies, he was known personally to few entomologists. His principal work, "Trichopterygia Illustrata," was published in 1874; a second supplementary volume on the Corylophidre, completed in his 80th year, still awaits publication.

Father Montrouzier, a missionary to New Caledonia, and a member of the Entomological Society of France, was wellknown as a collector in, and writer on the fauna and flora of, New Caledonia, the Solomon and Woodlark Islands.

William Roelofs, a former President of the Belgian Entomological Society, was a coleopterist and an authority upon Curculionidæ.

Alois Friedrich Rogenhofer, of the Vienna Natural History Museum, was a distinguished Lepidopterist, best known for his work, in association with the Felders, on the Lepidoptera collected during the voyage of the "Novara."

## MIMICRY IN INSECTS.

Sharing in the perplexity avowedly felt by many of my predecessors in this chair as to the choice of a subject for the Annual Address - perplexity arising rather from the redundancy than from the scarcity of entomological matter I have been led to think, considering the wide-reaching importance of the questions involved and the unmistakeable interest shown in the recent discussion at two of our meetings, that some account of the Mimetic Relations existing among Insects might not be out of place. Having for a considerable period devoted some attention to the matter, I propose to pass in review what has been placed on record; and if, in so doing, I traverse ground very familiar to most of us, my excuse must be the fascinating interest which attaches to the whole subject.

The application by Henry Walter Bates, our lamented President, of the great principle of natural selection in elucidation of the Mimicries found among Insects* is too well known to require any detailed repetition here. It is sufficient to recall that, as the result of many years' experience in tropical South America, Bates established the facts that (1) among the abundant and conspicuous butterflies of the groups Danainæ, Heliconiinæ, Acræinæ, and some Papilioning were found very much rarer mimicking forms, chiefly of the group Pierinæ but partly belonging to other groups and some even to the Heterocera, which, departing rery widely from the aspect of their respective allies, imitated with more or less exactness the abundant species in question; (2) the numerous and showy Danainr, etc., although of slow flight, did not appear to be molested by the usual insectivorous

[^52]foes; and (3) the members of these unassailed tribes possessed malodorous juices not found in the mimicking forms or their allies. From these data he argued that the explanation of these extraordinary resemblances was to be found in the great advantage it would be to species unceefended by offensive secretions, and therefore palatable and much hunted down, to find escape in the disguise of species recognized and avoided as unpalatable ; and traced the mimicries to the longcontinued action of natural selection, perpetually weeding out by insectivorous agencies every occurring variation not in the direction of likeness to the protected forms, but as perpetually preserving, and so aiding the development by heredity of, every variation favourable to the attainment of the protective mimicry.

This sagacious application of the Darwimian theory in solution of one of the most difficult and baffling of the problems presented to zoologists, was of the greatest service and encouragement to all students of evolution. I retain to-day the liveliest recollection of the delight I experienced in the perusal of a copy of Bates's memoir received from himself; for his work was not that of the mere cabinet systematist, but came with all the force of face-to-face commune with the abounding life of the tropics.

Before two years had passed, Bates's explanation of mimicry was confirmed by his former companion in exploration, Alfred Russel Wallace, who, working with equal devotion in the Malayan Islands, had observed and was able to adduce a strictly analogous series of mimetic resemblances among Oriental butterflies, and gave his unreserved acceptance of the Batesian interpretation.* Such support from the co-founder with Darwin of the theory of natural selection, and from a naturalist of the widest experience in both Western and Eastern tropics, was of the greatest weight with evolutionists generally.

My own contribution to the subject was read to the Linnean Society in March, 1868. $\dagger$ In the previous year I had made an entomological tour in Natal, and had enjoyed some

[^53]
## ( lxxvi )

precious opportunities of observing in mature several cases of mimicry between species not inhabiting the Cape Colony. There was no claim to originality in my paper ; it simply rounded off the case by adding from Africa, the third great tropical region of the globe, a series of instances and observed facts confirmatory of those brought forward by Bates from the Neotropical, and by Wallace from the Oriental region. Of course I had had nothing like the extended field experiences of those great naturalists, and the African material then available was but scanty; but it so happened that perhaps the most striking and elaborate of all recorded cases of mimicry that exhibited by the females of the Merope-group of Papiliohad come under my personal observation in South Africa, and I was thus in a position to describe satisfactorily a wonderful illustration of the Batesian theory.*

It will be remembered that Bates, in his memorable paper (l. c., p. 507), also brought to notice the very close resemblances, or apparent mimicries, which unquestionably exist between species belonging to different groups or subfamilies of protected distasteful butterflies themselves; but neither he nor Wallace felt able to give any explanation of these instances, which obviously differed very materially from the cases of mimicry of an unpalatable protected species by a palatable unprotected one. Not until 1879 was there any elucidation of this side of the matter, but in May of that year appeared in "Kosmos," Fritz Müller's notable paper on "Ituna and Thyridia," which was translated by Professor Meldola, and printed in our "Proceedings" for the same year (p. xx.). In this memoir, Müller made the valuable suggestion that the advantage derivable from these resemblances between protected forms was the division between two species of the percentage of victims to the inexperience of young insectivorous enemies which every separate species, however well protected by distastefulness, must pay.

[^54]Professor Meldola not only brought forward and supported, with all his wonted grasp and acumen, F. Müller's daring interpretation of this phenomenon, but in 1882,* in a paper discussing the objections brought against Müller's view, made a distinct advance by showing how that view could justly be extended to explain the characteristic and peculiar prevalence of one type of colouring and marking throughout large numbers of species in protected groups-so especially noticeable in the subfamilies Danainæ, Heliconiinæ, and Acræinæ.

In 1887 was published $\dagger$ Professor Poulton's most interesting memoir entitled "The Experimental Proof of the Protective Value of Colours and Markings in Insects in reference to their Vertebrate Enemies," which dealt in great detail with the actual results of numerous experiments conducted by himself and other naturalists with the object of ascertaining to what extent highly conspicuous (almost always distasteful) larve and perfect insects are rejected or eaten by birds, lizards, and frogs. The conclusions given at the close of this paper (pp. 266-267) cover a wide range in connection with the subject of warning coloration, and among them I would call special attention to No. 5, in which the author points out that " In the various species in which a conspicuous " appearance is produced by colour and marking, the same " colours and patterns appear again and again repeated," and adds that "In this way the vertebrate enemies are only " compelled to learn a few types of appearance, and the " types themselves are of a kind which such enemies most " easily learn." This generalisation certainly had the merit of first detecting a great additional advantage derivable from the common aspect exhibited by a number of protected forms in the extended "Müllerian" associations indicated by Prof. Meldola; and it was applied by Wallace to the case of the Heliconiidæ in the comprehensive survey of warning coloration and mimicry generally given in "Darwinism" (Ch. IX., pp. 232-267, 1889). We are further indebted to Prof. Poulton for the discussion and summary of all extant data up to 1890 in his "Colours of Animals," a work

[^55]which abounds in pregnant suggestion, and indicates with justice and clearness how far the evidence forthcoming was valid, and in what directions evidence still lacking should be sought.

Wallace well observed ("Darwinism," p. 264) that "to "set forth adequately the varied and surprising facts of " mimicry would need a large and copiously illustrated " volume; and no more interesting subject could be taken "up by a naturalist who has access to our great collections " and can devote the necessary time to search out the many "examples of mimicry that lie hidden in our museums." A work ostensibly of this character was issued in 1892-! 3 , in two Parts, from the pen of the late Dr. Erich Haase, under the title of " Untersuchungen über die Mimicry auf Grundlage eines natürlichen Systems der Papilioniden ";* and last year an English translation of the second Part was published, and has quite recently been reviewed by Prof. Poulton. $\dagger$ This treatise is of large quarto size, and the first Part contains 120 pages and 6 coloured plates, while the second extends to 158 pages and includes 8 coloured plates. The first Part $\ddagger$ deals solely with the family Papilionidre (s. str. = subfamily Papilioninæ) and principally with the great genus P'ipilio (s. lut.), which on grounds of structure, system of markings, form of larvæ and pupæ, and foodplants of larva, is divided into the three sulgenera of Phumacophayus, Cosmodesmus, and Papilio (s. str.). With the utmost minuteness the species assigned to these groups, with their sexual, geographical, or mimetic variations, are traced through the four zoological regions recognized by the author, and very elaborate analysis of markings is made in aid of arriving at their natural affinities from a phylogenetic point of view. Haase shows that in P'apilio the models which are mimicked by other species of that great genus are always members of the Pharmacophatus group, or as he calls them "Aristolochia-Butterflies "-whose larvie feed on that tribe of plants, and which, as he contends, derive their

[^56]offensive juices directly from the poisonous properties of their food in the early state.

In Part 2* a lengthy account is given of the cases of mimicry occurring throughout the class of insects, and reference is also made to the few known instances in other classes of animals. The Lepidoptera occupy the bulk of the memoir, and, as in Part 1, a geographical order is followed, the mimicries in each of the four zoological regions being given under their respective families and genera, but in separated accounts of (firstly) models, and (secondly) mimickers. In the "Allgemeiner Theil" which concludes the work, and occupies about half of Part 2, there are sections treating of mimicry (a) within the limits of the old genus Papilio (in connexion with Part 1), (b) between "immune and nonimmune " Lepidoptera, and (c) among "immune" Lepidoptera themselves; followed by a consideration of objections to the theory of mimicry, and of mimicry as a part of protective adaptation to the environment.

While I regard Part 1 as a memoir of value, and as likely to prove serviceable to the student of a group so difficult to classify as the Papilioninie, and while I recognize the great labour and research displayed throughout the work in the assembling of the accessible facts and data, I must reluctantly record my concurrence in Prof. Poulton's severe criticism of the extremely unsatisfactory nature of the general treatment of the subject in Part 2. Apart from the cumbrous handling of the mass of details accumulated, the writer manifests such disregard of obvious difficulties, such unscientific haste in jumping to conclusions, and such inadequate recognition of what had been accomplished by previous investigators, that one can only regret that he ever entered on the speculative part of his work, and did not confine his energies to the better concentration and arrangement of the materials so assiduously collected.

Among recent contributions to the subject, we shall, I think, all agree in assigning a high place to the memoirs with which Dr. F. A. Dixey has enriched our "Transac-

[^57]tions." In 1894 he read before the Society his elaborate paper "On the Phylogeny of the Pierinæ, as illustrated by their Wing-markings and Geographical Distribution," and took occasion to discuss the wide divergence from the primitive or typical pattern of the group caused by mimicry in such genera as Euterpe, Pereute, Dismorphia, etc. Adopting the Müllerian interpretation as expanded by Meldola, he proceeded to offer the original suggestion that, in the acquisition of closer resemblance between two or more protected forms, it was not necessary that in every instance the process of adaptation should lie solely in the imitation of one particular form as model, but that there might very well exist mutual convergence of the forms concerned, thus accelerating the attainment of the common beneficial resemblance. This "reciprocal mimicry" the author further explained in a paper read in 1896 "On the Relation of " Mimetic Patterns to the Original Form" (pp. 72-75), by a consideration of certain mimetic sets of Heliconii, Pierinæ, and Papilionince which present features and relations of pattern and colouring explicable apparently in no other way than by the hypothesis in question. This paper also gave a lucid demonstration, traced through corresponding series of existing forms of both mimetic and non-mimetic Pierince, of "the successive steps through which a complicated and " practically perfect mimetic pattern could be evolved in " simple and easy stages from a form presenting merely the " ordinary aspect of its own genus," and further adduced reasons for holding that "it is not necessary that the forms " between which mimicry originates should possess consider" able initial resemblance." In his latest memoir, " Mimetic "Attraction," read on 5th May last,* Dr. Dixey expanded a suggestion he had previously (1896) made respecting divergent members of an inedible group to point out-still from evidence in the Pierine subfamily to which he has devoted so much fruitful study-" how the process of gradual " assimilation starting from one given point may take not " one direction only but several divergent paths at the same

[^58]" time," with the result that a more or less intimate mimetic relation was brought about with several protected forms of quite different affinities, though each connected in their colouring and aspect with some group of distasteful associates. He further set forth very fully the distinction which exists between the mimicry of inedible by edible forms, which could only be in one direction and was of advantage to the mimicker alone, and the assimilation among inedible forms themselves, where the mimetic attraction acts reciprocally, to the advantage of all participators.

