S. 920

3.

NOVITATES ZOOLOGICAE.

VOL. III., 1896.

NOVITATES ZOOLOGICAE.

A Journal of Zoology

IN CONNECTION WITH THE TRING MUSEUM.

EDITED BY

THE HON. WALTER ROTHSCHILD,

ERNST HARTERT, AND DR. K. JORDAN.

VOL. III., 1896.

ISSUED AT THE ZOOLOGICAL MUSEUM, TRING.

PRINTED BY HAZELL, WATSON, & VINEY, LD., LONDON AND AYLESBURY.

1896.

CONTENTS OF VOLUME III.

GENERAL SUBJECTS.

MAMMALIA.

AVES.

REPTILIA.

COLEOPTERA.

LEPIDOPTERA.

NOVITATES ZOOLOGICAE.

Vol. III. MARCH, 1896. No. 1.

DESCRIPTIONS DE NOUVELLES ESPÈCES DE *LAMPYRIDES* DU MUSÉE DE TRING.

PAR ERNEST OLIVIER,

*Membre des Sociétés Entomologiques de France, de Londres, etc.**

1. **Lucidota disjuncta** sp. nov.

♂. *Oblongo-ovalis, picea; antennarum* 2-9 *articulis hirsutis, longe flabellatis, tribus primis et ultimo albidis, alteris fuscis; prothorace subogivali, villoso, albido, disco piceo, angulis posticis rectis; scutello brunneo; elytris fuscis vitta lata submarginali albida; mandibulis, palpis, pedibusque albis; ultimo ventrali segmento albescente, pygidio bipartito.*

Long. 6 mm.; lat. hum. 3 mm.

Hab. Rio de Janeiro.

Cette petite espèce est remarquable par les articles 2-9 de ses antennes munis au côté interne d'un long rameau hérissé, ainsi que les articles eux-mêmes, de longs poils gris, et par son pygidium profondément divisé en deux lobes triangulaires à sommet très aigu.

Je ne connais pas la ♀.

2. **Lucidota tenuis** sp. nov.

Oblongo-ovalis, fusca; antennis compressis, nigris, ultimo articulo albido; prothorace ogivali, albido, macula discoidali brunnea, basi recte truncato, angulis rectis; elytris pubescentibus, nigris, vitta lata submarginali albida; pedibus infuscatis; pygidio subquadrato, postice leviter emarginato.

Long. 5 mm.; lat. 3 mm.

Hab. Para (Mus. Tring); Fonteboa (ma collect.).

Cette espèce est la plus petite connue du genre.

3. **Cratomorphus elevatus** sp. nov.

♂. *Breviter oblongus, piceus; capite nigro; prothorace pallide flavo, macula basali obscura, medio longitudinaliter carinato; scutello triangulari flavescente; elytris piceis, pallide marginatis, tricostatis; ventri pubescente, nitido, nigro, quinto et sexto segmentis plaga cerea ornatis, ultimo triangulariter producto, punctis duobus basalibus flavidis notato; pygidio ogivali.*

* Voir un premier mémoire, Vol. II., 1895, p. 29.

♀ *ignota.*

Long. 15 mm.; lat. 6·5 mm.

Hab. Mexico.

Cette espèce est à peu-près de la taille du *picipennis* Gorh. Elle en diffère bien nettement par les caractères suivants: sa tête est noire; son prothorax offre à la base une tache quadrangulaire obscure; ses élytres sont bordées de testacé pâle largement au bord externe, étroitement sur la suture, et sont, en outre, chargées de trois côtes longitudinales bien saillantes qui ne se prolongent pas jusqu'à l'angle apical, la médiane étant la plus longue et l'interne la plus courte; le sommet de ces côtes très tranchants est de couleur brun testacé.

Le *C. elevatus* se place dans la quatrième section du genre, section qui comprend les espèces dont le dernier segment ventral, chez le mâle, est rétréci près du sommet en une pointe conique obtuse.* Le tableau de cette section devra donc être ainsi complété:—

Pygidium légèrement bisinué:	*C. distinctus* Ern. Oliv. et *C. ovatus* Gorh.
Pygidium trilobé:	*C. concolor* Perty et *C. parmatus* Gorh.
Pygidium en ogive:	*C. elevatus* Ern. Oliv.

4. **Luciola ambita** sp. nov.

Oblonga, pubescens; capite nigro; antennis, tibiis, tarsisque piceis; prothorace rufo, transverso, convexo, punctulato, in medio longitudinaliter sulcato, antice valde attenuato, lateribus arcuatis, basi recte truncato, angulis valde retro productis; scutello triangulari, nigro, rufo limbato; elytris prothorace haud latioribus, leviter ampliatis, dense, profunde et seriatim punctatis, nigris, rufo circumdatis; pectore, femoribusque rufescentibus; abdomine piceo, duobus ultimis segmentis cereis.

Long. 11 mm.; lat. 5 mm.

Hab. Java, Sukabumi.

Cette espèce se rapproche de *L. circumdata* Motsch.; mais elle en diffère essentiellement par sa forme plus allongée, sa forte pubescence fauve, ses élytres sans côtes saillantes, son écusson en triangle aigu, noir avec une bordure d'un rouge flave, etc.

5. **Luciola humilis** sp. nov.

Angusta, nigra, pubescens; prothorace rufo, subquadrato, in medio antico angulose, basi recte truncato, angulis rectis, haud prominulis; scutello triangulari, rufo; elytris prothorace parum latioribus, parallelis, rugosis, costulatis; coxis et femorum basi rufis; duobus ultimis ventris segmentis cereis, ultimo hamulato apice nigro.

Long. 7 mm.; lat. 3 mm.

Hab. Cairns, North Queensland.

Cette petite espèce est voisine des *L. pupilla* Ern. Oliv. et *microthorax* Ern. Oliv.: elle en diffère par la coloration du ventre, qui n'offre que deux segments blancs, au lieu de trois, et surtout par la forme tout autre du dernier segment; elle s'écarte, en outre de *L. microthorax*, par son prothorax plus élargi et la couleur rousse de son écusson.

* Voir mon "Essai de Classification du genre *Cratomorphus*" in *Soc. Ent. France*, 1895 p. cxlv

6. **Luciola praestans** sp. nov.

Oblonga, rufa, pubescens; capite antennisque nigris; prothorace rufo, attenuato, in medio canaliculato, margine antico rotundato, basi recte truncato, angulis obtusis prominulis; scutello rufo triangulari, apice obtuso; elytris prothorace haud latioribus, elongatis, parallelis, punctulatis, costulatis, nigris, sutura tenuiter rufa; tarsis, tibiis, femoramque dimidia parte piceis; ventris segmentis piceis, rufo limbatis, tribus ultimis cereis, ultimo triangulari, apice inciso.

Long. 15 mm.; lat. 5 mm.

Hab. Stanley Pool, Congo.

Cette belle espèce se place près de l'*insignis* Ern. Oliv., dont elle se reconnait aisément à la couleur noire de la tête et du bord marginal des élytres, à son dessous rembruni, etc.

Cette description est faite sur la ♀ ; le ♂ m'est inconnu.

7. **Photuris telephorina** Perty ab. **mixta** ab. nov.

Elytres flaves : une large tache noire couvre toute la base, sauf la côte suturale, qui reste flave ; au deuxième tiers de la longueur, une bande oblique noire se joint à la suture sans atteindre le bord externe et se prolonge en une fine bordure tout autour de l'angle apical.

Hab. Petropolis, une ♀.

Je crois devoir signaler cette nouvelle modification bien caractérisée de cette espèce si variable.

LAMPYRIDES CAPTURÉS AU PARAGUAY PAR M. LE DR. BOHLS.

DÉTERMINÉS ET DÉCRITS PAR M. ERNEST OLIVIER,

Membre des Sociétés Entomologiques de France, de Londres, etc.

1. **Lucio splendens** Ern. Oliv.

Ern. Oliv., *Soc. Ent. Fr.* 1885, p. 129, pl. 3, fig. 1 ♂.

2 ♀. La coloration du corps est la même que chez le ♂ : les articles des antennes sont appendiculés seulement d'un seul côté ; le dernier segment ventral est court, triangulaire, incisé au sommet.

2. **Lamprocera extincta** sp. nov.

♂. Omnino nigra ; prothorace antice maculis duabus rufis ornato et tenuissime rufo limbato ; tribus ultimis ventris segmentis in medio puncto fulvo notatis.

Long. 20 mm. ; lat. hum. 9 mm.

Entièrement noir à l'exception de deux taches triangulaires rousses attenant au bord antérieur du prothorax, d'une fine bordure rousse aux côtés de ce prothorax et d'un petit point fauve au milieu de chacun des trois derniers segments du ventre.

3. **Ledocas xanthomus** Ern. Oliv.

Ern. Oliv., *Soc. Ent. Fr.* 1894, p. 23.

♂. Les taches flave-orangé de la base des élytres sont confluentes ; la suture est semblablement colorée sur une très petite longueur à partir du sommet de l'écusson.

4. **Dodacles nigricollis** Gorh.

Cladodes nigricollis Gorh., *Ent. Soc. Lond.* 1880, p. 8.

Dodacles nigricollis Ern. Oliv., *Soc. Ent. Fr.* 1885, p. 141, pl. 3, fig. 6.

♂. Les deux points lumineux placés à chaque côté du dernier segment ventral sont bien accentués sur un exemplaire.

5. **Dodacles erebeus** sp. nov.

♂. Ater, opacus, ultimo ventrali segmento punctis duobus albidis notato.

Long. 12—16 mm. ; lat. 6—7·9 mm.

Cette espèce est aussi obscure que *Ledocas carbonarius* Ern. Oliv. Elle s'en éloigne par la forme du prothorax et des élytres, ainsi que par la sculpture de ces dernières.

6. **Lucidota thoracica** Oliv.

Lampyris thoracica Oliv. *Ent.* II. No. 28, p. 27, pl. 3, fig. 29.

Lampyris vitellinithorax Perty, *Del. an. art.* p. 27, t. 6, fig. 6.

Lucidota rubricollis Gorh., *Ent. Soc. Lond.* 1880, p. 19.

D'un noir brillant à l'exception des parties de la bouche, de la base des antennes, des jambes antérieures, qui sont plus ou moins jaunâtres, et du prothorax, qui est

d'un beau rouge brillant. La femelle est un peu plus grosse et les articles de ses antennes sont moins longuement appendiculés. Le mâle a le dernier segment ventral en carré transversal, avec une petite pointe triangulaire dans le milieu de son bord postérieur : de chaque côté, on remarque une tache jaunâtre qui a du être le siège de l'appareil lumineux pendant la vie de l'insecte. Le dernier segment ventral de la femelle est triangulaire, largement échancré au sommet, jaunâtre à la base.