Another of our Fellows, Colonel C. Swinhoe, distinguished for his wide and intimate knowledge of Oriental Lepidoptera, read before the Linnean Society, in 1895, a most interesting paper " On Mimicry in Butterflies of the genus Hypolimnus." * In this memoir, as the author points out, a small group of wide-ranging mimetic insects is followed throughout its geographical distribution ; and the process of mimetic modification is traced through the female, from the amazing instability of that sex of $H$. bolinu (local form) in the Fiji Islands, where the male is stable and of the normal ancestral pattern and colouring, to the opposite extreme in Africa, where (with the exception of $H$. misippus) both sexes of the known allied forms of the genus are equally mimetic. $\dagger$ The singular contrast between the numerous modifications of the female of the Bolina type, and the absolutely constant imitation of Danais chrysipus alone by the o $H$. misipmus is well brought out, and the different courses thus pursued by the respective females are shown to depend on the range, variation, and abundance of the model that is mimicked. Colonel Swinhoe had previously (1887) published a good account of mimicry in Indian butterflies, $\ddagger$ and in it made special reference to the remarkable series of close likenesses between species belonging to different subgenera of the great protected genus Euplea.

[^59]So much prominence has naturally been given to the rery conspicuous development of mimicry among the Lepidoptera, that it is not uncommon to hear the matter spoken of as if limited to butterflies and moths, and even entomologists need to be reminded of the prevalence of the phenomenon among other orders of insects. The stinging Hymenoptera furnish the most numerous models to members of other orders, being closely mimicked by numerous Diptera, by many heterocerous Lepidoptera, by various Carabid, Heteromerous, and Longicorn Coleoptera, and by some Hemiptera; while certain ants are well imitated by spiders. As regards Coleoptera, mimicry is mainly found within the limits of the order itself-e.,. , Cicindelids by Heteromera and Longicorns, Carabids by Heteromera, Malacoderms by Longicorns, and Rhynchophora by Longicorns; but certain Cicindelid and Rhynchophorous beetles are closely copied by Orthoptera, belonging respectively to the genera Condylodeira and Scepustus. Lepidoptera do not seem to find mimickers beyond their own order, unless the case quoted by Haase * from E. Hartert, of the resemblance of a large Cicada to the Indian Thunmantis alivis (Morphinæ) be one of actual mimicry. Nor do Diptera appear to be models for imitation, except in the case of the hunting spiders, which mimick the Muscidæ they chase; although the neuropterous Bittacus certainly bears a strong likeness to Tipula, and may possibly find the advantage of that harmless aspect in approaching its prey. It cannot be denied that some of the inter-ordinal mimicries are even more impressive and striking than those so notable among butterflies, the excellence of the superficial disguise of general outline, proportion of parts, colouring, and markings being so great as to throw into obscurity the really vast structural discrepancies. Such cases as the imitation of the SouthAmerican wasps of the genera Polybia and Synceca by moths of the genera Splecosoma and Myrmecopsis, $\dagger$ of the Bornean sand-wasp Myygnimia aviculus, by the beetle Coloborrhombus

[^60]fasciatipennis,* or of the Philippine tiger-beetle Tricondyla, by the cricket C'ondylodeira, $\dagger$ are absolute marvels of deception all belonging to that special phase of mimicry where the obvious advantage to the unarmed mimic lies in being mistaken for the armed and formidable model.

As the Lepidoptera are at present the only order in which a very considerable number of mimetic relations have been observed, it may be of service to note here the various directions in which mimicry ramifies within the ordinal limits. The very large majority consists of cases where (a) Rhopalocera are copied by other Rhopalocera ; and, taking the groups in succession, we find that (1) Danaine (including Neotropinæ) are mimicked by members of their own subfamily, by Satyrinæ, Heliconiinæ, Nymphalinæ, Erycinidæ, Pierinæ, and Papilioninæ ; (2) a few Morphince by Papilioninæ ; (3) Heliconïuc by Pierinæ ; (4) Acreina by Nymphalinæ, Lyceenidæ, Pierinæ, and Papilioninæ ; (5) some Nymphaline by members of their own subfamily ; (6) Pierine by species of their own subfamily, and very rarely by Satyrinæ $\ddagger$; and (7) Papilionince by members of their own subfamily and by certain Pierinæ.

The next series is composed of those comparatively few instances where (b) Rhopalocera are imitated by Heterocera; and here it is found that (1) Danaina (true, and Neotropinæ) are mimicked by Castniidæ, Chalcosiidæ (three different genera), Arctiidæ (two different genera), Dioptidæ (three different genera), and Geometræ (two different genera); (2) a few Acraina by Melameridæ (two different genera); (3) I'apilionince by Castniidæ, Chalcosiidæ, and Arctiidæ.|| Much

[^61]
## ( lxxxiv )

rarer are the known cases of (c) mimicry of Heterocera by Rhopalocera; but (1) certain Uraniida are simulated by Papilioninæ ; (2) Ayaristide by Nymphaline ; and (3) Lithosïde by Nymphalinæ. The mimicry of (l) Heterocera by Heterocera seems also to have been but seldom observed, but the cases recorded consist of (1) A!faristide by Liparidæ; (2) Melameride by Chalcosiidse ; (3) Geometride by Uraniidæ and Chalcosiidæ, and (4) Lithosiidte by Agaristidæ.*

It will be seen that the foregoing enumeration includes not only the Batesian mimicries, but also those coming under the category of Mïllerian associations of distasteful forms. To the latter class belong all cases occurring within the limits of the subfamilies Danainæ, Heliconiinæ, and Acræinæ, and also many of those existing between species of one or more of those groups and certain Pierine and Papilioninæ, as well as (among moths) the Agaristidæ, some Lithosiidæ, and very probably others. It seems clear that, in the same circle of various species all approximating with more or less accuracy to one special type of coloration, marking, and outline, there will often be found, in the larger and more comprehensive of such associations, both Batesian and Müllerian mimicries; this is indeed distinctly to be gathered from some of the cases tabulated by Bates himself, and has been lately well illustrated in the exceptionally rich Neotropical series of "homœochromatic " forms brought before us by Mr. W. F. H. Blandford, among which were several of the actual specimens figured by Bates in illustrating his famous memoir. In the scarcely less opulent Oriental region (as Col. Swinhoe has

[^62]
## ( lxxxv )

pointed out in the paper above mentioned, and has more fully of late described to me) the same state of things is prevalent, extensive Müllerian inedible associations among (e.\%.) the species of the three main groups into which the old genus Euploa has been divided, being "attended and surrounded " by numerous true mimics belonging to edible groups. The far poorer Ethiopian region has, to my knowledge, yielded as yet only a very few series including both inedible and edible imitators; but in the group of which the Danaine, Amauris eqialen, is the centre, there appears the exactly similar Danais (Melinda) moryeni ; and in the same way the much-mimicked Amauris echeria, var., has in East Africa a protected companion in the female Acrica johnstmi, while there is some reason for thinking that the widely-distributed Acrea encelon is modified in resemblance to the dominant Dunais chrysippus. Perhaps the most remarkable of these associations is that which surrounds the abundant and extremely conspicuous slow-flying diurnal Lithosiid moth, Aletis helcita. The apparently protected analogues of this insect are the closely similar Lithosiid, Phecugarista helcitoides, and Agaristid Eusemia falkensteinii, while the Batesian mimickers are found in the Nymphaline butterflies, Euphedru ruspina and E. eleus, and the aberrant Lycænid, Liptena sanduinea. Another point of interest in this last-named series is its great similarity in colouring and marking to that which is headed by Danais chrysippus, the differences being merely that in the Aletis set the red ground-colour is brighter, and the white spots in the black margins are larger; so that from the aspect of warning of distastefulness to enemies the two sets may be regarded as practically but one.

Among the Batesian mimicries in the Ethiopian region, I wish to revert more fully to the very striking and instructive case, already briefly referred to, presented by the females of the Merope-group of the genus I'apilio, because it has largely gained in interest by the increase of our knowledge in recent years. In 1867, when I wrote the paper above mentioned,* ${ }^{*}$ only three forms of the Merope-group were known, rid. : the

[^63]West-African $P$. merope, the South-African $P$. cenea (then regarded as not more than a variety of $P$. merope), and the Madagascar $I^{\prime}$. meriones. Of these the last-named alone had the sexes nearly alike, vil.: of a very pale yellow, margined with black in the forewings, and with the hindwings more or less black-marked and bearing conspicuous tails; each of the two continental species presenting not only the utmost disparity between the sexes but also the singular phenomenon of a polymorphic female, invariably without tails, accurately mimicking two or three widely-differing species of Danainæ, and at the same time offering numerous linking variations. I was justified in considering that the Madagascar form should be regarded as retaining the ancestral condition of this group of Papilio, while the females of the continental forms had been profoundly modified in the mimetic directions specified; and I pointed to the costal black bar in the forewings of the female $P$. meriones as possibly indicating the feature on which natural selection had been able to work, to the ultimate production of close imitation first of the lighter and at length of the darker Danainæ concerned.

It was startling to learn, in 1883, that a newly-discovered continental form of the group, $P$. antinorii, inhabiting Abyssinia, like the Madagascar $P$. meriones, had the sexes quite alike except for the costal black bar in the female; while in 1889 there was described from the Comoro Islands a fifth and very distinct species, $P$. Iumbloti, in which the sexes resemble each other even more closely than in the Madagascar form, and which therefore in all probability exhibits a still more primitive condition.

The survival of the ancestral similarity of the sexes on the African mainland, so far from the Malagasy archipelago as Abyssinia, was a discovery of much importance; and the greatest interest was added to the whole case when, in 1890, Prof. N. M. Kheil,* of Prague, described and figured two most remarkable new forms of the female $P$. antinorii. These females, given by the author as "ab. niarioides" and "ab. ruspina," respectively, in colouring and pattern mimic

* " Iris," iii., pp. 333-336.

Amauris dominicanus and Danais chrysipmes, almost as closely as do the hippocoonoides and trophonius females of $P$. cenea, but yet retain on the hindwings the fully-developed tails possessed by the male and the ummodified female.* One would naturally suppose that these conspicuous appendages to the hindwings, never found in the Danainæ but so characteristic of many groups of l'apilio, would have been among the first features to be lost in the process of assimilation to the Danaine models ; and, as Prof. Kheil mentioned in his paper, that the tails in the specimen of "niavioides" were injured, but had been restored in the figure, I felt a little doubtful about them, and ventured recently to address him on the subject. He most obligingly answered my inquiries, stating that the two forms of female were still in his possession, and that while the tails of the ab. niarioides were injured, as originally pointed out, those of the ab. ruspince were intact and are correctly delineated in Haase's figure, which-as well as that of niarioiles-was drawn from the actual specimen, lent by Prof. Kheil. It is to be noted that the tails are uniformly black, in accord with the broad hindmargins, instead of being pale yellow with a short median streak of black, as in the female of the male coloration. Prof. Kheil further informed me that the discoverer of these forms, the late Dr. A. Stecker, who collected at Lake Tana, brought together seven males, two females like the male, and one only of each mimetic form of female, and that he reported the male as very common, while the females seldom occurred.

This persistence in Abyssinia of the original female $P$. antinorii, side by side with two mimetic forms of the same sex retaining her outline of hindwings but far divergent from her in advanced imitation of two very different Danainre belonging to distinct genera, is strong confirmatory evidence of the view I advanced as to the development of the various tail-less mimetic African females of the group from the ordinary male-like type of female solely prevalent still in the Malagasy sub-region. From analogy with what occurs

[^64]over so large an area of the rest of Africa, I confidently anticipate that we shall receive from Abyssinia intermediate gradations between the three known forms of the female $P$. antinorii; and as the dominant model, Amauris echeria, is represented in Abyssinia by the abundant and very closely allied $A$. steckeri, I should not be surprised to see another mimetic female of $P$. antinorii closely resembling the typical $P$. cenea. More than this, we may not unreasonably hope to discover, at some point in the wide territories between Abyssinia and Zanzibar, females of the Merope-group exhibiting stages intermediate between the long-tailed mimetic females of $P$. antinorii and the entirely tail-less ones of $P$. cenea.

While dealing with this case, I would add that, until recently, of all the various tail-less continental females of this group known to me, the form dionysos-a rare phase of the West-African $P$.merope-was the least modified as compared with the male,* for it possesses merely a trace of the wide black bar that in two other forms divides the pale ground-colour into perfectly separate subapical and innermarginal spaces in the forewings, and the hindwings are ochre-yellow with a narrow black border. $\dagger$ Professor Poulton has, however, kindly shown me, in the Hope Collection of the Oxford University Museum, a much closer approximation to the masculine coloration in an extraordinary example of the female $P$. cenea from Zanzibar. In this female the transverse trace of black in the forewings is even fainter than in the diomysos form, and the colour of the wide pale spaces and the hindmarginal spots in all the wings is almost exactly of the pale creamy-yellowish tint of the male $P$. cenea; and on the underside, while the pale-yellowish of the forewings is better divided by blackish than on the upperside, the colouring of the hindwings corresponds much more nearly to that of the male than in any other female I have seen-the characteristic break in the submarginal brownish band being moreover very

[^65]
## ( lxxxix )

complete and wide. There can be no doubt that in this specimen we have a marked case of reversion to the original colouring of the female, but it is unaccompanied by any inclination towards the recovery of the lost tail of the hindwings.