Je possède le type du *Lampyris thoracica* étiqueté de la main d'Olivier, et j'ai vu au Musée de Bruxelles le *Lucidota rubricollis* de Gorham. Je suis donc certain de la synonymie que je donne.

Cette espèce a un habitat étendu. On la trouve à la Plata et au Brésil, et elle remonte au Nord dans l'Amérique centrale jusqu'au Mexique.

Lucidota bella Gorh. en diffère par son écusson fauve, par ses élytres chargées de côtes beaucoup plus saillantes, et par sa forme un peu plus allongée.

7. **Lucidota cucullata** sp. nov.

♂. Nigra, nitida; ore et duobus primis antennarum articulis piceis; antennis compressis; prothorace ogivali, apice erecto, lateribus rugose punctatis, luteis, macula discoidali nigra, angulis posticis leviter retro productis; scutello triangulari; elytris elongatis, parallelis, crebre punctatis, nigris, margine externo tenuiter luteo limbato; coxis piceis, pedibus nigris; ultimo ventrali segmento duobus punctis lucidis ornato.

Long. 6 mm.

Var. Un exemplaire de ma collection, provenant du Pérou, a la suture très étroitement fauve sur une petite étendue au milieu de sa longueur.

8. **Lucidota audax** sp. nov.

♂. Omnino nigra, mandibulis piceis et disco prothoracis miniato, exceptis; antennis compressis; prothorace rotundato, basi recte truncato, angulis obtusis; ultimo ventrali segmento in medio leviter producto, utrinque puncto lucido ornato.

Long. 5 mm.

9. **Lucidota tardita** sp. nov.

♂. Brunnea, nitida; antennis parum compressis; prothorace in medio antico leviter anguloso, basi recte truncato, angulis fere rectis, rufescente, macula discoidali antice dilatata nigra; scutello piceo; elytris brunneis, sutura et margine externo tenuiter flavo limbatis; coxis et tibiis piceis; tribus ultimis ventris segmentis cereis, ultimo parvo, emarginato.

Long. 7—8 mm.

10. **Lucidota misera** sp. nov.

♂. Nigra; antennis compressis, serratis; prothorace rotundato, antice attenuato, basi leviter arcuato, angulis retro productis, marginibus crebre et profunde punctatis, nigro, antice rufescente, disco duabus maculis oblongis miniatis ornato; elytris brunneis, margine externo anguste flavo, ante apicem desinente; penultimo ventrali segmento puncto medio lucido ornato, ultimo breviter producto.

Long. 6·5 mm.

11. **Phengodes uruguayensis** Berg.

Berg, *Soc. Ent. Fr.* 1886, p. lix.

Un seul exemplaire (♂), qui diffère légèrement du type par son prothorax entièrement noir, sans bordure flavescente.

12. **Phengodes pallens** Berg.

Berg, *Soc. Cient. Argentina*, 1885, p. 232.

Deux exemplaires (♂) plus grands que le type que je possède ; les élytres sont un peu plus longues et arrivent à la hauteur du troisième segment abdominal.

M. Bohls a capturé en même temps deux larves que je crois être celles de ce *Phengodes*. En voici la description : Corps étroit, linéaire, d'un brun jaunâtre brillant, hérissé de longs poils roux épars sur le thorax, plus denses sur l'abdomen ; yeux, mandibules, et palpes noirs ; segments thoraciques légèrement déprimés ; abdomen cylindrique, composé de dix segments d'égale dimension, sauf le dixième, qui est beaucoup plus étroit, brun, et légèrement échancré à l'extrémité ; pattes courtes, massives.

Long. 13—14 mm.

13. **Cratomorphus bifenestratus** Gorh.

Gorh, *Ent. Soc. Lond.* 1880, p. 34.

2 ♂. J'ai vu le type de cette espèce au Musée de Bruxelles. Le pygidium est fortement trilobé à lobe médian large, tronqué carrément ; les latéraux, beaucoup plus courts et plus étroits, sont arrondis au sommet.

14. **Aspidosoma fenestratum** Bl.

Lampyris fenestrata Bl., *Voy. d'Orb.* p. 111.

♂ ♀. La taille de cette espèce est assez variable. Le type existe au Muséum de Paris.

15. **Aspidosoma lineatum** Gyll.

Lampyris lineata Gyll., *Sch. Syn. Ins.* App. p. 23.

Très commun au Brésil. Ce n'est qu'une variété de l'*A. hesperum* de Linné, Olivier, Fabricius.

16. **Aspidosoma sticticum** Gemm.

Aspidosoma sticticum Gemm., *Col.* Heft VI. 1870.

Lampyris maculata Fabr., Oliv., Cast.

De Geer (1774) ayant déjà donné le nom de *maculatum* à une espèce d'*Aspidosoma*, M. Gemminger a du changer le nom de l'espèce de Fabricius, d'Olivier, etc.

17. **Aspidosoma buyssoni** Ern. Oliv.

Ern. Oliv., *Soc. Ent. Fr.* 1888, p. 95, pl. 1, fig. 6.

Décrit sur des exemplaires de ma collection et du Musée de Bruxelles provenant de la République Argentine.

18. **Aspidosoma lepidum** Gorh.

Gorh., *Biol. Centr.-Amer. Malacod.* p. 54.

Plusieurs exemplaires légèrement différents du type en ce que la bordure marginale des élytres est un peu plus longuement prolongée et les taches latérales du prothorax ne sont pas jointes à la médiane.

19. **Aspidosoma bohlsi** sp. nov.

Oblongum, piceum; prothorace subogivali, macula quadrata praescutellari nigro et rufo variegata; scutello triangulari, rufo; elytris prothorace vix latioribus, dein ampliatis, fuscis, margine externo late pallido, ventri roseo, ♂ tribus ultimis segmentis cereis, ♀ quinto macula mediana flava ornato.

Long. 8—8·9 mm.

Cette espèce ressemble beaucoup à une autre encore inédite (*Aspidosoma neglectum* Ern. Oliv.), qui fait partie de ma collection et provient du Brésil. Cette dernière diffère cependant essentiellement de *A. bohlsi* par son prothorax bien arrondi en avant, au lieu d'être atténué en ogive, par ses élytres chargées de trois côtes saillantes, à bordure marginale peu distincte, et par la poitrine et le ventre, sauf les segments lumineux, bruns.

20. **Photuris fruticola** Motsch.

Telephoroïdes fruticola Motsch., *Et. Ent.* 1854, p. 60.
Photuris trivialis Bohm., *Eug. res.* 1858, p. 77.
Espèce très répandue au Brésil.

21. **Photuris lividipennis** Motsch.

Bicellonycha lividipennis Motsch., *Et. Ent.* 1854, p. 58.
Aussi du Vénézuela et du Brésil.

22. **Photuris signifera** Kirsch.

Kirsch, *Berl. Ent. Zeit.* 1865, p. 78.
Ern. Oliv., *Soc. Ent. Fr.* 1886, p. 243, pl. 3, fig. 16.

C'est avec doute que je rapporte à cette espèce un unique individu (♀) en mauvais état.

23. **Photuris lurida** Kirsch.

Kirsch, *Berl. Ent. Zeit.* 1865, p. 76.
Ern. Oliv., *Soc. Ent. Fr.* 1886, p. 244, pl. 3, fig. 17.
Aussi en Colombie.

CONTRIBUTIONS TO THE ORNITHOLOGY OF THE PAPUAN ISLANDS.

By THE HON. WALTER ROTHSCHILD and ERNST HARTERT.

(The work of these "contributions" is so divided that Walter Rothschild works out the families *Paradiseidae*, *Ptilonorhynchidae*, and *Rallidae*, while E. Hartert alone is responsible for the rest.)

I.

LIST OF THREE SMALL COLLECTIONS FROM BRITISH NEW GUINEA, MOSTLY BROUGHT TOGETHER IN THE OWEN STANLEY MOUNTAINS.

(Plate I.)

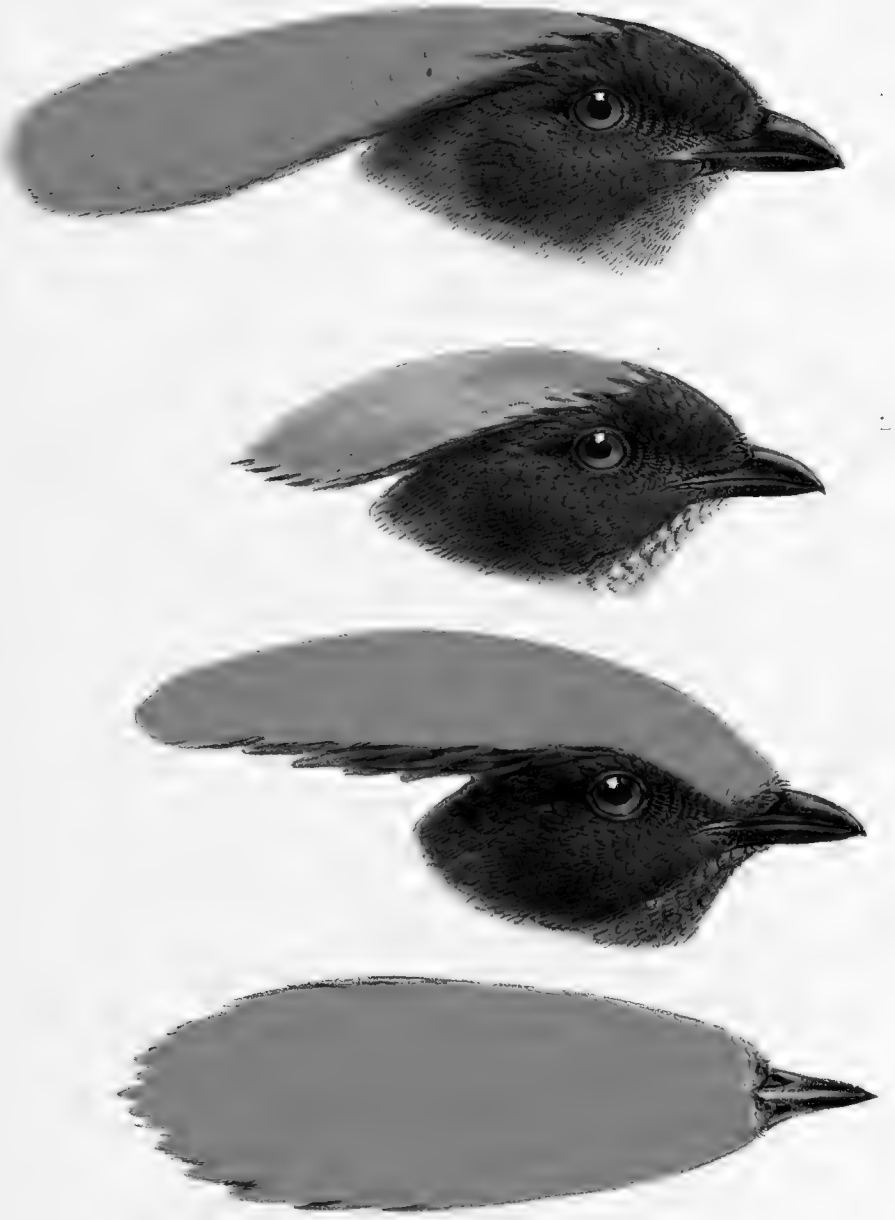
ONE of these collections was made by our collector Anthony in the *Mailu District* during the months of July and August; another in the *Eafa District* between Mounts Alexander and Bellamy, in elevations of from 5000 to 6000 feet, in October; and the third consisted of some skins from high elevations in the *Victoria District*, which were purchased in London.