Returning to the general aspects of the subject, it is of importance to consider more closely how the evidence stands in relation to (A) persecution by insectivorous foes, (в) possession of malodorous and distasteful juices by certain groups, (c) rejection or avoidance by foes of the insects provided with offensive juices, and (D) loss occasioned to distasteful spocies by the attacks of young and inexperienced enemies; for it is admittedly on the co-operation of these factors that the theory of mimicry depends.
(A.) As regards the first point, the broad fact of insects generally constituting the food of countless devourers, vertebrate and invertebrate, is beyond dispute; immense and incessant persecution is universally at work. But when we proceed to examine this world-wide persecution more in detail, and to ask in what special directions it works, or what groups or species are the particular prey of certain groups or species of enemies, we very soon discover how little is exactly known. Birds, for instance, are such notorious and apparently indiscriminate insect-eaters, and some of them are so active and demonstrative in their hunting, that it seems but reasonable to regard them as the chief pursuers on the wing of the abundant and defenceless butterflies. Yet in the discussion which followed the reading of Dr. Dixey's last paper above referred to nothing was more noticeable than the very scanty testimony to such persecution on the part of birds that could be brought forward by the very competent well-travelled entomologists present. In fact, the poverty of observed cases of such attack has induced the opinion among some entomologists that birds very rarely chase butterflies at all, and the published expression of this view by Pryer, Skertchley, Piepers, and other experienced collectors cannot be overlooked. But I am persuaded that in this instance, as in so many others where the life-history of animals is concerned, the dearth of evidence is due to the neglect of well-
directed and sustained observation. Little can be gaineā by merely noting such cases as happen to force themselves on the collector's attention; the collector must resolutely set himself to search out and keep watch upon what really takes place. Considering that there is no record of any naturalist's having seriously taken up the investigation of this matter in the field, I think that very much positive evidence could hardly be expected, and that what has been published goes far in the direction of proving that birds must still be reckoned among the principal enemies of butterflies. Belt's well-known note on the pair of Puff-birds that he watched for half-an-hour bringing various butterflies to feed their young is supported by E. Poeppig's observation* that in the forest it is easy to discover where a Galbula's favourite perch has been chosen, as the wings of large butterflies, whose bodies only have been eaten, strew the ground for several paces round about. Von Wied found a large "Tagschmetterling " in the stomach of a Bucco, and E. Hartert butterflies in that of Merops pusillus; while E. L. Arnold saw Terias hecabe and Papilio pammon caught by birds in India. $\dagger$ Hahnel published in "Iris" (1890) the observation that in SouthAmerica birds hunted Pierinæ more than any other group of butterflies, and often snapped up specimens close to him. Haase in Siam saw some C'atopsilic (Pierinæ) and Hesperiide captured and eaten by sparrows. I have recorded Mrs. Barber's remarks that among the insects caught and brought to their nestlings by various Sun-birds at the Cape she often noticed Pyrameis cardui, and also Mr. Mansel Weale's note that T'chitrea cristata captures the male Papilio cenca. Mr. T. Ayres, a very trustworthy ornithological observer, has remarked (in his notes in "The Ibis " on the habits of SouthAfrican birds) that the King-hunter, Ispidina natalensis, feeds almost entirely on butterflies. Col. Swinhoe informs me that in India he has on several occasions seen Merops riritis catch and eat butterflies, and that he has also witnessed many cases of other birds pursuing them ; while the common

[^66]Corvus splendens was found greedily to devour any edible butterflies thrown to it. This evidence is supported by that kindly furnished to me by Mr. F. Lewis, of the Ceylon Forest Service, who has for many years been familiar with the ways of birds in the jungle, vid. : -that he has seen Merops viridis and MI. philipminus occasionally take small white and yellow butterflies (Terius, spp.), and the latter bee-eater and $M$. swinhoii frequently capture Catopsilic, especially when these butterflies are travelling in thousands along the river-valleys. Mr. Lewis also gives Buchanya leucopyyialis as a very active hunter of butterflies on the wing. In England I have noticed a swallow hunting one of the common "Whites" (apparently Pieris brassice), and also three sparrows for some time chase and eventually capture a female E'pinephile janiru; while at the Cape I have seen Fiscus colluris, the common shrike of the colony, seize in succession several newlyemerged Papilio lyaus on the wing.

In Mr. Skertchley's paper, " On Butterflies' Enemies,"** he gives a list ( p .485 ) of no fewer than twenty-three species of butterflies belonging to five different subfamilies, which he observed in Borneo with both hindwings mutilated in the same manner, as if a piece had been bitten out while the insect was at rest-but this description of mutilation he attributes, not to the assaults of birds, but to those of lizards and perhaps small mammals. I see nothing, however, to lead us to conclude that birds do not attack butterflies when at rest, especially when settled on flowers, foliage, etc., with closed and erect or pendant wings ; it is highly probable, indeed, that they would mark down a settling butterfly and make direct for it. It seems to me likely that most of the destruction of butterflies by birds is not effected by the difficult chase of these wavering and erratic or often very eapid flyers in the open, but is carried on mainly against the slowly-flying bulkier females while engaged in depositing their ova, usually among the fohage of trees, undergrowth, or herbage, where they would be almost unnoticed by the collector. An equally if not more dangerous time for

[^67]butterflies of both sexes is during courtship and pairing, when they are less on their guard than at any other period, and those actually paired (unless rery well concealed by close resemblance of their underside to the immediate surroundings) have little chance of escape.* Col. Swinhoe has mentioned to me that birds often do not seem inclined to take the trouble to give chase to flying butterflies, but sit merely watching them, and this is in support of the riew that they more frequently adopt the easier plan of attacking them when feeding, settling, or at rest. The frequency of the cases where mimicry is confined to the female points with some significance to the probability that persecution is more directed against that sex than against the male.
(в.) The presence of malodorous juices in many insects is a matter of common observation, and is a protective property possessed by several entire groups, especially among the Lepidoptera and Coleoptera. There is abundant evidence as to the prevalence of these secretions, and among the Lepidoptera they are particularly developed in the butterflies of the groups Danainæ, Neotropin:e, Acræinæ, and Heliconinæ, and also in some Papilioninæ, as well as in many moths of the groups Agaristidæ, Chalcosiidæ, Arctiidæ, Lithosiidæ, etc. The strength of the disagreeable odour emitted is in some species very great ; $\dagger$ Seitz, for instance, mentioning that the smell of the South-American Heliconius besctiei and Eueides alipher't extends over a radius of several paces, and Woodmason and De Nicéville testifying to the same effect as regards the Indian Papilio philoxenus and allied forms. When molested many of these offensively-smelling species exude drops of a yellow or whitish fluid which leave on anything they touch a stain and odour difficult to remove, as I have experienced in the case of the Mauritian Eupleca euphone, the South-African Danainæ and Acreinæ, and various South-African Agaristidæ, Glaucopidæ, and Arctiidæ.

The origin and manner of acquisition of these unsavoury

[^68]secretions have yet to be discovered ; the suggestion (so much insisted on by Haase) that these juices are directly derived from those of similar quality in the food-plants of the larvæ arising from the long-known circumstance that some of the food-plants of species in the protected groups are of an acrid or poisonous character, such as (e.\%.) Asclepiads in the case of many Danainæ, and Aristolochia in that of the inedible forms of Papilioninæ. No doubt, too, the fact that the unpleasant qualities are very often fully developed in the larvæ of the distasteful species-as I have found with Danais chrysippus and various Acrææ-lends some weight to the suggestion; but at present nothing approaching sufficient data can be brought forward respecting the actual food-plants to which the protected groups, in contrast to the unprotected, are thought to be restricted. It cannot be gainsaid, as Prof. Poulton has pointed out,* that the food-plants of many of the distasteful European moths do not belong to any poisonous or acrid category ; and his own and Mr. Latter's papers on Dicranura vinula alone amply demonstrate what powerful acids can be elaborated by a larva which finds its food in such innocuous plants as poplar and willow. The supposed direct derivation of the nauseous juices from the plants consumed is thus plainly a matter that awaits investigation from both biological and chemical standpoints.
(c.) The avoidance or rejection as food by insectivorous animals of the insects possessing malodorous or distasteful juices no longer rests merely on the negative evidence given by Bates, Wallace, Belt, and other competent observers, to the effect that in nature such distasteful forms are habitually neglected and unmolested ; there is now much positive experimental evidence as to the manifest avoidance or disgust with which such species are left untouched, or thrown aside after tasting, when offered to domesticated or captive vertebrate animals that devour ordinary insects with avidity. The numerous experiments of this kind recorded by Butler, Jenner Weir, Weismann, Poulton, and Lloyd-Morgan, as

[^69]regards both larvæ and imagos of European species, are supported by a few made by Belt with Heliconiinæ in Central America, by D'Urban and myself with Danainæ and Acræinæ* in South-Africa, and by Haase with Danainæ in Singapore.

It is manifest, of course, that even the most distasteful forms cannot enjoy complete immunity from persecution ; in ordinary circumstances they are doubtless mainly kept down by parasitic insects, $\dagger$ and during any scarcity of more palatable prey it is certain that they will be devoured faute de mieux by vertebrates and invertebrates alike. To the latter condition are perhaps due such cases as Distant's $\ddagger$ note of the orthopterous Hemisaga devouring an imago of Danais chrysippus; Col. Yerbury's || observation that in Ceylon Euplect core and Delias eucharis were largely taken by a Mantis, and Danais limniace by two kinds of Asilider ; and Belt's remark that a flower-frequenting spider captured Heliconiidæ.
(D.) As regards the important point whether the protected forms have to suffer a certain percentage of loss from the attacks of young and inexperienced birds and other animals, it must be admitted that the evidence at present forthcoming is exceedingly scanty; and I have long felt considerable doubt as to the sufficiency of this factor to account for the mimetic resemblances, often remarkably close, between members of associated protective groups. But on reviewing carefully the recorded observations which appear to bear on the question, I have found reason to think that there is enough support to justify the provisional acceptance of the Müllerian explanation. We have in the first place Fritz Müller's own capture of Heliconii and Acræinæ with a notched piece bitten out of the wings, and Distant's (l.c., p. 65) of a Danais chrysippus whose wings had been bitten unsymmetrically, apparently by a bird. Then there is the significant record

[^70]of Skertchley (l. c., p. 485) who, among twenty-three species of Bornean butterflies taken with both hindwings mutilated in the same manner, notes no less than four Danainæ, vid., Hestia lynceus, H. leuconoe, Ideopsis dans, and Euplea midamus. Moreover, it is very remarkable that several of those entomologists who have specially emphasized the small part played by birds in attacking butterflies, mention, among the few cases of such attack as they witnessed, instances of protected forms being assailed, Sir G. Hampson* remarking that in South India the Euplœ⿸厂 and Danaids were caught as often as any others, and M. Piepers $\dagger$ that in two of the four cases which he had seen in Sumatra and Java, the species seized were Euplææ.

The question underlying this is manifestly whether insecteating animals have an instinctive inherited discernment of what species are unfit for food, or whether, on the contrary, each individual has to acquire this necessary knowledge by personal experience, aided in some vertebrate groups by parental guidance. So numerous and so marvellous are the instinctive or congenital activities of animals-especially in the insect world, where past experience or parental instruction is almost always non-existent-that there has been a very general disposition on the part of naturalists to incline to the former view in a matter so all-important as suitable food. Yet, as far as experiment has hitherto gone in this direction, there seems good ground for holding that-at any rate in such specially insectivorous vertebrate groups as birds, lizards, and frogs-the young possess no such hereditary faculty of discrimination, but have to discover individually what to avoid. This appears not only from Mr. Jenner Weir's and especially Prof. Poulton's careful and often-repeated experiments with lizards and frogs, $\ddagger$ but also from Prof. Lloyd-Morgan’s study || of newly-hatched birds of different orders, which indicates clearly with what complete want of discrimination every object of suitable size is at first pecked at and tasted, but how

[^71]soon experience tells and is acted upon. Prof. Lloyd-Morgan made special trial of these young birds with many distasteful insects and their larvæ, and states in conclusion (l.c., p. 43) that he did not find a single instance of instinctive avoidance, but that the result of his observations is that "in the " absence of parental guidance, the young birds have to learn " for themselves what is good to eat and what is distasteful, " and have no instinctive aversions."

In concluding what I feel to be a very incomplete outline of what has been done in this most important branch of zoological research, I cannot refrain from expressing the gratification I find in noting how by far the chief part in the investigations pursued and in the deductions derived from them has from the outset been borne by Fellows of this Society. It is work on which we may with justice be congratulated, and which should encourage perseverance in the same and lindred lines of inquiry.

Here, as in many other biological researches, it cannot be too strongly insisted on that no result of lasting value can be hoped for without resort to the living animals among all the natural conditions and surroundings. It was not a stay-athome theorist, familiar only with the dried specimens of the cabinet, that detected the meaning of mimicry and gave to science a rational explanation of the mystery, but an ardent explorer and naturalist, who devoted many of the best years of his life to field-work in tropical lands. I am the last to undervalue the knowledge of the systematist, which is absolutely indispensable to all intelligible record, and I fully recognize that no naturalist can be properly equipped for his work without a fair amount of systematic training; but philosophical discovery in any direction such as we are now considering can never be truly adranced without unflagging observation and experiment among organisms living in their natural environment. How but by the closest and most exact attention to the entire life-history of animals in their native haunts can we expect to deal satisfactorily with such questions as this of mimicry, of protective resemblances generally, of seasonal dimorphism, sexual selection, local variation, and the like? Admitting gratefully the good
work of this kind which has been carried on in Europe, and especially in our own country, one cannot but regret that from tropical regions, where alone the abundance, complexity, and incessant activity of life afford full prospect of the adequate reward of such research, we have little more than isolated notes and unconnected and incomplete observations, mere indications-precious as they are-of the rich harvest that lies unreaped for lack of resident workers devoted to the task.

It is on this account that I earnestly renew the plea put forward from this chair on the 5th May last, for the establishment, in tropical countries, of Biological Stations for the study of the terrestrial fauna; where, as in the existing Marine Biological Stations, naturalists could follow, during a succession of seasons, special lines of observation and experiment under favourable conditions of laboratory and other equipment, free from the hindrances and distractions of ordinary collecting travel, and with all the advantages of mutual help and encouragement. The living expenses, for men of the simple tastes of the naturalist, would not be great; and I feel certain that, with the increasing facilities for swift transport, it would not be long before many students of biology would embrace the opportunity so provided for the effectual prosecution of researches of the utmost value to science.

## ( xcix )

## I N D E X.

Note.-Where the name only of the Genus or Species is mentioned, the description will be found on the page referred to.
The Alabic figures refer to the pages of the 'Transactions'; the Roman numerals to the pages of the 'Proceedings.'
New Genera and Species, and those which have been redescribed, will be found in detail, but certain of the longer papers are arranged generically under their headings.
Many of the subjects indicated as being found in pp. 317-332, and xx.-xlvii., are referred to in the President's Address, which is not separately indexed.


## GENERAL SUBJECTS.

Abnormalities in Halticid beetles, exhibited, x., liii.; gynandromorphous Chelisoches morio, exhibited, xxxiii.
Annual Meeting, lxi.
Brachycerus apterus, photograph of, exhibited, xvii.
Butterflies, neuration of, changes in the wing structure of (A. R. Grote), 333; aberrations in Lepidopterous neuration, 342.
Bye-Laws, alteration of, at Special Meeting, xlvii.
Cordyceps growing from a Cicada larva, exhibited, viii.
Dermestes vulpinus and Agrotid larvæ, damage by, referred to, 1 x .
Destruction of butterflies by birds, etc., referred to, xxxviii.-xlvi.
Dicranura vinula, the prothoracic gland of (O. H. Latter), structure and function, 113; homology, 121 ; referred to, xi.-Presence of potassium hydroxide in the alimentary canal of, 124.
Dimorphism, Seasonal, in African butterflies (Dr. A. G. Butler), 105.
" Dry-" and " wet-season forms," discussion on, vi.
Dunning, Mr. J. W., death of, Iv.
Homæochromatism and mimiery in butterflies, puper, exhibitions and discussion on, xx., xxxiv.
Hybridization of Lepidoptera, Staudfuss's experiments on, account of (Dr. F. A. Dixey), 1.:-of Tephrosia bistortata and T. crepuscularia, xlix.; of Zygæna ochsenheimeri and $Z$. filipendulæ, iii.

## ( c )

Insects from Orkneys, exhibited, viii. ; from Cannes, $x x$.
Insects introduced into Great Britain, exhibited:-Acrydium æg!ptium, viii.-Anisolabis annulipes, Ivi.-Apterygida arachidis, Chelisoches: morio, xviii.
Locusts, cooked for food, exhibited, v.
Mimetic Attraction, reciprocal Mimicry and Convergence in Butterflies (Dr. F. A. Dixey), 317.
Müller, Dr. Fritz, death of, xxxii.
President's Address, lxvi.
Protection of British insects in danger of extermination, proposed assuciation for, ix., xvi.
Temperature experiments on Lepidoptera, results of exhibited, xviii., xlviii.
Victoria Research Fund, Letter from the President of the Royal Society, xii.
Watson, Capt. E. Y., death of, lviii.

## COLEOPTERA.

Aphthona grenadensis, n. s., 267.
Brachysomus hirtus, exhibited, lvi.
Chætocnema minuta, referred to, 269.—nana, n. s., 269.
Chalepus plebeius, 278.
Coleoptera from Austrian Tyrol, i.-from Cintra, ii., exhibited.
Coscinoptera intermedia, n. s., 253.
Crepidius flavipes, n. s., 284.
Cryptocephalus tricostatus, referred to, 254 .
Cyphon caraibus, n. s., 294.-dehiscens, n. s., 293.
Dermestes vulpinus, damage by, referred to, lx .
Dicrepidius insularis, n. s., 283.
Disonycha lævigata, n. s., 262.
Elateridæ, characters and relative numbers of the sexes in species of, noticed, x .
Epitrix subfuscu, n. s., 265.
Esthesopus grenadensis, n. s., 289.
Eudectus giraudi, exhibited, x.
Glyptina nigrita, n. s., 266.
Halticid beetles, abnormalities in, exhibited, x., liii.
Hermeophaga smithi, n. s., 260.
Homophyla unicolor, n. s., 270.
Horistonotus sericeus, n. s., 288.
Hypolampsis annulicomis, n. s., 274.
Lactica levicollis, n. s., 2 อ 9.
Lema sharpi, n. s., 250.
Longitarsus horni, n. s., 268.
Lytta vesicatoria, exhibited, lvi.
Megistops granulatus, n. s., 275.
Metrecus paradoxus, exhibited, lx.
Myodites subdipterus, exhibited, 1x.
Nodonota grenadensis, n. s., 250 .
Notiophilus rufipes, exhibited, lvi.
Edionychis sharpi, 11. s., 272.—smithi, n. s., 271.

Ozena, referred to, 392.
Pachybrachys scabripennis, n. s., 2ŏ4.
Paussidæ, description of a new Insect of the Family (C.O. Waterhouse), 391.
Phædon nigripes, n. s., 25 อ.
Physimerus smithi, n. s., 273.
Physorhinus erythrocephalus, referred to, 286.
Plytophagous Coleoptera of St. Vincent, Grenada, and the Grenadines; species belonging to the following families described and alluded to :-(Crioceridæ-Galerucidæ, M. Jacoby; Hispidæ and Cassididæ, G. C. Champion), Aphthona, 267. - Cassididæ, 278. - Cerotoma, 277.Chetocnema, 269.-Chalepus, 277. - Chelymorpha, 279.-Chrysomelidx, 258.-Clythridx, 253.-Colaspis, 257.-Coptocycla, 279.Coscinoptera, 253.-Crioceridæ, 250.-Cryptocephalide, 254.-Cryptocephalus, 254.-Diabrotica, 276.-Disonycha, 261.-Epitrix, 265.Eumolpidæ, 256.-Galerucidx, 259.-Galerucinæ, 276.-Glyptina, 266.-Halticinæ, 259.-Haltica, 261.-Hermæophaga, 260.-Hispidæ, 277. - Homophceta, 271. - Homophyla, 270. - Hypolampsis, 274.Latica, 259.-Lema, 250.-Longitarsus, 268.-Megistops, 275.Mesomphalia, 278,-Myochrous, 2ธ̃8.-Nodonota, 25̄6.-Edionychis, 271.-Pachybrachys, 254.-Phædon, 2ă8.-Physimerus, 273.-Pseudoepitrix, 264.-Rhabdopterus, 257.-Schematiza, 276.-Systena, 262.Typophorus, 258.-Species exhibited, vi.
Prionoscirtes dilaticornis, n. s., 291.
Protopaussus walkeri, n. s., 391.-exhibited, liii.
Pseudoepitrix suffriani, n. s., 264.
Ptilodactyla antillarum, n. s., 296.-sancti-vincentis, n. s., 295.
Scirtes insularis, n. s., 292.
Serricorn Coleoptera of St. Vincent, Grenada, and the Grenadines; species belonging to the following families and genera described and alluded to (G. C. Champion) :-Eolus, 286.-Agrypnella, 281.-Anchastomorphus, 287.-Anchastus, 287.-Callirrhipis, 290.-Chalcolepidius, 282.Cneoglossa, 291.-Cosmesus, 290.-Crepidius, 284.-Cyphon, 293.Dascillidæ, 291.-Dicrepidius, 283.-Elateridæ, 231.-Esthesopus, 235.-Heteroderes, 285.-Horistonotus, 238. -Ischiodontus, 285.-Monocrepidius, 285.-Physorhinus, 286.-Prionoscirtes, 291.-Ptilodactyla. 295.-Pyrophorus, 289.-Rhipidoceridæ, 290.-Scirtes, 292.-Species exhibited, x .
Systena bicolor, n. s., 263.
Trichonyx sulcicollis, exhibited, lvi.
Velleius dilatatus, exhibited, lvi.-referred to, 1x.
Zeugophor flavicornis, from Colchester, exhibited, ii.

## DIPTERA.

Acanthiptera inanis, exhibited, vii.
Callicera ænea, exhibited, vii.
Cylindrotoma, early stages of, referred to, 363 .
Cylindrotomina, Earlier Stages of (Baron Osten Sacken), 36?.
Hydromyza livens, exhibited, vii.
Limnobia, early stages of, referred to, 364 .

Nephrocerus flavicornis, exhibited, vi.
Phalacrocera replicata, Structure and Life-history of (L. C. Miall and R. Shelford), 343.

Physocephala nigra, exhibited, vii.
Platyura marginata, exhibited, vi.
Stevenia maculata, exhibited, vii.
Syrph us guttatus, exhibited, vii.
Triogma, supposed larva of, referred to, 364 .

## HEMIPTERA.

Aspidiotus: nerii, 93. -rapare, 94, alluded to.
Ceroplastes nerii, n. s., 101.—rusci, 101.
Chionuspis nerii, referred to, 96.-striata, n. s., 96.
Cicadetta montana, exhibited, xiv.
Coccidæ, New, collected in Algeria, by Rev. Alfred E. Eiton (R. Newste:xl), 93.
Diaspis calyptroides, referred to, 94.
Emblethis verbasci, exhibited, liii.
Eriococcus formicicola, n. з., 102.-hymolææ, n. s., 102.
Hydrocores, species exhibited of genera Antipalocoris, Diaprepocoris Metrocoris, Pedinocoris, lvii.
Kermes variegatus, from Kent, exhibited, Iv.
Mytilaspis ampelodesmx, 11. s., 95.-minima, n. s., 95.-pomortm, referred to, 94 .
Notonectidæ, Revision of, Part I. (G. W. Kirkaldy), 393.-Genera characterized, 395.-Notonecta, 397. N. americana, 408.—bifasciata, 413.chinensis, 415.—glauca, 419.-handlirschi, n. s., 408.—insulata, 403 -irrorata,418.-lactitans, 405.-lutea, 425.-mexicana, 401.-montandoni, 417.-montezuma, n. s., 402.-nigra, 424.-shooteri, 406.-triguttata, 417.-uhlersi, 415.-undulata, 410.-variabilis, 414.-Species exhibited, xxxiv., lvii.

Parlatoria afinis, n. s., 97.-zizyphi, referred to, 98.
Planchonia algeriensis, n. s., 99.-ilicis, n. s., 100.
Velia currens, macropterous var., exhibited, xiv.