Anthony left Port Moresby for the first trip on June 12th, 1895, and reached Mailu after a very long and bad passage in a small boat. He started inland on July 6th, marched about twenty-five miles through broken country towards Mount Dayman, formed a camp, and collected for two weeks. He then made another march of about twenty-five miles, and collected ten days. A third march of about ten miles brought him to the foot of the mountains, where he stopped five days, but found birds very scarce, while insects were more abundant. He then ascended the top of the range, where he collected three days with very little success in birds. He wished to descend on the other side and to collect on the north-eastern slopes, but the report of the murder of the Clarke Expedition so frightened the natives that they would not proceed. He therefore followed the range in a south-easterly direction and collected another three weeks, in very bad weather, rain pouring almost every day, while the hills were continually enveloped in fog. After these three weeks he proceeded to Orangery Bay, where he reached the coast again in a place about twenty-five miles to the east from where he started inland, and collected a short time near the coast. Port Moresby was reached again early in September. All the birds were collected in July and August, some having exact dates, others not. All the birds from the second trip were collected in October, inland from Port Moresby, in what is called the Eafa district, between Mounts Alexander and Bellamy, in heights of about 5000 to 6000 feet. The collector says he could have reached higher elevations if his natives had not refused, but they declared they could not bear the cold, and the hill-tribes seemed not to know what to make of the party, as their district had not been visited before by strangers. Besides he seems to consider the time of the year unfavourable for shooting, and it rained "night and day."

No particulars could be obtained with regard to the few skins bought in London, but there were some very good things among them.

Craspedophora intercedens Sharpe, *Journ. Linn. Soc.* XVI. p. 444 (1882).

A series of *males* from Mailu and Eafa districts. The breast-shield varies in certain lights from metallic green to blue. The wings are 183—194 mm. long; the bill very constant, varying in length only about 3 mm.



J.G. Keulemans ad nat. del.

1. AMBLYORNIS INORNATA. 2. [illegible]. 3 & 4. [illegible]


BRITISH MUSEUM
NATURAL HISTORY

This species is at once distinguishable from *C. magnifica* of North-Western New Guinea by the base of the culmen being entirely hidden by the frontal feathers, which unite on each side, as properly remarked by Sharpe in his new *Monograph of the Paradiseidae*. The bill is also a little shorter, the breast-shield of a less metallic gloss, but these differences are trifling. Birds from German New Guinea (Constantinhafen, Simbang, and the Finisterre Mountains) are entirely similar to those from British New Guinea. W. R.

Drepanornis albertisii cervinicauda Scl., *P. Z. S.* 1883, p. 578.

Two *females* shot on July 19th and 21st, 1895, near Orangery Bay, and a good series of both sexes from the Eafa district. The iris is given as brown, feet grey, bill black. Dr. Sclater most appropriately called this bird, when he first named it, a subspecies, and bestowed upon it a trinomial. As such it must stand, the only obvious differences between the *male* of it and the Arfak bird being the lighter rump and tail; and the colour of the latter is by no means absolutely constant, neither in the darker nor in the paler species, though the former is always recognisable. The differences stated to exist in the colour of the crown and on the tips of the side-plumes are minute, and not quite constant in a large series. A *constant* difference in the length and thickness of the bill seems not to exist. The *female* of the Arfak bird is darker and more rufous above. All this seems not to indicate more than a well-marked subspecies. W. R.

Epimachus meyeri Finsch.

Both sexes from the Eafa and Victoria districts.

Astrarchia stephaniae Finsch.

Both sexes of this magnificent bird from the Eafa and Victoria districts. The *females* do not differ in structure from those of *Astrapia nigra*, but only in colour. The genus, therefore, is hardly of much value. W. R.

Paradisornis rudolphi Finsch & Meyer.

Both sexes of this glorious bird from the Eafa district and Mount Victoria. In October *males* were in full plumage, while others had their long tail-feathers not developed and a *female* was in full moult. W. R.

Paradisea raggiana Scl., *P. Z. S.* 1873, pp. 559, 697.

A fine series of adult *males* from the Mailu district, all very constant in colour, except that in two specimens the straw-yellow colour of the hind-neck extends much less down towards the back than usual. All are in full nuptial plumage, except one which has only short side-plumes and one which has none at all. The wing is mostly about 185 mm. long, the shortest being 183 and 181 mm. long, while a few have longer wings, *i.e.* 187, 190, and one even 194. W. R.

Cicinnurus regius (Linn.).

A large series of *males* and *females* from Mailu. *Female*: "Eye brown, feet pale blue, beak yellow."

I have now before me in the Tring Museum many specimens of *Cicinnurus regius*, about thirty of them with exact localities, from Mailu and Nicura in

British New Guinea, Simbang and Constantinhafen in German New Guinea, from Arfak, Salwatti, Mysol, and Aru Island, and I find that they are very constant on the whole, and have the forehead and the feathers on the bill light orange, quite different from the rest of the upperside. The specimens from Jobi Island differ obviously in having the short feathers on the bill produced farther towards the tip, thus leaving a smaller piece of the bill unfeathered, in having these feathers a little longer, much darker, and of the same colour as the back. These characters can be seen at a glance, and certainly are important enough to establish a subspecies upon. As there is a slight variation in the colour and extension of these parts, we may fairly expect that intermediate forms will occur, and therefore had better call the Jobi form a subspecies only, although my specimens are so obviously different. Salvadori was the first to notice the differences of Jobi specimens (*Ornitologia Papuasia* II. p. 650), and his seven specimens were evidently alike. A. B. Meyer (*Zeitschr. f. ges. Ornithol.* III. p. 36, 1886) also recognises the same characters as being peculiar to the Jobi Island specimens, and states that a Kafu skin showed the same peculiarity, but had a very yellowish red tail. Guillemard (*P. Z. S.* 1886, p. 656) also describes the Jobi bird as differing from the others, but the size of the supraocular spot and the violet tinge of the throat vary, and are therefore of no consequence. For the Jobi bird I propose the name of

Cicinnurus regius coccineifrons Rothsch., subsp. nov.

I may also mention that the one Aru skin I have is large, the wing longer than in any of my other specimens, the nasal plumes rather short and yellowish. Guillemard (*P. Z. S.* 1886, p. 656) mentions the same character, and therefore I should very much like to compare a series of specimens from Aru. W. R.

Diphyllodes hunsteini Meyer.

A *male* in moult and two *females* from the Eafa district, which seem to belong to *D. hunsteini* Meyer. W. R.

Parotia lawesi Rams.

Of this excellent species I have received a large series from the Eafa district. The most important character to distinguish it from *P. sexpennis* seems to me the

white frontal plumes on the top of the bill, extending right to the front. Between the two rows of white nasal plumes is a long upright crest of black feathers with a

strong browny gloss, not hitherto recognised in any figure of this bird, and laid back in most of the skins seen by me, but standing up as in the accompanying figure in some of my new skins; and this is evidently its proper position, though the bird may be able to lay it back sometimes. W. R.

Lophorina minor Rams.

A fine series from the Eafa district, shot at elevations of about 5000 to 6000 feet. The *males* have the wing from 124 to 136, but mostly about 130—132, mm. in length, the tails from 89 to 100. The adult *female* has the wing about 112—118, mostly about 115. The young *male* is entirely similar to the *female* in colour, but can be distinguished by its longer wing. The black feathers of the adult *male* begin to show at an early age in large patches above and below, and some black remiges and rectrices appear irregularly, but the feathers of the brilliant green breast-shield and the velvety mantle-plumes evidently come later.

This species was first described as *L. superba minor*, but it must evidently stand as a good species. The *male* can be distinguished at a glance by the very conspicuous black centres to the upper feathers of the breast-shield. Besides this, the wing is shorter, the longest of the mantle-plumes are broader at their tips, and there are some more differences, as pointed out by Ramsay and Meyer (cf. *Zeitschr. f. ges. Ornith.* II. p. 376, Pl. XVII.; III. p. 180; *Ibis*, 1886, p. 244, etc.). The *female* differs entirely from that of *L. superba* in the colour of the upperside, and in having a broad superciliary line of whitish spots running towards the occiput. W. R.

Phonygama purpureoviolacea Meyer.

Three skins from the Eafa district, October 1895, 5000—6000 feet. "Iris red, feet and bill black." This is the finest of the known species of *Phonygama*. It inhabits the mountains of British New Guinea, while *Ph. hunsteini* Sharpe (= *Ph. thomsoni* Tristr.) lives in the D'Entrecasteaux Group, *Ph. gouldi* in Queensland, and *Ph. keraudreni* is said to occur all over New Guinea and the Aru Islands! I am much in want of good specimens of the last two species, with exact localities and dates.

The *male* is apparently larger than the *female*. W. R.

Manucodia atra (Less.).

Mailu district; several specimens of both sexes.

The *males* are considerably larger than the *females*. W. R.

Chlamydodera cerviniventris Gould.

Mailu; both sexes.

"Eye grey, feet brown, bill black." The *male* seems to be distinctly larger than the *female*. W. R.

Aeluroedus melanocephalus Ramsay.

Typical skins from Mailu and Victoria districts.

Amblyornis inornata (Schleg.).

A. macgregoriae de Vis.

A. musgravianus Goodwin.

I am sorry to say that I cannot any longer distinguish between *A. inornata* and *A. macgregoriae* (or *A. musgravianus*, as one may call it, both names being published in 1890).