## HYMENOPTERA.

Alaptus fusculus, larve in eggs of Psocid, exhibited, xviii.
Auts of Grenada, etc., races, habits (Dr. A. Forel), 297.
Bembex frey-gessneri, n. s., 315.-_tohli, n. s., 313.—nxsuta, n. s., 314.
Brachymyrmex heeri, r. obscurior, referred to, 298.
Braconidæ, a Monograph of British, Part VIL. (Rev. T. A. Marshall), I.
Camponotus abdominalis, referred to, 297.-sexguttatus, var. u., grenctdensis, 297.
Cerceris hirtiventris, n. s., 303.-pallidula, n. s. (?), 302.—pruinosa, n. s., 303.-lutea, tuberculata, vidua (?), referred to, 304 .

Chæпияа, 30. C. conjungens, 30.
Chorebus, 26. C. limoniadum, 28.-lymphatus, 29.—näadum, 29.— nererdum, 27 .

## ( ciii )

Cremastogaster brevispinosa, r. minutior, referred to, $\mathbf{3 0 0}$.
Dacnusa abdita, 22.-adducta, 1.-albipes, 12.-ampliator, 6.-aquilegia, 21.-areolaris, 19.-cincta, 13.-clandestina, 20.-diremta, 16.egregia, 8.-gilvipes, 22.-gracilis, 17.-lateralis, 12.-lepidu, 14.leptogaster, 15.-macrospila, 10.-misella, 11.-orphanta, 18.-ovalis. 14.-petiolata, 7.-phoenicura, 2.-postica, 16.-semirugosia, 4.senilis, 10.-stramineipes, 19.-striatula, 4.-taïaris, 3.-temula, 9.tristis, 5.
Dinetus cereolus, n. s., 310.
Eciton antillanum, n. s., 299.-klugi, alluded to, 298.
Gyrocampa, 23. G. affinis, 24.-foveola, 25.-uliginosa, 26.
Hologambrus sericans, 11. s., 309.
Kohlia coxalis, u. s., 311.
Miscophus rgyptius, n. s., 315.
Palarus saundersi, n. s., 310.
Prosopigastra haudlirschi, n. s., 309.—lævior, n. s., 309.
Pseudomyrma flavidula, referred to, 300 .
Sphegidæ from Egypt, new or little-known (Rev. F. D. Morice), 301.
Sphex stschurowskyi (?), 302.
Stizus cheops, n. s., 313.-fuscatus, n. s., 312.-niloticus, n. s., 312.
Tachysphex, new species:-ægyptiacus, 306.—bryssoni, 307.-jasciatus, 306.—heliopolites, 306.—holognathus ( n . n ., for integer, 308), 434.luxuriosus, 307.-speciosissimus, 308.
Tachytes cameroniana, n. s., 305.-denticulata, 1. s., 305.
Wasps' nests containing coleopterous parasites, exhibited, lx.

## LEPIDOPTERA.

Abravas sylvata, aberrations of, exhibited, xlix.
Acrea, African species referred to, 107-110.
Acronycta psi, A. tridens, varieties of, exhibited and described, liv.
Actinota acmophora, n. s., 370.
Adelomorpha, referred to, 37.
Aeria agna, referred to, 318 .
African Butterflies, Seasonal Dimorphism in (Dr. A. G. Butler), 105.
Aglais (Vanessa) urticæ, aberrations of, exhibited, lvii., lviii.
Agrotid larvæ, damage to linen by, referred to, 1x.
Alucita similalis, candidalis, referred to, 36 .
Ambia, new species:-albomaculalis, 105.-atristrigalis, 162.-aulacophora, 165.-cataclystulis, 166.-fulvitinctalis, 163.-interstrigalis, 162.-metalophota, 166.-oculalis, 160.-picalis, 160.-rhabdotalis, 161.-semilunalis, 163.-tenella, 161.-tigridalis, 165.-trichostylalis, 164.

Anæa elara, n. s., 244.
Ancylis argenticiliana, n, s., 57.
Anthyria metriopis, n. s., 70.
Antiptilotis, n, g., S0. A, rubicunda, n. s., 8).
Aragon, Butterflies of (Mrs. Nicholl), 427.-exhibited, lvi.
Argynnis euphrosyne, aberration, exhibited, lix.

Argyractis, n. g., 135. A. argentilinealis, n. s., 136.—niphoplagalis, n. s., 136.

Aripana macrotis, n. s., 87.
Arxama atralis, n. s., 138.
Aulacodes, new species:-acroperalis, 177.-brunnealis, 178.-cervinalis 178.-convoluta, 180.-diopsalis, 177.-heptopis, 174.-junctiscriptali. 178. - parapomasalis, 175. - semicircularis, 180. - sinensis, 176. trichoceralis, 174.
Australia, Descriptions of New Lepidoptera from (E. Meyrick), 367.
Autogriphus, n. g., 59.-A. luteus, n. s., 60.
Bradina leucura, n. s., 200.-perlucidalis, n. s., 201.-remipes, n. s., 199.

Butterflies: Changes in the Structure of the Wings of (A. R. Grote) 333.-

- Neuration of Agapetidæ (Satyridæ), 340.-Hesperiidæ, 341.-Libytheidæ, Lycænidæ, Nemeobiidæ, Nymphalidæ, 340.-Papilionidæ, Parnassiidæ, 339.-Pieridæ, 340.
Butterflies, Mimetic Attraction in (Dr. F. A. Dixey), 317.-List of species alluded to, 327 .
Butterflies, mimicry and homœochromatism in, paper, exhibitions and discussion, xx, xxxiv.
Buzura nephelistis, n. s., 77.
Cacœecia torogramma, n. s., 388.
Canonistis, n. g., 74.
Canuza acmias, n. s., 379.
Caradrina heliarcha, n. s., 370 .
Carbia, 69.-C. calescens, referred to, 69.
Cataclysta, new species:-albidentatu, 153.-albipunctalis, 152.-constellalis, 151.-fulvicinctalis, 150.-pavonialis, 150.-pervenustalis, 152.-subornata, 151.-supercilialis, 152.-tessellalis, 149.

Catephia melanoschista, n. s., 372.
Central and South American Rhopalocera, descriptions of new species of (F. D. Godman and O. Salvin), 241.

Ceparcha lichenopa, n. s., 374.
Chloroclystis aristias, n. s., 385.
Chorentis octogemmiftra, n. s., 52.
Chrysocraspeda orgalea, n. s., 71 .
Clupeosoma basale, n. s., 217.-metachryson, n. s., 218.
Cocoon of unknown Japanese Moth, exhibited, lvi.
Celorhyncidia trifidalis, n. s., 205.
Cœnonympha iphioides, referred to, 428.-exhibited, lvi.
Compsoctena media, n. s., 63.
Conogetles mimastis, n. s., 88.
Coptobasis mesopsectralis, n. s., 203.
Crocydopora ๕nospora, n: s., 388.
Crocydoscelus, n. g., 35. C. ferrugineum, n. s., 35.
Cydia (?) prætextana, n. s., 58.
Danais erginus, n. s., 241.-nivosus, n. s., 241.
Dasyscopa polysemalis, n. s., 239.
Deilinia chlurochroa, n. s., 78.
Diastictis microdoxa, n. s., 75.

Diathraustodes hemileucalis, n. s., 204.
Dichocrocis tyranthes, n. s., 89 .
Dicranura vinula, the Prothoracic Gland of, and other notes (O. H. Latter), 113.

Diplopseustis metallias, n. s., 90 .
Diptychophora microxantha, n. s., 380.
Dracænura, new species:-albonigralis, 194.-cincticorpus, 194.-leucoprocta, 193.-prosthenialis, 193.-tagiadialis, 194.
Eccompsoctena, n. g., 61. E. secundella, n. s., 61.
Eccopsis præcedens, n. s., 56.
Ectropis petras, n. s., 75.
Eois iodesma, n. s., 37 j.-plumboscriptaria, $376 .-$ procrossa, n. s., 71.
Ephoria xanthocolona, n. s., 78.
Epicharma, n. g., 38. E. nothriforme, n. s., 39.
Erebia zapateri, 430.-exhibited, lvi.
Eremochroa, u. g., 368. E. alphitias, n. s., 369.-psammias, n. s., 368.
Eremothyris, n. g., 47. E. hollandi, n. s., 48.
Eriocephala allionella, larva of, exhibited, xxxiii.
Eschatura, n. g., 382. E. lemurias, n. s., 382.
Ethmia rhomboidella, n. s., 45.
Eullemma orthopetes, n. s., 375.
Euchlana pyrotoca, n. s., 79.
Eudemonia argephontes and $E$. brachyura, exhibited, xxxiii.
Glyphipterys gemmatella, 18.
Gonophylla ophiopa, n. s., 387.
Hadena bryochlora, n. s., 371.
Halterophora, n. g., 378.
Harpagoneura acrocausta, n. s., 79.
Heliconius, mimicry among species of, 317.
Heliothis leucatma, n. s., 363.
Hepialidæ, Australian, exhibited, lvi.
Heteroctenis, n. g., 71. H. dracontias, n. s., 72.-tigrina, n. s., 72.
Heterogyna penella, exhibited, xxxiii.
Hilarographa, 52.
Homeochromatic groups of Butterflies from Central America exhibited, xxii., xxviii.

Hydriomena hemizona, n. s., 385.
Hydrocampinæ, classified, 130.
Hyperaucha, n. g., 383. H. octias, n. s., 384.
Hypeuryntis, n. g., 389. H. coricopa, n. s., 389.
Idiothauma, n. g., 49. I. africanum, n. s., 50.
Jtuna lanassa, n. s., 242.
Jobula (?) radiata, n. s., 46.
Laspeyresia hemisphærana, n. s., 58.
Lemonias eudocia, n. s., 244.
Lepidoptera, aberrations in neuration of, 342.-from Cheshire, exhibited, ii. -from Hodgkinson collection, exhibited, iv.
Leto venus, exhibited, xxxiii.
Leucania micrastra, n. s., 383.
Lita intermediella, referred to L. fraternella, iv.

Luma allifascialis, n. s., 187.-maciopsalis, n. s., 186.-trimaculata, n. s., 187.

Luxicria ditrota, n. s., 76 .
Mabia fuscipennalis, n. s., 221.
Malay Archipelago, On Lepidoptera from the (E. Meyrick), 69.
Margarosticha leucozonalis, n. s., 147.
Melanargia galatea, aberration of, exhibited, lvi.
Meliana cylogramma, n. s., 367.
Melissoblaptes hilaropis, n. s., 378 .
Melitiea aurinia, varieties of, exhibited, Ivii.
Mesopolia, n. g., 62. M. inconspicua, n. s., 62.
Micraglossa œnealis, n. s., 224.
Micraputetis, n. g., 369. M. orthozonu, n. s., 369.
Microdes epicryptis, n. s., 384.
Mictopsichia argus, n. s., ธั 4 .
Mixophyla chrysias, n. s., 82.-trilinealis, n. s., 135.-xanthocasis, n. s., 81.

Monopis monachella, synonymy, etc., 63.
Mormoscopa, n. g., 371. M. crossodora, n. s., 371.
Musothyma, n. g., 375. M. cyanastis, n. s., 375 .
Musotima fuscidiscalis, n. s., 1. 6.-persinualis, n. s. , 155.
Mylothris, mimicry among species of, 317.
Napeogenes inachia, referred to, 319.
Narycia scotinopis, n. s., 383.
Nematois parvella, 66.
Nemeophila plantaginis, aberration of, exhibited, xlviii.
New Zealand, Descriptions of new Lepidoptera from (E. Meyrick), :3s3,
Noctuæ, aberrant forms of, from Romford, exhibited, lvi.
Notorea.s isoleuca, n. s., 386.
Nymphula, new species:-dentilinea, 139.-dentizonalis, 143.-lanceolalis, 140.-leucoplaca, n. s., 85.--perlalis, 143.-pleonacalis, 144.-seriopenctalis, 144.-sinicalis, 141.
Oligostigma, new species :-aræale, 1.70.-argyrilinale, 168.-camptozonale, 169.-gephyrotis, 84.-hemicryptis, 84.-metriodora, 83.-mormode.s, 83.-polydora, 82.-tripletale, 170.

Olyrus prestans, n. s., 242.-staudingeri, n. s., 242.
Omphaloptera, n. g., 157.
Orthosia horologa, n. s., 367.
Orygocera, n. g., 41. O. carmicolor, n. s., 42.
Osphrantes, n. g., 87. O. paraphra, n. s., 88.
Ozolet spilotis, n. s., 74.
Papilio eracon, n. s., 248.-iopas, n. s., 248.-bairdii, brucei, machaon, oregonia, zolicaon, exhibited and discussed, x.-merope, alluded to, xxxviii., xlv.

Pappophiorus, n. g., 39. P. eurynotus, n. s., 40.
Parnassius apollo, var., exlibited, lvi.
Parthenodes angularis, n. s., 181.-ectargyralis, n. s., 183.-mediocinctalis, in. s., 183.
Perivera homostola, n. s., 72.
Phigalia pedaria, vars., exhibited, xiv.

## ( cvii )

Phyciodes anomalus, n. s., 243.-faustus, n. s., 243.
Physetobasis heliocoma, n. s., 70.
Picrogama, n. g., 91. P. anticosma, n. s., 92.
Pieris, mimicry among species of, 317. P. brassicæ, varieties of, exhibited, lviii.

Piletocera, new species:-albicinctata, 212.-epipercialis, 210.-macroperalis, 214.-megaspilalis, 211.-nudicornis, 214.-torsicostalis, 212.
Placosaris, n. g., 89. P. leucula, n. s., 89.
Platyptilia tesseradactyla, from Galway, exhibited, iv.
Plusia moneta, exhibited, lix.
Plutodes hilaropa, n. s., 75.
Pomasia euryopis, n. s., 69.-gelastis, n. s., 70.
Praxis marmarinopa, n. s., 372.
Precis (Junonia), species referred to, 110.
Prionophora grammatistis, n. s., 374.
Probolosceles, n. g., 73.
Prorocopis, n. g., 373. P. melanochorda, n. s., 373.
Psammotis trygoda, n. s., 381.
Pseudopanthera iogramma, n. s., 377 .
Pseudoprotasis, n. g., 44. P. canairiella, n. s., 45.
Ptilothyris, n. g., 37. P. purpurea, n. s., 38.
Pyralidæ, on the classification of two subfamilies of : the Hydrocampina and Scoparianæ ; genera characterized (Sir G. F. Hampson) :-Almonia, 197.-Ambia, 159.-Argyractis, n. g., 135̆.-Arxana, 137.-Autacodes, 171.-Bradina, 198.-Camptomastyx, 215̌.-Cataclysta, 147.-Cenoloba, 222.-Clupeosoma, 216.-Calorhyncidia, 204.-Coptobasis, 202.Cymoriza, 156.—Dasyscopa, 239.—Daulia, 184.—Deuterophysa, 206.— Diathrausta, 205.-Diathraustodes, 203.-Dracrenura, 192.-Duponchelua, 191.-Eclipsiodes, 225.-Eristena, 136.-Eurrhypara, 220.Eurytorna, 208.-Hyaloplaga, 219.-Hymenoptychis, 195.-Luma, 186. —Mabra, 221.-Margarochroma, 185.-Margarosticha, 146.-Mestolobes, 223.-Micraglossa, 224.-Mixophyla, 134.-Musotima, 154.-Niphostole, 189.-Nymphula, 138.-Oligostigma, 167.-Omphaloptera, n. g., 157. -Orphnophanes, 187.-Osphrantis, 240.-Parthenodes, 181.-Perisyntrocha, 189.-Piletocera, 209.-Psammotis, 219.-Scoparia, 229.Stegothyris, 192.-Stenia, 206.-Strepsinoma, 190.-Symphonia, 153. -Talanga, 185.-Tatobotys, 196.-Tetraprosopus, 227.-Tetrernia, !ธs. -Thysanoidma, 157.-Xeroscopa, 225.-Zagiridia, n. g., 216.Zebronia, 218.
Pyrausta platycapna, n. s., 90.
Saturnia isabella, referred to, 433.
Satyrus prieuri, var. uhagonis, referred to, 429.-exhibited, lvi.
Scalidomia hirsutella, alluded to, 6 .
Scoparia, new species:-atropicta, 233.-barbipennis, 238.-glauculalis, 233.-oxygona, 381.

Scoparianæ, classified, 223.
Selidosema cremnopa, n. s., 387.
Semiocosma balanophora, n. s., 389.
Siculodes astrodora, n. s., 91.
Simaethis equatoris, n. s., 53.-flavimaculata, noticed, 54.

Spilosoma lubricipeda, varieties of, exhibited and described, viii., liii.
Strepsinoma, n. g., 85̆. S. amaura, n. s., 86.-ectopalis, n. s., 190.sphenactis, n. s., 86.
Synchloe lacinia, exlibited, lix.
Tæniocampa populeti, ab. ocularis, exhibited, ix.
Talis diacentra, n. s., 379.-enchias, n. s., 380.
Tatobotys albivenalis, n. s., 197.-aurantialis, n. s., 197.
Tatosoma agrionata, exhibited, liii.
Taxeotis goniogramma, n. s., 376.-pelopa, n. s., 377 .
Temperature experiments, results of, described and exhibited ( F . Merri-field):-on species of Colias, Drepana, Melitæa, Pieris, Saturnia, Vanessa, xviii.-on Aporia cratiegi and Argynnis paphia, xlviii.
Tephrosia bistortata, silk of, exhibited, xvii--oviposition in, xvii.-T. bistortata and T. crepuscularia, and hybrids, exhibited, xlix.
Thalamarchis, n. g., 80. T. chalchorma, n. s., 81.
Thalassodes phrixopa, n. s., 73.
Thaumatogiapha, n. n., 52 .
Theatrocopia, n.'g., 43. T. elegans, n. s., 44.-roseoviridis, n. s., 43.
Theope, new species:-diores, 246.-eleutho, 247.-mania, 217.-matuta, 246.-polimela, 247.-speciosa, 245.-talna, 245.

Thyas irioleuca, n. s., 373.
Tigridoptera monochrias, n. s., 76.-ptochopis, n. s., 77.
Tiquadra lichenea, n. s., 66.
Tithorea monosticta, n. s., 243. T. pavonii, 321.-tarracina, referred to, 320.
Tortrix viridis, referred to, 59.
Western Equatorial African Microlepidoptera (Lord Walsingham), 33.
Xanthorhoe lophogramma, n. s., 386.
Xenopseustis, n. g., 369. I. pecilastis, n. s., 370.
Ypsolophus basistriatus, n. s., 41.
Zagividia, n. g., 216. Z. noctualis, n. s., 216.
Zygæna ochsenheimei $i$ and $Z$. filipendulx, hybrids between, exhibited, iii.

## NEUROPTERA,

Stenopsocus cruciatus, parasitized eggs of, exhibited, xviii.

## ORTHOPTERA.

Acrydium ægyptium, imported, exhibited, vii.
Anisolabis annulipes, exhibited, lvi.
Apterygida arachidis, exhibited, xviii.
Chelisoches morio, exhibited, xviii.-gynandromorphous, exhibited, xxxiii.
Locusts, used as food, exhibited, v.
(Edipodidæ, variable species of, exhibited, xiv.
Phyllocrania illudens, exhibited, Iv.

-
*

## Exflanation of Plate II.

PAGE
Fig. 1. Crorydoscelus ferrugineum, Wlsm., ot ..... 33
(With head, and bifid scale.)
2. Ptilothyris purpurea, Wlsm., ot ..... 36
(With head, and joints of antennæ enlarged- side-view and section.)
3. Epicharma nothriforme, Wlsm., of ..... 37
(With head.)
4. Pappophorus eurynotus, Wlsn., oै ..... 38
(With head, and fold in hindwing containing hair- pencil enlarged.)
5. Orygocera carnicolor, Wlsm., o ..... 40
(With head.)
6. Thentrocopia rossovividis, Wlsm., $¢$. ..... 41
(With head.)
7. Pseudoprotasis canariella, Wlsm., ơ . ..... 43
(With head.)
8. Eremothyris hollandi, Wlsm., ڤ ..... 46
(With head.)
9. Idiothauma africanum, Wlsm., 우 ..... 48
(With bead.)
10. Autogriphus luteus, Wlsm., ㅇ ..... 58
(With head.)
11. Eccompsoctena secundella, Wlsm., ơ . ..... 59
(With head.)
12. Mesopolia inconspicua, Wlsm., ot ..... 60
(With head, and joint of antenna enlarged.)


Lo


7



Equatorial African Micro-Lepidoptera

## Explanation of Plate III.

PAGE
Fig. 13. Ypsolophus basistriatus, Wlsm., ..... 39
14. Theatrocopia elegans, Wlsm., + ..... 42
15. Ethmia rhomboidella, Wlsm., ㅇ ..... 43
16. Jobula ? radiata, Wlsm., ơ ..... 44
17. Glyphipteryx gemmatella, Wkr., $q$ ..... 46
18. Choreutis octogemmifera, Wlsm., đo. . ..... 50
19. Simaethis equatoris, Wlsm., ot ..... 51
20. Mictopsichia argus, Wlsm., đ ..... 52
21. Eccopsis prcecedens, Wlsm., đ ..... 54
22. Ancylis argenticiliana, Wlsm., ơ ..... 55
23. Laspeyresia hemispherana, Wlsm., of ..... 56
24. Cydia? pratextana, Wlsm, ot ..... 56
25. Compsoctena media, Wlsm., ot ..... - 61
26. Tiquadra lichenea, Wlsm., đ ..... - 64
27. Nematois parvella, Wkr., oै ..... - 61


Equatorial African Micro-Lepiảoptera

## Explanation of Plate IV.

## PAGE

Mytilaspis minima, Newst. ..... 95Figs. 1-3. $\%$ pygidium.4. $\begin{gathered}\text { ( } \\ \text { (second stage) pygidium. }\end{gathered}$5. Larva, antenna.M. ampelodesmre, Newst.95Fig. 6. $\quad$ t pygidium.7. $\widehat{\text { ( }}$ (second stage) antenna.
Chionaspis striata, Newst. ..... 96
Fig. 8. $\quad$ p pygidium.
Parlatoria affinis, Newst. ..... 97
Fig. 9. it adult;10. do, antenna;11. do. pygidium.12. ot apical joint of antenna.
P. zizyphi, Lucas ..... 98
Fig. 13. $\quad$ i thoracic tubercle.
Planchonia algeriensis, Newst. ..... 99Fig. 14. $q$ dermis ;15. do. (second stage) antenna ;
16. do. do. leg.
17. Larva, antenna.
$\boldsymbol{P}$. ilicis, Newst. ..... 100Fig. 19. it antenua.Ceroplastes rusci, L.10Fig. 20. $q$ antenna;21-23. O stigmatic area.
C. nerii, Newst. ..... 101
Fig. 24. O antenna;25. do. stigmatic area.
Eriococcus formicicòla, Newst. ..... 102
Fig. 26. $q$ antenna;
27. do. dermis.
E. thymelace, Newst. ..... 102
Fig. 28. $q$ antenna.
29. do. dermis.

Trans. Ent Soc Lond. 1897. Pl.IV.


R.Newstead del.


Algerian Cocciax.


Minterri Bros. Iith

## Explanation of Plate V.

Fig. 1.-Enlarged dorsal view of prothoracic gland and its appendages in $D$. vinula : $v$, vestibule; $g s$, glandular sac ; d, duct ; $t^{1}, t^{3}, t^{3}$, lateral tubes containing bunches of bristles ; $r m^{1}$, retractor muscles of $t^{1} ; r m^{2}, r m^{22}$, retractor muscles of $t^{2} ; p m v$, protractor muscles of vestibule ; $r m v$, retractor muscles of vestibule ; $l r m v$, lateral retractor muscles of vestibule.

Fig. 2.-External view of aperture of gland, $g a$; and of lateral tubes, $l t ; v$, vestibule pulled open.

Fig. 3.-Bristles on low knob from within $t^{1}$ or $t^{2}$.
Fig. 4.-Dorsal view of glandular sac, $g s$, nat. size, showing protractor muscles of vestibule, $p m v$; st, stigma; $l^{1}, l^{2}$, first and second pair of legs.

Fig. 5.--Dorsal view of glandular sac in situ to show relations to nerve cord : $g^{1}, g^{3}$, first and second thoracic ganglia ; $A, C$, alimentary canal cut short and turned forward; $s$, silk glands.

Fig. 6.-Transverse section of apex of $t^{1}$, when retracted to show its bifid termination.

Fig. 7.-Longitudinal section through duct, $d$, of gland; $v$, vestibule; e $c$, external chitin; $h$, hypodermis ; $t c$, transitional cells ; $r c$, chitinous rods (rings) which keep duct open.

Fig. 8.-Portion of duct under higher power: $r c$, as above; $d c$, cells of duct with rather enlarged nuclei and cell bodies.