For a long time, from 1871 to 1894, no specimen of *Amblyornis inornata* with a crest was known, though Bruijn's hunters, D'Albertis, and others had brought many *females* and *males* out of the Arfak region. In 1884 Sharpe described the totally distinct *A. subalaris*, also from a *female* (or young *male*), without any sign of a crest, but soon afterwards Finsch & Meyer made us acquainted with the beautifully crested *male*. In 1890 the names of *A. macgregoriae* and *A. musgravianus* were given to crested *males* from the mountains of British New Guinea, but no specimens of that form reached Europe until this year. As late as 1894 a crested *male* of *A. inornata* was first made known by Meyer, and I have since acquired seven. Quite lately came, among some birds sent for sale to London from the Victoria district, two *males* which fully agreed with the description of *A. macgregoriae* (that of *A. musgravianus* being very incomplete and in general terms). They were very much like the Arfak birds, but the crest decidedly shorter, and the whole bird rather small. Comparing my specimen (the other is in the British Museum) with the series of *A. inornata* from Dutch New Guinea, I soon anticipated that they would probably be not more than subspecies. I was, therefore, not a little surprised when in the last collection from the Eafa district I found a beautiful *male*, with a crest fully as long as any of those from Arfak, and not different in size! I now give the measurements of the crested *males* at present in my collection in millimètres :—

	CREST.	WING.	TAIL.	TARSUS.
1. ♂ ad. Arfak Region	95	137	96	35
2. ♂ ad. Arfak Region	95	142	97	35
3. ♂ ad. Arfak Region	94	136	95	35
4. ♂ ad. Arfak Region	96	136	None.	36
5. ♂ apparently adult. Arfak Region	Not fully developed.	135	95	36
6. ♂ ad. Northern Coast of Dutch New Guinea (? Arfak)	86	140	96	35
7. ♂ ad. Northern Coast of Dutch New Guinea (? Arfak)	90	142	91	36
8. ♂ ad. Mt. Victoria, Owen Stanley Mountains	85	132	90	34
9. ♂ ad. Eafa District, between Mts. Alexander and Bellamy, 5 6000 feet. October 1895	95	137	93	35

On the upperside is no remarkable difference in colour between any of these, but beneath Nos. 1, 2, 4, 5, 6 are somewhat more rufous, and No. 7 is exactly between these and the paler ones, which are Nos. 3, 8, 9.

One more reason not to attach great importance to the length of crest in this *Amblyornis* is that it is not constant in *A. subalaris*.

Crestless specimens from Arfak (Bruijn coll.) have mostly shorter wings, and these are apparently *females*, while some, evidently young *males*, have the wings as

long as the crested *males*. The very different descriptions of the "bowers" of the two supposed species are rather puzzling at present, and we should try to learn more about it, but if the birds cannot be distinguished our present knowledge of the differences in their bowers cannot constitute their distinctness. W. R.

Amblyornis subalaris Sharpe.

A series of beautiful *males* and *females* from Eafa and Victoria districts. The crest is 60 to 65 mm. long, but in one 70. In some skins it is pointed to a sharp angle, but in others not. This is apparently due to preparation. The *females* have the wing a little shorter.

The plate illustrates the differences of the three recognised species: *A. inornata*, *A. subalaris*, and *A. flavifrons* (see Nov. Zool. II. p. 480). W. R.

Loria mariae (de Vis).

One *female* from the Eafa district; on the label: "Eye grey-black, feet greenish, bill black." This bird entirely agrees with the descriptions of *Chemophilus mariae* ♀ and *Loria loriae* Salvadori, but, as it has no wattles at the angle of the mouth, it would properly belong to *L. mariae* (de Vis). I, however, have a *male* from the Arfak region which exactly agrees with the *male* of De Vis's species, only the metallic sheen on the inner secondaries is slightly more greenish. In view of this wide distribution, which is the same as that of *Amblyornis inornata*, I cannot at present believe that *Loria loriae* and *Loria mariae* are really two different species. W. R.

Oriolus striatus Quoy & Gaim.

Three skins from Mailu. Iris dark red, bill red, feet bluish.

Mino dumonti Less.

♀ ad. One skin from Mailu. "Eye, feet, beak yellow." Wing 143 mm.

Calornis metallica (Temm.).

♀ ad. Mailu. Iris red. Wing 104 mm.

Paramythia montium de Vis.

Mount Victoria; one perfect skin, not sexed. Another in the British Museum. Sclater has given an admirable figure by Keulemans in the *Ibis* of this marvellous bird. He there proposed, under reserve, to create a new family *Paramythidae* for this bird, chiefly for the reasons that the covering of the tarsus differed from that of the *Sturnidae* (under which family it was classed by its first describer) and that it seemed to him (judging from an imperfect wing) that there was no first primary, or, better said, that it had only nine primaries. It is true that the tarsus, with the exception of its lowest part, is covered by an unbroken lamina, while it is covered throughout with a number of very distinct scales in the *Sturnidae*, and the tarsus and toes are very slender in comparison with those of the *Sturnidae*. On the wing, however, I find that the first primary is *not quite absent*, though very much reduced. It is stiff and narrow, about 8 or 9 mm. long, and certainly not "functionary" as a flight-feather. Nevertheless it is there, and the difference between it and the first (or tenth, as it is called by some authors) primary of *Sturnus vulgaris*, where it is about 15 mm. long, is less than that between *Sturnus vulgaris* and *Lamprocolius*

phornicopterus, where it is about 32 mm. long, though both the latter are recognised as *Sturnidae*. How uncertain the length of the first primary as a family character is, may be seen by comparing it, for example, in *Pholidauges verreauxi* (14 mm.), *Calornis metallica* (14 mm.), *Streptocitta torquata* (19 mm.), *Acridotheres tristis* (25 mm.), *Gracula robusta* (40 mm.), *Gracula javanica* (31 mm.), *Mino dumonti* (30 mm.), *Basilornis* (25 mm.), and others, as well as comparing different species and genera of *Alaudidae*. I was rather surprised to find that in the so-called nine-quilled (or rather, nine-primaried!) *Passeres* the tenth primary is not always, nay, not even as a rule, and very likely never, entirely absent, but only much reduced, and often difficult to find, because stiff and narrow and hidden by its longer covert. From these reduced little feathers to those of *Pholidauges*, *Sturnus*, or *Calornis* is no longer step than from the latter to *Acridotheres*, *Basilornis*, and *Gracula*. However wide the gap between total absence and development of an organ may be considered, it is wholly unscientific to use its presence in a diminutive size as a character to separate large groups, such as families, when we see that in the groups which we recognised it varies as wide as the difference is between its size in the families where it was called "absent" and the smallest in the families where it was called "present." I am very sorry that these facts exist, because they take from us an apparently very convenient character to split up into groups a number of the many "Passerine birds," which, in spite of the many clever attempts to classify them, will long remain a crux of ornithologists. Finally, I am bound to mention (and this should and will be known to ornithologists) that what I saw is no new discovery, but has long before been laid before the Zoological Society of London in an important paper entitled "Remarks on the Numbers and on the Phylogenetic Development of the Remiges of Birds," by Hans Gadow. See *Proc. Zool. Soc. Lond.* 1888, p. 655.

The creation of the family of *Paramythidae* MAY be justified for other reasons, but the minute size of the first primary cannot be taken as an important reason for it. The measurements of our specimen are: wing 103 mm., tail 105, tarsus 30, entire culmen 20. E. H.

Rhectes nigrescens Schleg.

A *female* from the Eafa district differs from a *female* from Arfak in a decidedly longer bill. As Meyer (*Zeitschr. f. ges. Ornith.* III. p. 21) mentions some slight differences between *males* from the two different localities, it is quite possible that they are not the same, but more material is necessary to decide finally. E. H.

Pomareopsis bruijni (Salvad.).

1875. *Grallina bruijni* Salvad., *Ann. Mus. Civ. Genoa* VII. p. 929; id., *Orn. Papuasia* II. p. 191 Sharpe, *Cat. B. Brit. Mus.* III. p. 273; id., in Gould's *B. New Guinea* III. pl. 13.
1880. *Pomareopsis semiatra* Oust., *Bull. Ass. Sci. de France* p. 173.
1894. *Symmorphus nigripectus* de Vis, *Report on New Guinea* 1894, *Rep. on Ornith. Specim.* p. 4, No. 44.

I believe that the three synonyms quoted here really belong to the same species. The description and measurements of *Symmorphus nigripectus* so closely agree with this species that I cannot help regarding it as synonymous for the present, though I hope to be enlightened on the subject by our fellow-worker Mr. de Vis, to whom we owe so much of our knowledge of birds from South-Eastern New Guinea.

The Tring Museum has it from the Mailu and Victoria districts. E. H.

Monachella mülleriana (Schleg.).

♀. Mailu, July 19th, 1895. "Iris, feet, beak dark brown." Wing 96 mm.

Colluricincla megarhyncha (Quoy & Gaim.).

♂. Mailu, July 30th, 1895. "Iris deep brown, bill and feet dark grey." Wing 92 mm.

Melanocharis bicolor Rams.

♀. Mailu. "Iris grey, feet and beak brown." Wing 67 mm.

Pachycephala schlegeli obscurior Hartert subsp. nov.

The south-eastern representative form of the *Pachycephala schlegeli typica* from the Arfak region of New Guinea, of which two *males* are at hand for comparison with fifteen *males* from Arfak, differs only from the latter in having the abdomen of a deeper tawny orange, which colour seems also to be extended farther on towards the sides, in having a larger black chin-spot, and the white of the throat less in extent. We have it from the Eafa district from heights of 5000 to 6000 feet, and from the Victoria district Mr. de Vis has had specimens from 6000 to 8000 feet. Wing. 85 mm. E. H.

Myzomela rosenbergi Schleg.

Two from the Eafa district, not distinguishable from a large series from Arfak in the Tring Museum. E. H.

Ptilotis visi Hartert sp. nov.

Ptilotis, speciei *P. chrysotis* dictae similis, sed corpore supra et alis rufescentioribus, *gutture* pallidiore, regione supra-auriculari pallidiore facile distinguenda.

Hab. Nova Guinea meridionali.

This species has been mixed up with *P. filigera* Gould, from North Queensland, by Salvadori, Gadow (cf. *Ornit. Papuasia* II. p. 345; *Cat. B. Brit. Mus.* IX. p. 237), and others, but it is not typical *P. filigera* from Queensland (Cape York), from which it differs in being much darker above and below, the top of the head not being grey but greenish olive, the breast being washed with greenish olive, the white mark above the ear-coverts indistinct, if visible at all, the whitish grey spots on the nape smaller and sometimes quite absent. In fact *Ptilotis visi* is nearer to *P. chrysotis* of North-Western New Guinea, from which it differs in the quite different colour of the upper parts, which are strongly washed with rusty rufous, the paler chin and throat, the paler ear-coverts, the paler line above the ear-coverts (which is almost black in *P. chrysotis*), and generally in the presence of some greyish spots on the nape. The breast is also less greenish (though distinctly so), the wings more rufous outside and with much broader inner rufous margins. The type of *P. visi* is from the Mailu district, from where the Tring Museum has four beautiful skins; but we have also specimens *q*, *u*, *v*, *r*, *x* of Salvadori's list (*l.c.* p. 346), which I consider to belong to this species, as well as two skins from the Fly River which seem to belong to the same form, although the white mark above the ear-coverts is rather distinct and the region above it rather dark. They may be subspecifically distinct, but more material is required from that place to decide that question. We have also two skins from Wokan, Aru Islands, which are not *P. visi*, but nearer to *P. filigera*. They are, however, skinned after having been preserved in spirits of wine (see Salvadori, *l.c.* p. 346), and therefore not much weight can be attached to their

coloration, but they are certainly nearest to *P. filigera*, from which they will probably differ in some slight points only.