Frg. 9.-Glandular cells of sac : $b m$, sharply defiued basement membrane ; ch, very thin chitinous lining covering free surface of cells. The large size and branching character of the nuclei are shown, and the vacuolated borders of the cells.


The prothoracic gland of 1 , rinula.

## Explanation of Plate VI.

Fig. 1. Sphex stschurowskyi (?), Rad. ot. Head.
2. Cerceris pruinosa, sp. n. ㅇ. Apex of clypeus.
3. Tachysphex fasciatus, sp. n. f. Pygidial area.
4. "" " Apex of anterior wing.
5. Tachysphex heliopolites, "sp. n. "ㅇ. Pygidial area.
6. " ", " Apex of anterior wing.
7. Tachysphex buyssoni, sp. n. ¢. Pygidial area.
8. ", ", " Apex of anterior wing.
9. Tachysphex luxuriosus, sp. n." q. Pygidial area.
10. "" ", " Apex of auterior wing.
11. Tachysphex speciosissimus, sp.n., ?. Pygidial area.
12. ", ", A pex of anterior wing.
13. Tachysphex (?) integer, sp. n. Apical production of clypeus.
14. , ", , Apex of anterior wing.
15. Prosopigastra handlirschi, sp. n. \&. Apex of last dorsal segment.
16. Prosopigastra lavior, sp. n. \&. Apex of anterior wing.
17. " ," ", Apex of last dorsal segment.
18. Hologambrus sericans, sp. n. む. Head (anterior view).
19. " " ", " (lateral view).
20. Palaru" saundersi, sp. n. "Head̉.
21. ", " Apex of abdomen, ot.
22. " " " Denticulated transverse crest on

2nd ventral segment, seen from behind.
23. Kohlia coxalis, sp.n. Anterior coxa.

| 24. | " | " | " | Post |
| :---: | :---: | :---: | :---: | :---: |
| 25. | " | " | " | 2 nd joint of fla |
| 26. | " | " |  | 8 th ve |
| 27. |  |  |  | Genital armatur |

28. Stizus fuscatus, sp. n. Head.
29. ", " Apex of antenna, oै.
30. Stizus cheops, sp. n. Apex of antenna, ${ }^{\text {t. }}$.
31. ", " " Head.
32. Bembex loolli, sp". n. đे. Apex of antenna.
33. ", " " ," Intermediate femur, tibia and metatarsus.
34. " ", ". Genital armature.
35. Bembex nasuta, sp. n. "才. Apex of antenna.

36. " , ", 7 th ventral segment.
37. " " ", Genital armature.


New Sphegidæ from Egypt.
a


## Explanation of Plate VIII.

The Structure and Life-history of Phalacrocera replicata. Fig. 1. Dorsal view of larva, $\times 5$.
2. Ventral view of do., showing sucker-like invagination for the larval head, the rudiments of the legs of the fly, and the anal sucker, $\times 5$.
3. Side-view of prothorax, with cleft for larval head, and rudiment of leg, $\times 5$.
4. Last segments of larva, in side-view, $\times 5$.
5. Mandible of larva.
6. "Labium" of larva, with the double plate common in Dipterous larvæ, $p$, rudiment of imaginal palp.
7. Maxillary palp of larva, with sensory spot.
8. Antenna of larva.


## Explanation of Plate IX.

The Structure and Life-history of Phalacrocera replicata.
Fig. 9. Dorsal view of larval head, showing labrum (l), antennæ ( $(1)$, and part of maxillæ ( $m x$ ),$\times 100$.
10. Ventral view of do., showing labium, maxille ( $m x$ ), maxillary palps ( $m x_{p}$ ), salivary duct ( $s(l$ ), and the attachment (i) of the fold of integument which unites the head and prothorax, $\times 100$.
11. Ventral view (not quite full) of mouth-parts, ", antenna, $h$, hooklets on labrum, mxp, maxillary palp, $s c$, sclerite of maxilla, bearing brush, $b r$; so, subulato organ at base of maxilla; 1 , labium, $\times 120$.
" 12. Outline of serrated labial plate ( $C f$. fig. 6).
13. Pupa (side-view), showing prothoracic respiratory tube, legs and wing of fly, abdominal hooks, etc., $\times 5$.
14. Male pupa (ventral view), $\times 5$.
15. Extremity of abdomen of female pupa (ventral view), $\times 5$.
16. Eggs, laid upon leafy shoot of moss. The eggs should be shown as lying in the axils of the leaves.
17. Outline of ovary from female larva. The oblique line shows the plane of the section in fig. 30 .


Phalacrocera replicata.

## Explanation of Plate X.

The Structure and Life-history of Phalacrocera replicata. Fig. 18a. Longitudinal (nearly median) section through body of - larva. This joins 18b. lr, brain, s, salivary gland, $h$, heart or dorsal vessel, $s t$, stomach, $f$, fat-body.
" 18b. $o$, ovary, $h$, heart, $m$, Malpighian tubule, un, anus.
, 19. Brain with dorsal vessel ( $d v$ ), trachere and ganglia (dorsal view).
" 20. Do., side-vierr ; oe, œesophagus. In figs. 19 and 20 the upper end is anterior, and in fig. 20 the right-hand side is dorsal.
, 21. Epithelium of stomach, with granular secretion on its free surface.
, 22. Do., with protrusions (p. 348).
, 23. Do., with granular masses and dividing cells.
, 24 . Surface-view of part of the two cellular cords in the heart (p. 351):


## Explanation of Plate XI.

The Structure and Life-history of Phalacrocera replicata.
Fiff. 25. Longitudinal section through hinder end of a cellular cord, showing its continuity with the epidermis.
26. Transverse section through heart, showing the cellular cords in situ.
27. Outline of testis.
28. Section through larval testis.
29. Do., highly magnified, showing spermospores and spermatozoa.
30. Ovary cut along the oblique line shown in fig. 17 (p. 357).
31. One follicle of the ovary.
32. Base of a dorsal process to show the surface of the chitinous cuticle, the thick inner layer, the generating epidermis, and a tracheal branch.
33. An œnocyte (p. 352) with central ( $n$ ) and peripheral nucleus ( $n n^{\prime}$ ).


(


[^0]:    * In Trans. Ent. Soc. Lond. 1895. p. 395. Table of Species (2) 1 ; for "First cubital areolet," read " Second," etc.

    TRANS. ENT. SOC. LOND, 1897.—PART I. (APRIL.)

[^1]:    © Sce Addendum (p. 91).

[^2]:    * The Bône records were added subsequently. TRANS. ENT. SOC. LOND. 1897.-PART I. (APRIL.)

[^3]:    He however makes an exception in the case of $A$. bomba $(=$ induna).

    TRANS. ENT. SOC. TOND 1897.-PART J. (APRIL.)

[^4]:    * By which I mean a series labelled, not only with exact localities, but with the dates of capture, and altitudes.

[^5]:    * Salivary glands ; glandules of Filippi. I prefer not to assign these to any definite segments.
    $\dagger$ Bütschli, Zeit. wiss. Zool. Bd. 20, 1870.

[^6]:    * Vide Carrière, Arch. f. mikr. Anatomie, xxxv., 1890.

[^7]:    trans. ent. soc. Lond. 1897.-part in. (july.)

[^8]:    * In some specimens of nymphavata, responsalis, affinialis, and other species vein 10 arises from the cell.

[^9]:    $\ddagger$ In junceule rein 10 of the forewing sometimes arises from the cell.

[^10]:    trans. ENT. SOC. LOND. 1897.-PART II. (JULY.)

[^11]:    ${ }^{\circ}$ Eurytorna heteronoxa, Meyr., Trans. Ent. Soc. Londi, 1886, p. 252

    Fiji.

[^12]:    * Champ., Biol. Centr.-Am., Col., iii., 1, pp. 439, 440.

[^13]:    * This is also the case in C. quadrifoveolutus and its allies, though I have not mentioned it in the descriptions. In all these forms the elytra (when properly closed) are more or less dehiscent in their apical third, but more distinctly so in the female than in the male.

[^14]:    Propter errorem typographicum dicuntur ibi antennæ maris "12-gliedrig." Sunt eae, ut in hoc sexu fieri solet, 13-articulatæ.

[^15]:    * "On the Relation of Mimetic Patterns to the Original Form," Trans. Ent. Soc. Lond. 1896, pp. 65-79, pls. III.-V.

    TRANS. ENT. SOC. LOND. 1897.-PART III. (SEP'I.)

[^16]:    Trans. Ent. Soc. Lond. 1896, pp. 65-70. It should be added to the foregoing that $P$. ciurdi $q$ itself is probably attracted by H. charitonia, which may perhaps be considered an outlier of the 11. atthis combination. This is analogous to the attraction of another intermediate term in the atthis line, viz., $P$. demophile of, by the agna group.
    $\dagger$ Figured by Hewitson, Exot. Butt., " Pieris," pl. II., fig. 14, and ibid., pl. VI., fig. 39.

[^17]:    - Vide supra, p. 319, note.
    $\dagger$ Three at least of the above five lines of development, viz., the agna, the numata, and the inachiu lines, can be paralleled from the genus Dismorphia and its allies, and it is interesting to see in the latter case how the same ultimate result is brought about by somewhat different means. But I have not attempted to include species of Dismorphia within the above series, because the affinity of this genus with Pieris and Mylothris is not close, and its own course of mimetic development, so far as phylogeny is concerned, must be regarded as completely independent.

[^18]:    Trans. Ent. Soc. Lond. 1894, pp. 297, 298 ; ibid., 1896, p. 75.

[^19]:    " See also an abstract in " British Association Reports," 1894, p. 692.

    + "Tropical Nature," 1878, p. 205. See also Haase, op. cit., p. 68. It should, however, be stated that neither of these authors assigns any protective value to the underside of the male forms in question.

[^20]:    * Vide Trans. Ent. Soc. Lond. 1894, pp. 297, 298 ; ibid., 1896,

[^21]:    * E.g., as was pointed out above, forms like Pieris pandosia, $P$. leptalina, etc., show the result of attraction by the inachia group upon Pieris of the ordinary kind. Similarly the yellow female of $P$. demophile exemplifies the ordinary form attracted in another direction, that of the agna combination. Again, the last-named development of Pieris has served as a basis for a further attraction, that by Heliconius charitonia, as seen in P.viardi 9 ; and this latter form has given scope for the influence of the atthis group as shown by P. locusta 우.

[^22]:    * I learn from my friend Dr. Hofmann that an intermediate form between the five-branched and one-branched radius of the secondary has been discovered in the Tineidæ.

[^23]:    * "Dr. Sharp points out that, although the tracheæ in the pupal wings have much the same arrangement, as the nervures in the imagines, the tracheæ are not changed into nervures ; but that the latter probably have their origin from string-like structures, which run near the tracheæ, called Semper's rods."-Ent. Rec., 1896, p. 11थ.

[^24]:    * "It has been shown by Hagen that the two layers of membrane can be separated when the wings are recently formed, and it is then seen that each layer is traversed by lines of harder matter, the nervures. These ribs are frequently called wing-veins, or nerves, but as they have no relation to the anatomical structures bearing those names, it is better to make use of the term nervures."-Ent. Record, 1896, p. 231. For the purposes of the present paper it has seemed to me clearer and shorter to use the common term.

[^25]:    Identified for us by Mr. M. B. Slater, F.L.S. Mr. Scherren gives us the following localities :-The Norfolk Broads (Hickling, Ormesby), the Waveney, near Beccles Bridge, marshes round Brightlingsea, Seaford. We have not found the insect in Yorkshire. Phalacrocerc has been taken in France, Germany, and Sweden. It is said to feed upon Hypmum elocles, Fontinalis antipyretica, and other mosses, besides Amblystegium (formerly known as $H_{y 1} \boldsymbol{m}^{\prime \prime}$ fluitans).

[^26]:    Mr. Scherren recommends the collector to pull out a mass of vegetation, and shake it over a piece of mackintosh.

[^27]:    * De Geer, op. cit., i., pl. 37.
    $\dagger$ Schiödte, De met. Eleutheratorum.
    $\ddagger$ The insects quoted are all aquatic. The terrestrial larva of Cylindrotoma (p. 361) bears similar but sherter processes.

[^28]:    * Cf. Dicranota (L. C. Miall, Trans. Ent. Soc. Lond. 1893, p. 245).
    $\dagger$ Cf. Balbiani, Études sur Cryptops. Arch. de Zool. exp. (2), viii. (1890).
    $\pm$ See also Dicranota (loc. cit., p. 243).
    § The mucous or culyciform cells of Balbiani are described as staining deeply and uniformly.
    li. Cf. Dicranota (loc. cit., pp. 243, 244).
    - Cf, Dieranota (loc. cit., p. 244).

[^29]:    Phalacrocera illustrates the remark of Balbiani (loc.cit., p. 71) that the folds of the intestinal epithelium vary with the phase of digestion.

[^30]:    Owing to the great transparency and delicacy of the wall of the dorsal vessel, the double opening which we have mentioned was not clearly seen.

[^31]:    Beddard, Monograph of the Order Oligochæeta, p. 77.

[^32]:    *Steinhaus, Die Morphologie der Milchabsonderung, Du Bois Reymond's Archiv., 1892, Suppt.
    $\dagger$ Waymouth Reid on Pigeon's Milk. B. A. Report, 1894.

[^33]:    - Waymouth Reid, The Process of Secretion in the skin of the common Eel, Phil. Trans., Vol. 185 (1894), and authors there cited.
    $\dagger$ Zeitschr. f. wiss. Zool., xliii., pp. 512-536 (1886).
    $\ddagger$ Graber, Biol. Centralbl., xi., pp. 212-224 (1891).
    § Weismann's "garland-shaped cellular cord" (Entw. d. Dipteren, p. $13 \pm$, pl. viii., fig. 10) may possibly be a structure of the same kind. See also Pantel on Thricion larva (C.R., 1897, i., pp. 472, 580).
    || C.R., cix., pp. 409-411.

[^34]:    * Miall, Trans. Ent. Soc. Lond. 1893.

[^35]:    * Hammond, Science Gossip, xi., p. $20 \pm$ (1875).

[^36]:    Lacaze-Duthiers, Ann. Sci. Nat., Zool., 1854.

[^37]:    * De Geer found that the pupal stage lasted only six days, and we have found the time variable according to the season and temperature.

[^38]:    * Since our paper was read there has appeared in the Lunds Universitets Årsskrift, xxxiii., an account of the larva of Phalacrocera, by Simon Bengtsson. The plates give useful information respecting the external features, the mouth-parts, and the skeleton of the head. Our ignorance of Swedish prevents us from making more than a superficial acquaintance with the text.

[^39]:    trans. ent. soc. lond. 1897.-part iv. (dec.)

[^40]:    ${ }^{1}$ Syst. Nat. Ed., x., p. 439. ${ }^{2}$ Hist. abrég. Ins., i., p. 475.
    ${ }^{3}$ Ent. Syst., iv., p. 60.
    ${ }^{4}$ Kirk., 1897, Ent., p. 260.
    ${ }^{5}$ Trans. Linn. Soc., xii., pp. 10-18.
    ${ }^{6}$ I am not aware that any author has indicated a type for this genus, and therefore now set apart $E$. indicu for that purpose.
    ${ }^{7}$ Abh. K. bühm. Ges. Wiss. (5) iii.
    ${ }^{s}$ Abh. K. bühm. Ges. Wiss. (5) vii.
    TRANS. ENT. SOC. LOND. 1897.-PART IV. (DEC.)

[^41]:    ${ }^{1}$ 1872, in Marshall, Ent. Mo. Mag., viii., p. 244.
    ${ }^{2}$ 1879, Trans. Ent. Soc. Lond., p. 271.
    ${ }^{3}$ 1883, An. S. Cient. Argent., xvi., p. 122.

[^42]:    - I regret that I cannot altogether agree with Berg's account of the antennal segments (An. S. Cient. Argent., xvi., p. 122). He believes that the antennæ in Notonecta and Signoretiella have five segments. I am unable to speak with regard to the latter genus, but judging from preparations in glycerine jelly of four species of the former, examined under a compound microscope, the third segment of Berg appears to be only a muscular articulation between the true second and third segments. The basal segment, which Berg thinks may be au antenniferous tubercle (tuberculo antenar), seems in structure, texture, and method of articulation, to be a true antennal segment.

[^43]:    * I shall be greatly indebted to any South American or South African entomologist who will send me the Notonecte of his country.

[^44]:    - The smallest length given is that recorded by Uhler (l.c., p. 293), and 10.5 mm . is the smallest I have examined.

[^45]:    * These names are given here as they were spelt on the labels, but it is difficult to identify some, as the same places are spelt differently in almost every atlas consulted.

[^46]:    © As an example, group 4 is distinguished mainly by having the hindwings almost or quite black behind the tran-verse black bar usually preseut. The same character exists in British Guiana examples of $1 \%$. theleiope and $H$. vestu, not in other respests true components of the group; it is absent in their Amazon representatives, at least as far as Bolivia, where it turns up again in association with very different groups.

[^47]:    * It has since occurred to me that terms accurately descriptive for those who accept the theories of Mimicry and Warning Colours may be obtained by an extension of the terminology proposed by me in 1890 ("The Colours of Animals," pp. 336 et seqq.). In the majority of cases there is reason for the belief that Müllerian groups have been formed by a gradual approximation towards the appearance of some aggressive and abundant species, or towards that of the most prominent general characteristics of several such species belonging to a specially defended section of Lepidoptera, such as the Euplœinæ or Acræinæ. Mülleriau groups of this kind-probably by far the commonest-may be said to possess Synaposematic ( $\sigma \dot{v} v$, together ; à $\pi \delta$, away ; $\sigma \hat{\eta} \mu \alpha$, sign) colours, pattern, or appearance, the noun being Synaposeme. They may also be said to possess Miullerian Warning Colours or Common Warning Colours. For those extremely interesting but, as I believe, relatively uncommon cases, in which the approach is mutual-a process of "give and take," so well described by Dr. Dixey-the term Diaposematic ( $\delta$ ó, used to express mutual relation, as in "dialogue," àmb, and $\sigma \hat{\eta} \mu a$ ) may be employed, the noun being Diaposeme. These cases may also be spoken of as Reciprocal Warning Colours. Mr. Arthur Sidgwick has kindly helped in the formation of these new terms. -E. B. Poulton, June 14th, 1897.

[^48]:    Homœochromatic pairs, such as those of Series I. in my exhibit, are not demonstrably in the relation of "model" and " mimic," but in one for which some other word must be found. I would suggest that each member of such a pair, or group, which does not show the departure indicative of a mimetic form, be called the "homotype" of its associates. Thus Helicomius gulanthus. would be the homotype of, or homotypic with, H. luce.-W. F. H. Blandford, July, 1897.

[^49]:    * The objections to any explanation based on distribution alone have been forcibly stated by Fritz Müller himself. "Kosmos," 1882, p. 262.

[^50]:    - This has been demonstrated on a complete scale by Jordan, "On Mechanical Selection," Nov. Zool., 1896, pp. 426-525.-F. A. D.

[^51]:    © Mr. Galton has lately tested his law (first euunciated in his work, "Natural Inheritance," 1889, p. 134) by application to the records of the breed of Basset hounds already mentioned. His recent paper, "The Average Contribution of each Several Ancestor to the Total Heritage of the Offspring," Proc. Roy. Soc. 1897, pp. 401-413, shows that it stands the test remarkably well.-F.A.D.

[^52]:    * Trans. Linn. Soc., xxiii. (1862).

[^53]:    \% Trans. Limn. Soc., xxi. (1864). - + Trans. Limn. Soc., xxvi. (1869).

[^54]:    * At various subsequent dates I was enabled, through the valuable aid of Mr. J. P. Mansel Weale and Colonel J. H. Bowker, to make known to science conclusive evidence of the species-identity of the three mimetic females of Papilio cenea, and of the pairing of the widely-differing sexes of that species. - See Trans. Ent. Soc. Lond., 1874, p. 137, and 1881, p. 169; and "South Afr. Butterflies," iii., p. 254 (1889).

[^55]:    * Ann. \& Mag. Nat. Hist. (5), x., pp. 417-425.
    + Proc. Zool. Soc. Lond., 1887, pp. 191-274.

[^56]:    * In Vol. III. of Bibliotheca Zoologica (Stuttgart).
    + "Nature," 4th and 11th November, 1897.
    $\ddagger$ "Entwurf eines natürlichen Systems der Papilioniden."

[^57]:    * Subtitle, "Untersuchungen über die Mimicry."

[^58]:    * Trans. Ent. Soc. Lond. 1897, p. 317.

[^59]:    * Linn. Soc. Journ. Zool., xxv., pp. 339-348.
    + It should be noted that in the African H. salmacis and the Malagasy $H$. dexithea the sexes are alike and non-mimetic, and that therefore these species probably most closely approximate to the primitive appearance of the genus.
    $\ddagger$ Journ. Bombay Nat. Hist. Soc., ii., pp. 169-174.

[^60]:    * Op. cit., ii., p. 10. Haase (on p. 11) cites Brauer to the effect that the genus Drepana is mimicked by the neuropterous Drepanopteryx, which is stated to feed on Lepidoptera.
    $\dagger$ See Haase, l. c., ii., p. 76, pl. xiii.

[^61]:    * See Pryer, Trans. Ent. Soc., 1885, p. 369, pl. x., who in the same place also figures another most striking case from Borneo, in which the hymenopterous Triscolia patricialis is mimicked by the lepidopterous Scoliomima insignis.
    + See Bates, l. c., p. 509.
    $\ddagger$ In the Oriental region Delias is mimicked by Prioneris and Pieris, and in the Ethiopian region Mylothris by Pieris and Eronia. An interesting case in support of the probable distastefulness of Mylothris is found in Madagascar, where the abundant M. phileris is mimicked by the very scarce Elymnias masoura, a Satyrine which is extremely divergent in colouring from all known members of its genus and subfamily.
    $|\mid \mathrm{Col}$. Swinhoe informs me that the Pierine Teracolus limbatus-" the southern form of T. etrida"-is accurately mimicked by the Geometrid moth, Abraxas etridoides. This case seems to support Col. Swinhoe's opinion

[^62]:    (Proc. Ent. Soc. Lond., 1897, p. xxxvii.) that the species of Teracolus are inedible. I have noted (Proc. Zool. Soc. Lond., 1894, p. 21) another instance of marked resemblance to the females of the smaller East African Teracoli in the Satyrine, Physcanewra pione.

    * There is some ground for suspecting Acherontia atropos to be a protected species. It has an apparent mimicker in Africa-its natural habitat-in the shape of another Sphingid of almost equal size, Protoparce solani, which, when seen at rest on tree-trunks, 1 have, on more than one occasion, mistaken for the Death's Head. I do not know if any experiments as to the distastefulness of Acherontia have been made; but I incline to the belief that, if this moth is shunned by any insectivorous animals, such avoidance is more likely to be due to its squeaking powers and its threatening gesture, when irritated or alarmed, of suddenly elevating the robust and spiny forelegs. I know of no other moth that assumes this menacing attitude.

[^63]:    * Trans. Linn. Soc., xxvi.

[^64]:    * For coloured figures of the three forms of P. antinorii, $q$, see Haase, l. c., ii., pl. i.

[^65]:    * See Trans. Ent. Soc. Lond., 1874, p. 178.
    + Hewitson (Exot. Butt., iv., Papilio, xii., fig. 39) delineates an example in many respects intermediate between dionysos and hippocoon, but rather closer to the latter form as regards the forewings.

[^66]:    * Cited by Haase, l.c., ii., p. 10t.
    $\dagger$ These three cases also cited by Haase, l. c.

[^67]:    * Ann. \& Mag. Nat. Hist. (6), iii., pp. 477-48ă (1889).

[^68]:    * It is not improbably in these circamstances that the imperfectly mimetic but still "warning" underside of the male in Perrhybris becomes specially serviceable (Cf. Dixey, Trans. Ent. Soc., 1896, p. 71).
    + Cited by Haase, l. c., ii., p. 101.

[^69]:    * Proc. Zool. Soc. Lond., 1887, pp. 198, etc., and " Nature," 4th Nov., 1897, p. 3.

[^70]:    * De Nicéville (Butt. Ind., etc., i., p. 318) notes that Acræa riolce was the only butterfly rejected by all the species of Mantidæ to which he offered various buttertlies.
    + C. V. Riley (apud Haase, l.c., ii., p. 47) found that a dipterous parasite was very prevalent in the larvæ of Danais archippus, often destroying a whole brood.
    $\ddagger$ Nat. in Trausvaal, p. 65 (1889).
    || Proc. Ent. Soc. Lond., 1897, p. xl.

[^71]:    * Proc. Ent. Soc. Lond., 1897, p. xxxvii.
    + Report of Intern. Zool. Congress, iii. (Leyden, 1895), p. 460.
    $\ddagger$ See Proc. Zool. Soc. Lond., 1887, pp. 191, etc.
    || " Habit and Instinct," pp. 29-58.