P. visi ♂ ad. (type): Bill black. Upperside greenish olive, strongly washed with rufous on the interscapulium, back, and rump, but strongest on the interscapulium. Remiges deep brown, outer webs narrowly bordered with rusty olive, inner webs broadly margined with rufous, specially towards the base. Wing-coverts rufous brown, margined with rusty rufous. Under wing-coverts light rufous. Rectrices deep brown, narrowly margined with olive on the outer webs, broadly bordered and tipped with rufous. Under the eye a short whitish line. Ear-coverts greyish, bordered above with an often indistinct line of whitish, below with a long golden-yellow line. Chin and throat pale brownish grey; rest of under surface rufous brown, with a greenish olive wash on the breast, and without any distinct spots. Nape generally with some pale greyish spots. Total length about 180 mm., *a.* 92—97, *c.* 80—85. Salvadori's Naiabui specimens have the wing mostly a little longer. Old skins are not so bright as our fresh ones.

It is not impossible, of course, that all these forms may one day, when a large material comes to hand, be regarded as subspecies only, but at present they must most decidedly be kept separate. I am obliged to Mr. Ogilvie Grant, who went over our birds with me in the British Museum, and who is likewise of the opinion that *Ptilotis filigera*, *P. chrysotis*, and *P. visi*, the last of which stands somewhat in the middle between the two others, are three different species.

I named the new form after Mr. de Vis, of the Queensland Museum, whose different articles on the collections made during Sir William Macgregor's expeditions have greatly enlarged our knowledge of the birds of British New Guinea. E. H.

Melirrhophetes belfordi de Vis.

♂. Eafa district, between Mount Alexander and Mount Bellamy, 5000 to 6000 feet, October 1895. "Eye brown, bill dark brown, feet grey." This specimen agrees well with the description of Mr. de Vis. E. H.

Melirrhophetes ochromelas batesi Sharpe.

One adult specimen from the Mailu Mountains. The *Melirrhophetes* from the mountains of British New Guinea was named *M. batesi* by Sharpe, but when he did so he did not have a specimen of *M. ochromelas* to compare, but had to go merely by the description of Meyer and Gould's figure of that species. Mr. Grant and I have compared the two forms, of which there are now specimens both at Tring and in the British Museum; and we did not find any other tangible difference than the colour of the stripe above and behind the bare space surrounding the eye and the tips of the upper ear-coverts. These are pale buff in *M. ochromelas* from Arfak, and rufous fawn-colour in *M. batesi*. Perhaps the breast and abdomen are also a shade darker in *M. ochromelas*, but it requires a series of fresh specimens to decide whether that has any constancy. It is very doubtful to me whether these slight differences will be found to be constant when some series from the countries between Arfak and the Owen Stanley Mountains come to hand, and the safest course seems to treat these forms as subspecies, thus recording the fact that the forms from the extreme points of their distribution are slightly different; while we may take it for granted that intermediate forms will be found. E. H.

Centropus menebeki Less. et Garn.

♂ ad. Mailu district, August 5th, 1895. "Iris pink." Wing 230 mm., tail 365.

Sauromarptis gaudichaud (Quoy & Gaim.).

Dacelo gaudichaud Quoy & Gaim., *Voy. Ant. d. Monde Zool.* p. 112, Pl. XXV. (1824).

Mailu.

The name of this large kingfisher is *S. gaudichaud*, and not *S. gaudichaudi*, as spelt by modern ornithologists. Messrs. Quoy & Gaimard spelt it without an *i*, and there is no reason to alter their spelling.

No white on the back in our specimens from British New Guinea, but we have one from Aru and one from German New Guinea, collected by Kubary, which have also no white on the back. The blue in our bird from Constantinhafen (*S. kubaryi* Meyer, *Ibis*, 1890, p. 414) is in no way more whitish or silvery cobalt than in others, but its bill is larger than in any other specimen before me. *S. kubaryi* is certainly not a species, but it may possibly stand as a local subspecies. E. H.

Dasyptilus pesqueti (Less.).

Two specimens from Mailu. In comparing these skins and one from the Owen Stanley Mountains with one from Constantinhafen, German New Guinea (Kubary coll.), and sixteen from the Arfak region (Arfak, Dorey), I cannot find any constant differences. *Females* are smaller, but I cannot see that the red colour is less bright; it is, however, absent on the side of the occiput in one *female*. E. H.

Neopsittacus pullicauda Hartert sp. nov.

Speciei *Neopsittacus musschenbroeki* dictae similis, sed occipite nuchaque obscuriore, cauda supra obscuriore, infra virescente (nec ochraceo-flavo vel aurantio), breviore, distinguendus.

Hab. Owen Stanley Mountains (type from the Victoria district).

The *Neopsittacus* of the mountains of British New Guinea differs from *N. musschenbroeki* Schleg. from the Arfak Mountains in the hinder part of crown, occiput, and nape being dark green, with a very slight brownish red wash and some very faint yellowish streaks, while these parts are olive-brown with a strong orange shade and very distinct yellow shaft-stripes in *N. musschenbroeki*. The tail is a little shorter than in the latter, of a much darker green above and without an indication of orange tips, below dark brownish green instead of ochre-yellow or orange. It seems also that the red on the breast and middle of abdomen is much more extended, but this character varies with age. Mr. C. W. de Vis, in the *Report on Ornithological Specimens collected in British New Guinea* of 1894, mentions on p. 1 that he had specimens of a parrot collected on Mount Manaeao, at elevations of 5000 and 5650 feet, in April, which he "referred with diffidence to *N. musschenbroeki*," as he noticed some peculiarities, but the characters he mentions, viz. a yellow bill and the green of the outermost tail-feather being confined to the base of the outer web, are not clear. The bill in the skin before me is orange-yellow, and the extent of the deep red colour in the rectrices is the same as in *N. musschenbroeki*, where, however, it varies a little. Its total length is about 190 mm., the wing 102 mm., tail 86 mm., tarsus 12 mm. E. H.

Psittacella brehmi pallida Meyer.

A. B. Meyer in *Zeitschr. f. ges. Ornith.* III. p. 3 (1886) described as a new species from some *females* from British New Guinea *Psittacella pallida*, because it differed from *females* of *P. brehmi* from Dutch New Guinea in being paler and washed with greyish on the throat and sides of the head, and in having a shorter tail. Salvadori afterwards (cf. *Cat. B. Brit. Mus.* XX. p. 499, 1891) declared that he had not been able to detect any difference between the supposed two species. We have now received three *males* from the Eafa district, and, comparing them with three *males* and four *females* from Arfak, I find that they differ from the latter in having the throat and sides of the head paler and with a slight greyish wash, and in being more yellowish green on the breast and abdomen, while the north-western birds are more grass-green. These characters are quite noticeable in the specimens before me, but as they are not quite constant they can hardly be considered to justify a *specific* separation, but they seem constant enough for a *subspecific* distinction. I may add that there is no great difference in the length of the tail or in size, though *P. b. pallida* is a little smaller as a rule. De Vis (*Report*, 1894) mentions some doubtful specimens which seem to belong to a third form, to judge from his remarks. E. H.

Charmosyna stellae Meyer.

Males and *females* from the Eafa district and Mount Victoria.

Accipiter cirrhocephalus (Vieill.).

An evidently perfectly adult *male*, with the wing 185 mm. long, from Mailu.

Falco severus Horsf.

A fine skin from Mount Victoria. Some of the old feathers on the underside are paler, and have longitudinal black spots, which are probably the remainder of the immature plumage. The rectrices have a narrow rufous terminal border. E. H.

Falco ernesti Sharpe.

A beautiful *male* (though marked *female* on the label by mistake) from the Eafa district, October 1895. "Iris brown, feet and cere yellow."

The Tring Museum has also a *female* from Arfak.

Reinwardtoenas reinwardti griseotincta Hartert subsp. nov.

Comparing specimens of *Reinwardtoenas reinwardti* from S.E. New Guinea, Kaiser-Wilhelmsland, Arfak, Waigiu, and the Moluccas, I find that the Moluccan birds are much more white on head, neck, and breast, and have more dark feathers on the wing-coverts, besides being a trifle smaller as a rule; while the birds from New Guinea have the head, neck, and breast of a much darker grey, more rufous on the wing-coverts, and are perhaps a little larger. Waigiu specimens stand somewhat between Moluccan and Papuan specimens in the darkness of the neck and breast, but belong rather to the latter. Of the New Guinea specimens it may be said that those from Arfak seem to be a little lighter than those from the Eastern and Southern parts of the island, where they are of the darkest grey. In any case, however, the

Moluccan bird is easily recognisable as being whiter, and it is therefore desirable to give the Papuan bird a subspecific name. I do not know the *R. minor* Schleg. from the island of Misori in the Geelvink Bay, but *R. brunni* (Scl.) is a very distinct species. Count Salvadori, to whom we owe so much of our knowledge of the Papuan Islands, has already (see *Ornitol. Papuas.* III. p. 128) pointed out some differences between Moluccan and Papuan specimens, but gave no new name, as he did not consider such local forms important enough to give them a name. E. H.

Goura albertisii Salvad.

Two typical specimens from Mailu.

II.

NOTE ON TWO MORE SPECIMENS OF *ASTRAPIA SPLENDIDISSIMA*.

Since I described and figured this splendid bird in Vol. II. of this journal, I have received two more *males*, which are quite complete. The central rectrices are 185 and 210 mm. long, cream-colour with black tips for 70 and 81 mm., and only 1·5 inch (= 38 mm.) longer than the next pair. The wings of these specimens measure about 5·15 inches (= 130 mm.). W. R.

III.

ON THE FORMS OF *MACROPTERYX MYSTACEA*.

When arranging the Swifts in the Tring Museum I found two specimens, a *male* and a *female*, of *Macropteryx mystacea*, collected on the island of Guadalcanar by Mr. Woodford, and recorded by Grant in *Proc. Zool. Soc. Lond.* 1888, p. 194. They struck me at once by having a uniform grey underside, while *M. mystacea* from other localities have the middle of the abdomen white and a good deal of white on the lower tail-coverts. On further examination I found that the wings of the two Solomon Island specimens were about three-quarters of an inch, or about 20 mm., shorter. These differences, if the two specimens are compared with a number of New Guinea specimens of *M. mystacea*, are so obvious that I should not have hesitated to describe them as a species had I not found that both the length of the wing and the colour of the under parts vary to a certain extent in *M. mystacea*. So I find that the Moluccan specimens have the wings mostly shorter than those from New Guinea, and the extent of the white colour on the abdomen varies also. There are a skin from Buru and one from Ceram in the British Museum which have very little white on the belly only. Nevertheless the Guadalcanar birds are striking enough to deserve a subspecific name, and I propose for them that of

Macropteryx mystacea woodfordiana Hartert subsp. nov.

It differs from *M. mystacea typica* from New Guinea in the uniform grey under tail-coverts and abdomen (without white in the middle) and the shorter wing. It has the wings 8·21 inches (=208 mm.) and 8·15 inches (=206·5 mm.), the tails 7 and 7·5 (=177·5 and 190 mm.). I think it is quite possible that the Moluccan birds will be separated subspecifically at one time or another, but at present I have not sufficient material to decide, and I find too much variation in size, while I can

see no differences in colour. The species was first described from New Guinea, and the Papuan form must therefore stand as *Macropteryx mystacea typica*. I have measured the following specimens from New Guinea and adjacent islands :—

	Wing.
1. Mailu district, British New Guinea	9·0 inches.
2. „ „ „ „ „	9·1 „
3. „ „ „ „ „	9·2 „
4. Kafu	9·4 „
5. „	8·95 „
6. Andai, Dutch New Guinea	8·65 „
7. Mansiman, Arfak...	8·9 „
8. Arfak Mountains	8·8 „
9. Owen Stanley Mountains	8·95 „
10. Fly River	9·0 „
11. Jobi Island	8·9 „
12. Waigiu	9·2 „
13. Port Moresby	9·15 „
14. Aru Islands	9·18 „

The following from Duke of York and New Ireland :—

1. Duke of York	8·75 „
2. New Ireland	8·65 „

From the Moluccan Islands :—

1. Halmaheira	8·5 „
2. Buru	8·6 „
3. Amboina	8·6 „
4. Buru	8·5 „
5. Halmaheira	8·6 „
6. Buru	8·5 „
7. „	8·68 „
8. „	8·5 „
9. Batjan	8·5 „
10. Amboina	8·56 „
11. „	8·4 „
12, 13. „	8·8 „
14. „	8·7 „
15. „	8·0 „
16. Ceram	8·8 „

E. H.

NOTES ON *HETEROCERA*, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.

By THE HON. WALTER ROTHSCHILD and DR. KARL JORDAN.

FOR some time past we have been working at several families of *Heterocera*, and publish in this paper a number of notes on structural characters and affinities, as well as diagnoses of genera and species which are to our knowledge new to science. The descriptions of new species are by Walter Rothschild, while Dr. K. Jordan is responsible for the remainder of this article as far as it is undersigned "K. J."

We have thought it best to give the exact size of the wings of the new species by measuring three lines—the anterior margin, exterior margin, and posterior margin. The anterior margin is measured from base of subcostal nervure to tip of vein 8 of forewings, or vein 7 of hindwings; the posterior margin from base of subcostal nervure to tip of vein 1^b; and the exterior margin to forewings from tip of vein 8 to tip of vein 1^b, that to hindwings from tip of vein 7 to tip of vein 1^b, if not otherwise stated. AM means anterior margin, EM exterior margin, PM posterior margin.

If the wing of a species is different in general shape from that of an allied species, the mere expanse (length of wings + body) does not give us any idea about that difference.

SATURNIDAE.

1. **Opodiphtera inversa** Rothsch. sp. nov.

Larger than *astrophela* Wlk., tawny ochraceous with grey shades. Ocelli much smaller, but with a larger vitreous centre, that of hindwings considerably more circular. The inner band on forewings is straight behind cell, not curved, and is joined along the median vein to intracellular portion, forming two right angles. The band is double, the inner side pinkish grey, outer side dark vinaceous. The outer band is much nearer posteriorly the outer margin, and differs conspicuously, as also do the other bands, by having the light half inside, while in *astrophela* the light half is outside. On hindwings is a curved double band, of same colour as those on forewings, at basal half, which crosses cell at origin of vein 3; this band is absent from the ♂ of *astrophela*. Half-way between ocellus and outer margin of hindwings is a band composed of three lunulated lines; the two outer are dark vinaceous, the inner one pinkish grey. *Underside* more shaded with pinkish grey; outer bands of both wings indicated, but pinkish only. Collar grey; rest of body similar to wings.

Expanse: forewing AM 55 mm.; EM 36 mm.; PM 33 mm.
„ hindwing „ 34 „ ; „ 30 „ ; „ 37 „

Hab. Mailu, British New Guinea (Anthony, July 1895); 1 ♂. W. R.

SPHINGIDAE.

2. **Phlegethontius stuarti** Rothsch. sp. nov.

Upperside: forewings greyish white, with a strong yellow wash which makes them have the colour of ground mustard seed. On the discocellulars is a white stigma surrounded by a black ring; obliquely between this and the costa is a smaller stigma, also surrounded by a black ring. At the base of wings are three black dots, one before costa and two behind it, the two latter including a white dot between themselves. Between base and stigmata are four zigzag transverse black lines, which converge behind till before inner margin two amalgamate, leaving only three. Beyond the stigmata are three black lines which are strongly dentated; the space between the outer two is much paler than between the first and second. Between the outer of these three lines and the outer margin are two rows of irregular anchor-shaped spots, one quite close to the outer margin, the other half-way between it and the dentated lines. The outer margin is very distinctly and strongly marked in alternate black and white spots. Round the area of the stigmata the wings are more or less clouded with black scales. Hindwings same ground-colour as forewings, but darker, especially in costal and apical area. In the hairy basal region is a black band, cut short posteriorly, where it is followed by a square whitish spot. There are three black dentated bands across outer half of wing, terminating at anal angle, the inner one of which is sometimes double, and stands closer to the second than that does to the third. Outer margin equally distinctly marked as in forewings.

Underside: all four wings grey, with yellow tinge much feebler. Basal half of forewings darker. Apical half of both pairs of wings crossed by three zigzag dentate black lines.

Head above lavender-grey, a spot on either side in front of eye black; palpi almost maize-yellow. Thorax above same colour as wings; two small black dots behind head, followed by two transverse lines (interrupted or complete), two black dots in centre, and one on each side above base of wings.

Abdomen darker, except middle of first two segments above and whole underside; down the centre of abdomen above run two rows of white spots at the hind edges of segments. On each side of second segment is a black patch, and on the five following ones an ochraceous rufous (*not yellow*) patch, partly surrounded by black. The last patch is small in the *male* and practically absent in the *female*.

Expanse: forewing AM 53 mm.; EM 29 mm.; PM 31 mm.
„ hindwing „ 32 „ ; „ 21 „ ; „ 19 „

Hab. La Paz, Bolivia (Arthur Maxwell Stuart, October 1895); 2 ♂, 1 ♀.

The peculiar mossy appearance of the scales and the greenish yellow ground-colour are such that, when the wings are closed and the insect is at rest, it must be practically impossible to distinguish it from yellowish lichens. W. R.

3. **Theretra crossei** Rothsch. sp. nov.

This is most closely allied to *T. lucasi* Wlk. and its Indo-Australian allies, but I must describe is as distinct, for I have two specimens identical, and it comes from West Africa.

Differs from *lucasi* Wlk. by the conspicuous convex outer margin and the much rounded inner angle. Between the margin and the row of black dots on the veins

are two zigzag transverse lines, *not* straight as in *lucasi*, and the spots stand behind the line reaching the apex, while in *lucasi* they stand upon the line.

Expanse: forewing AM 33 mm.; EM 17 mm.; PM 21 mm.
„ hindwing „ 20 „ ; „ 13 „ ; „ 11 „

Hab. Assaba, Lower Niger (Dr. Crosse); 1 ♂. Gold Coast ?; 1 ♂.

I name this species after the collector, but hope soon to have the pleasure of naming a more conspicuous insect after him.

Panacra mira Swinhoe, *Cat. Lep. Het. Oxf.* I. p. 13. n. 54. t. 1. f. 6 (1892) (Cape York), is a synonym of *P. turneri* Lucas, Queensland newspaper; Miskin, *Proc. R. Soc. Queensl.* 1891. p. 62 (Mackay). W. R.

4. **Pachygonia maxwelli** Rothsch. sp. nov.

This species is very distinct from any of the others of the genus, but stands nearest to *P. coffeae* Wlk.

Upperside: both pairs of wings longer and narrower than in *coffeae*. The submarginal line of forewings runs from inner angle to vein 4, and is here five millimetres from outer margin; from vein 4 it runs straight towards the apex, where it ends at vein 7; while in *coffeae* it is zigzag, does not form an angle, and is more or less parallel with outer margin. The three transverse lines between costa and vein 4 run obliquely inwards in *maxwelli*, while in *coffeae* they run obliquely outwards. A pale pinkish grey line runs from inner angle to the small black stigma on the discocellulars. Near the base of inner margin is a large black wedge-shaped patch abruptly terminated at vein 2; in *coffeae* this patch is scarcely darker than rest of wing, and instead of being cut off by vein 2 it runs up gradually narrowing to the costa. On hindwings the black transverse band across the yellow disc is wanting, and the yellow area itself reaches to the base; apex rufous red followed by black; at anal angle are four lines terminated by vein 3—inner one broadest, pale pink, next blackish, third very narrow, pinkish, fourth grey.

Markings of underside corresponding to upperside, but much heavier and more distinctly apparent than in *coffeae*, and ground-colour much redder.

Head and thorax grey, with a black median line, forked behind; on each side of thorax is a large black patch edged with white behind. Abdomen grey, variegated with rufous, below almost rufous.

Expanse: forewing AM 32 mm.; EM 16½ mm.; PM 21 mm.
„ hindwing „ 19 „ ; „ 13 „ ; „ 13 „

Hab. San Augustino, near Mapiri, Bolivia, 3500 feet (Arthur Maxwell Stuart, September 1895); 1 ♂. W. R.

5. **Unzela variegata** Rothsch. sp. nov.

Upperside: forewings differ from *U. japix* (Cram.) firstly in that the transverse line which separates the area of the basal fourth from the dark patch in centre of wing is serpentine, while it is straight in *U. japix*; then in the basal area itself being in the new species cinnamon-grey, with a longitudinal brown streak at inner margin, while in *japix* it is olive-brown, with a round lavender patch in centre. The central dark patch is much less distinct, and instead of being sharply incised on the outer side is constricted into the shape of an hour-glass. Hindwings in *japix* are uniform dark brown, with two short pink streaks at the anal angle, while in *variegata* they

are yellowish grey with a broad dull brown border and a narrow transverse line beyond the middle.

Underside: the wings in *japix* have pale grey borders; in *variegata* these borders are broadly dark brown, while the rest of the wings is much more whitish. Abdomen on underside in *variegata* much dirtier greyish white. The antennae are longer and thicker, and the *male* claspers are larger.

Expanse: forewing AM 25 mm.; EM 12 mm.; PM 17 mm.
„ hindwing „ 17 „ ; „ 12 „ ; „ 10 „

Hab. San Augustino, near Mapiri, Bolivia, 3500 feet (Arthur Maxwell Stuart, September and October 1895); 2 ♂. W. R.

AGARISTIDAE.

Note.—My attention was drawn to the definition of this family especially by Prof. Dr. Karsch's article on the African *Agaristidae* in *Ent. Nachr.* p. 343 (1895), where that learned author says that, according to Aurivillius, the *Agaristidae* are Noctuid-like moths distinguished from the allied families by vein 5 of the hindwing originating from the apex of the cell in the middle between veins 4 and 6; a short definition which I found in discordance with Hampson, *Moths of India* II.—a work which every student of moths will appreciate the more the longer he works with it, though in detail it is, of course, not free from errors—who includes in the *Noctuidae* a number of forms which Karsch's definition would bring to the *Agaristidae*, and I became convinced that a few stray notes on the structure of some genera and species of the Agaristids would be of some help in coming in future to an exact delimitation of the present family. Karsch's definition is based upon that of Aurivillius in *Ent. Tidskr.* p. 183 (1892)—in fact it is only a repetition of one of the nine characters by which Aurivillius distinguishes that family; and I therefore shall annex my notes to those nine characters, which I give in the same order as Aurivillius did.

1. " Stirn aufgeblasen oder mit einer hornigen Erhabenheit."

The forehead is indeed mostly gibbose and often armed with a more or less prominent conical processus, which is truncate at the tip, and bears a circular or subcircular ridge. In Trimen's *Pais pulchra*, and in a new genus and species from Madagascar described in this paper, the processus is long and thin; in *Copidryas gloveri* S. & R., *Apina callisto* Wlk., and in Butler's *Aegocera cornigera* it is naked and has the form of a flattened, slightly excavated horn, the tip of which is rounded, or bi- or tripartite, recalling the frontal horn of certain *Cetonidae*. A great number of Agaristids have, however, the forehead only slightly convex, such species as *Agarista saturata* Wlk. and allies for example, and are without a frontal processus or horn, the circular ridge also being wanting; while on the other hand well-developed frontal horns occur amongst the *Noctuidae*. *Agrotis segetum* Schiff. has a feeble, but distinctly visible, frontal circular ridge. In Cramer's *Phalaena hyroglyphica* (*Pap. Ex.* II. t. 147. f. b) the front of the head is produced into a short cone. *Agrophila sulphuralis* (L.), various species of *Acontia* O. and of allied genera—for example *A. dispar* Wlk. (*Lep. Het. B. M.* XII. p. 790), *Omia cymbalariae* Hb., *Heliodes rupicola* Hb.—have a more or less obviously gibbose forehead with a circular horny ridge; whereas in the species of *Megalodes* Guen. the head is armed with a long horn as in *Copidryas* and *Apina*. Vein 5 of the hindwings comes in the Noctuids mentioned here from below the middle of the discocellular veinlets.

2. "Rippe 1 der Vorderflügel wurzelwärts nicht gegabelt, einfach."

3. "Rippe 5 der Vorderflügel nahe an der Rippe 4 entspringend."

These two characters the *Agaristidae* have in common with the *Noctuidae* and *Arctiidae*. A bifurcation of the submedian nervure to the forewing is sometimes obviously indicated by a longitudinal furrow in the basal portion of the vein.

4. "Rippe 2 der Hinterflügel nahe an der Hinterecke der Mittelzelle entspringend."

The position of vein 2 to the hindwings is neither amongst the *Agaristidae* nor in the Noctuids, Arctiids, Hypsids, etc., of great constancy, and this vein stands on an average not nearer to vein 3 in the *Agaristidae* than in the allied families. We find the extremes in respect to the position of vein 2 of the hindwings in *Agarista agricola* (Don.), *Phalaenoides latinus* (Don.), *Euthisanotia argentata* Druce, with vein 2 coming from near vein 3, and on the other hand in *Pais pulchra* Trim., *Charilina amabilis* (Drury), and *Eusemia mollis* Wlk., in which that vein originates before the apical third of the cell.

5. "Rippe 3 und 4 der Hinterflügel aus einem Punkte (der Hinterecke der Mittelzelle), oder mit sehr kurzem gemeinschaftlichen Stiel entspringend."

This character applies to many *Agaristidae*, *Noctuidae*, *Arctiidae*, etc., but is by no means met with in all Agaristids; vein 3 is removed from 4, though it always stands nearer to 4 than to 2, in many species of various genera, most obviously so in *Eusemia mollis* Wlk. and *Agarista luctifera*, Boisd.

6. "Rippe 5 der Hinterflügel aus *der Mitte* der konkaven Querrippe ausgehend."

Prof. Karsch (*l.c.*) thinks this character the most important one, and sufficient to distinguish the *Agaristidae* from their allies by. In the Arctiids, Hypsids, and most Noctuids, etc., vein 5 of the hindwings comes from the lower angle of the cell, or from between lower angle of the cell and middle of the discocellular veinlets. In a great number of Noctuids vein 5 approaches the centre of the discocellulars; in others it comes just from below the centre; while in others again, as in *Heliothis* Tr. and some allied forms, it originates exactly from the middle of the apex of the cell. We can, in fact, draw up a series of genera which show every intergradation between the two extremes, the position of vein 5 at the lower angle of the cell and the position in the centre of the discocellulars; compare *Barasa* Wlk., *Charielea* Steph., *Agrotis* O., *Asperasa* Moore, *Erastria* O., *Bryophila* Tr., *Heliothis* Tr. And this occurrence of intergradations makes it probable to me that not all the species of Noctuoid moths with vein 5 coming from the middle of the discocellulars are true *Agaristidae*, and that there might be true *Agaristidae* with that vein originating below the centre of the discocellulars. Even if we admit *Heliothis* Tr., *Glottula* Guen., *Sphetta* Wlk., and some other genera to be Agaristids, there remain many others, like *Eupsephopaectes procinctus* Grote from California, which I cannot convince myself to be anything else but *Noctuidae* in spite of vein 5 to the hindwings having the same position as in *Episteme* Hübn. (*Eusemia* Dalm.). On the other hand, in a number of true *Agaristidae*, in *A. albomarginata* Moore, *amatrix* Westw., *semperi* Feld., *hesperioides* Wlk., and others, there is a peculiarity in the neuration of the hindwings—explained on p. 37—which gives vein 5 the appearance of coming from near the lower angle of the cell. In *Phalaenoides albamedia* Luc. vein 5 stands below the middle, owing to the development of a stridulating organ; and, alas, in *Agarista belangeri* Guér. vein 5 is decidedly depressed at the base, as it is in typical Arctiids, Hypsids, etc.

In *Agarista agricola* Don. and its nearest allies vein 5 stands nearer to 6 than to 4.

7. "Rippe 8 der Hinterflügel nahe an der Wurzel mit der vorderen Mediana vereinigt und daselbst mehr oder weniger verdickt."

In this respect the *Agaristidae* and *Noctuidae* are identical, and exhibit rather important variation. In most *Agaristidae* the basal partition of the subcostal nervure (vein 7), before touching vein 8, is very feebly developed, and veins 7 and 8 appear, therefore, to be shortly stalked together, the more so as vein 7 is mostly not anastomosed to (confluent with) vein 8, but joined to it by a very short thick bar, which has such a position as to appear to be a prolongation of the main part of vein 7 (compare *Episteme victrix* Westw., *dentatrix* Westw., *Aegocera*, *Metagarista*, *Ovios*). In *Agarista agricola* Don. and allies the basal partition of vein 7 is obliterated, so that veins 7 and 8 are actually stalked, as in many Arctiids. Sometimes veins 7 and 8 are merged together for about ½ mm. (*Pycnodontis* Feld., *Clitis* Wlk.); or they touch one another, remaining separated by a slight furrow (*Mila* Auriv., *Diamuna* Wlk.), or by a deep and rather broad one (*Godasa* Wlk.). The basal partition of vein 7 is much thicker in *Godasa*, *Mila*, *Clitis*, etc., than in *Episteme*, *Agarista*, *Phalaenoides*, *Aegocera*, etc.

8. "Hinterflügel mit Haftborsten."

This character the *Agaristidae* have in common with the *Noctuidae*, *Arctiidae*, etc.

9. "Die Fühler gewöhnlich vor der Spitze mehr oder weniger verdickt."

There occur very different types of antennae in this family. The typical antennae are more or less club-shaped (*Agarista*, *Episteme*, *Aegocera*, *Rothia*, etc.), but very often the antennae are not thickened towards the apex, or they are even setiform (*Phalaenoides funebris* Moore, *albamedia* Luc., *Zalissa*-species); and there are a good number of genera with serrate and pectinate antennae (*Apina callisto* Wlk., *Aucula* Wlk., *Pycnodontis* and *Leiosoma* Feld., *Psychomorpha* Harr., and others). Clubbed antennae are found, besides *Castniidae*, also among other families of moths—for example, in *Cistidia* Hb., a genus of *Geometridae*.

As it becomes pretty clear from the above short notes that none of the nine points of Aurivillius's definition of the present family are really decisive, every one of them either occurring in other families or being found only in part of the true *Agaristidae*, an exact definition of the family remains still a desideratum; but as we believe that, before our knowledge of the earlier stages of *Agaristidae*, which seem to exhibit some constant characters, has increased, and till we know more of the anatomical and morphological details of the Noctuoid and Bombycoid moths, an exact delimitation of *Agaristidae* will be impossible, we think it after all best to accept, for the present, Aurivillius's view, and to unite to the *Agaristidae* all Noctuid-like moths with vein 5 of the hindwings originating in or before the middle of the discocellulars, and to exclude all other forms, with the exception, I am sorry to say, of *Agarista belangeri* Guér.

To the *Agaristidae* of Kirby's *Catalogue of Lep. Het.* we have to add some genera and species which are undoubtedly Agaristids, and to remove some which belong to other families.

Apina callisto Wlk., Kirby's *Cat.* p. 442, is certainly an Agaristid. *Apina angasi* Wlk. is by no means generically identical with *callisto*; it is no Agaristid. Vein 7 of the hindwing is in *angasi* anastomosed to vein 8 for about 2 mm.; the same character we find in *Satara aequata* Wlk., Kirby's *Cat.* p. 33 (= *Arctioneura lorquini* Feld.), which is likewise no Agaristid, but an Arctiid *s.l.*

Callimorpha lemnia Boisd., in Kirby's *Cat.* under *Episteme* Hb., is most probably a Geometrid.

Eusemia siriella Druce, Kirby's *Cat.* p. 28, is a Geometrid according to the type-specimen.

The genera *Hecatesia* Boisd. (Kirby's *Cat.* p. 12), *Diamuna* Wlk. (*Lep. Het. B. M.* XII. p. 960), *Clitis* Wlk. (*l.c.* p. 961), and *Aucula* Wlk. (*Trans. Ent. Soc. Lond.* (3). I. p. 253) are Agaristids.

Listonia jamaicensis Möschler, *Abh. Senk. Nat. Ges.* XVI. p. 37. f. 13 (1891). is perhaps also an Agaristid.

Duga Wlk., in Kirby's *Cat.* amongst the *Agaristidae*, p. 898, contains in the *Catalogue* two species, *pinguis* and *zemire*; *D. pinguis* Wlk. is a Geometrid, *D. zemire* (Stoll) a Pyralid. Swinhoe's *Duga rana*, *Cat. Lep. Oxf.* I. p. 96. t. 3. f. 3 (1891), is not a Lithosid, as Swinhoe says, but a Geometrid.

Phaegorista pallida Druce, Kirby's *Cat.* p. 417, is the same as *Sarothrocera* (nec *Sarothrocera* White, 1845) *alluaudi* Mab., according to Mabille's figure and the type of *pallida*. Druce gave as habitat "Ogowai, East Central Africa," perhaps (?) a mistake for Ogowe R., West Africa. The name of *pallida* has the priority over that of *alluaudi*. I agree with Karsch that this insect is not an Agaristid, though vein 5 of the hindwings comes from the centre of the discocellulars.

Phalaena Bombyx mummia Cramer, *Pap. Ex.* III. p. 61. t. 228. f. c (1782) (Surinam) is an Agaristid, and comes into the genus *Pycnodontis* Feld., not into *Are* Wlk., *Lep. Het. B. M.* III. p. 758 (1855), where it is placed by Walker with a "?".

In pattern of the forewings many *Agaristidae* agree perfectly well with the *Noctuidae*. A most obvious and rather widely distributed character amongst the Agaristids is the occurrence of metallic bluish scales on the forewings above, which often form conspicuous patches, especially one in the cell beyond the middle and another upon the discocellular veinlets. Red, yellow, and white markings on a black ground are prevalent in this family, and it appears to me that there is rather commonly a variation of the colour within the same species from white to yellow, and from yellow to red. This variability has not yet been noticed, except in the genus *Episteme* Hb. by Hampson, *Moths of India*, and so a good number of colour-varieties stand still in Kirby's *Catalogue* as species. In *Eusemia longipalpis* Kirsch the ♂ has the band of the forewings and the patch on the hindwings white; of the *female* sex of this species there occur three forms, one similar to the *male*, a second with the patch to the hindwings orange, and a third with both the patch to the hindwings and the band on the forewings orange; intergradations prove that these forms belong to one species. *Eusemia longipalpis* and some other *Agaristidae*, as well as *Milionia glauca* (Stoll), apparently confirm Eimer's opinion that the new colour develops from the posterior side. The white-marked *Aegocera trimeni* Feld. and the orange-coloured *A. tricolor* Druce are not only identical in the outline and position of the markings, but there occur also specimens of *trimeni* with the hindwings obviously tinged with orange, and examples of *tricolor* which are much paler than others. There are two specimens of a *Mitophrys* Karsch from Sierra Leone in the Tring Museum, one marked with orange, the other with white. We find no other difference between the specimens besides that disparity in colour, and are convinced that the two specimens are the same species; they agree fairly well with *Mitophrys halans* Karsch, *Ent. Nachr.* p. 354. t. 2. f. 7 (1895), and *M. agoma* Karsch, *l.c.*, respectively.

Among the numerous species (?) of *Xanthospilopteryx* Wall. similar cases of dichromism can be observed. The hindwings of *X. pardalina* (Wlk.) are yellow

or red; sometimes they are orange. *X. geryon* (F.) has occasionally orange hindwings instead of red ones. *Rothia eriopis* (H. S.), from Madagascar, has bright yellow hindwings in the ordinary type; the Tring Museum possesses a series of specimens taken in the same district with *eriopis* which have the hindwings bright carmine.

Sexual dichromism is not seldom. Usually the *female* is darker than the *male*; such is the case in *Phalaenoides donowani* Boisd., *tropica* Luc., in the genus *Aegocera*, in *Ophthalmis mollis* (Wlk.), etc. The *female* of *Eusemia saturata* Wlk. (= *doleschalli* Feld.) has the bands on fore- and hindwings orange, while they are white in the *male*.

Other secondary sexual differences are not rarely met with. Haase, *Iris* I. p. 165 (1887), noticed already tufts of long hairs at the base of the abdomen of the *males*, and described them as scent-organs. These organs are present in all typical *Agaristidae*, but as the hairs fall off easily, they often escape notice. A number of species have, besides, another scent-organ, not mentioned by Haase, on the hindwings within a deep longitudinal fold (*Episteme dentatrix* Westw., *albomarginata* Moore, *hesperioides* Wlk., etc.). In the *males* of *Andrhipparis* Karsch and *Hespagarista* Wlk. the abdomen is furnished at the tip with a tail of long hairs. *Hecatesia* Boisd., *Androloma* Grote, and *Aegocera tripartita* Kirby have in the *male* a stridulating organ on the forewings; a similar one, situated on the hindwings, is present in the *male* of *Phalaenoides albamedia* Luc.

The antennae are usually thicker in the *male* than in the *female*; in the species with pectinated antennae, the pectinations are shorter in the *female* sex, sometimes scarcely perceptible. The forehead is narrowed behind in the *males* of a number of species, such as *Aegocera trimeni* Feld., *bimacula* Wlk. The terminal joint of the palpi is usually, not always, longest in the *female*.

In consequence of my researches on the structural characters of the *Agaristidae*, which showed me that under the genera *Agarista*, *Episteme*, *Phalaenoides*, etc., very heterogeneous forms stand united, I am obliged to propose a good number of new genera, which I base on such characters as can more easily be grasped. There is only one alternative—either to split up the family in a greater number of genera, or to treat all *Agaristidae* as "*Agarista*." In what state the division of the *Agaristidae* into genera at present is will be understood when I say that the diagnosis of *every* genus of this family in Hampson, *Moths of India*, is wrong. I divide the *Agaristidae* in the following groups:—

Group I.—*Antennae simple; forewings without areole.*

a. African forms.—There are no representatives of this group in the Aethiopian fauna.

b. Indo-Australian forms.—Here comes only the genus *Episteme* Hb., with *lectrix* (L.) as type. Hampson, *Moths of India* II. p. 149 (1894), rejects Hübner's name of *Episteme* as "*genus non descriptum*" (many other genera of Hübner's have been accepted in that volume) and employs the name of *Eusemia* Dalm. The incompleteness of Hübner's generic descriptions is no reason not to accept his names; insufficient are so many (perhaps most) diagnoses of Lepidopterous genera created by ancient and modern authors, and so many genera have been based upon heterogeneous forms—even Hampson's diagnosis of "*Eusemia*" applies only to some of the species included in that genus in *Moths of India*—that I fully agree with

what Aurivillius says about names of genera (*Iris* 1894. p. 123), and must treat as *nomina nuda* only such names as are not accompanied by any diagnosis whatever. I hope I shall not be accused of inconsequency because Felder's generic name *Pycnodontis* is applied in this paper; we ought to have given a diagnosis to that name, but we prefer to wait until our researches on the American *Agaristidae* are more complete.

Without areole are the following species in Hampson's work: *lectrix* (L.), type of genus *Episteme* Hb., *nigripennis* Butl., *adulatrix* Koll., *maculatrix* Westw., *irenea* Boisd., *latimargo* Hamps., *fasciatrix* Westw., *vetula* Hübn., and perhaps *negrita* Hamps., which is unknown to me. Besides these species, which include numerous named varieties, true *Episteme* Hb. are also *bisma* Moore, *bijugata* Wlk., and a new species described below by Mr. Rothschild; all other forms that stand under "*Eusemia*" in Hampson's book have an areole and belong to other genera.

Westwood's figure of *E. maculatrix* Westw. in *Nat. Libr.* differs remarkably from that given later on in *Cabinet of Oriental Entomology*. K. J.

6. **Episteme conspicua** Rothsch. sp. nov.

Male.—*Upperside:* forewings black, with the usual slight blue gloss. Basal fifth has a number of scattered metallic blue scales forming two spots behind the costa; across the apical third of the cell runs a transverse yellow line. Beyond the cell is a broad yellow transverse fascia, split up below the lower median vein so as to form a separate spot at the angle of inner margin. In the middle between this fascia and the outer margin is a row of six very small half-obliterated spots. Hindwings similar to *bisma* Moore, but the black outer margin is much reduced, and the red discal area is paler and brighter.

Underside as above, only the costal margin for its basal half is lavender, and there is a round white dot at the basal fourth of cell; the cellular transverse line is broader, and the submarginal spots are large, very distinct, and of a lavender tint. Hindwings with submarginal spots distinctly marked, while above they are almost, if not quite, absent.

Body as in *bisma*, but the yellow abdominal bands broader, and the pale spots on the thorax smaller.

Female similar, but submarginal spots on both wings less developed.

Expanse: forewing AM 38 mm.; EM 23 mm.; PM 25 mm.
hindwing „ 25 „ ; „ 23 „ ; „ 15 „

Hab. Kina Balu, North Borneo; 2♂, 2♀.

This species is much larger than *bijugata* Wlk., which it resembles, and can at once be recognised by the yellow underside of the thorax, the extremely narrow and obsolete cellular band, and the presence of the round spot at the angle of inner margin of forewing. W. R.

c. American forms.—We have a moth from Jamaica of Noctuoid appearance, which has the antennae setiform and is without areole. The name of this insect we have not yet found.

Westwood, *Tr. Linn. Soc. Lond.* (2). 1. p. 202. n. 7 (1877), says of his *Othria ecuadorina* that the areole is wanting; we do not know the species, and can, therefore, not say whether that statement is correct. K. J.

GROUP II.—*Antennae simple; forewings with areole.*

Karsch, *Ent. Nachr.* 1895. p. 347, divides this group in two sections, according to the position of vein 10 to the forewings; this nervule is either stalked with 8 and 9, or it arises from the areole. These two sections do not seem to me to be quite natural, as the following examples will show; but I accept them, as they are certainly very convenient for a preliminary grouping of the genera. In Druce's *Agarista darna*, *Ann. Mag. N. H.* (6). XIV. p. 22 (1895), from Timor, the position of vein 10 is so variable that we have specimens, caught at the same locality and at the same time of the year, with vein 10 being stalked with 8 and 9, others with vein 10 originating from the apex of the areole close to the stem of 8. 9, and others again with that vein coming from the areole and being distinctly separate from 8 and 9.

In the ♂ of *Hecatesia thyridion* Boisd. veins 9 and 10 are shortly stalked together, while in the ♀ vein 10 arises from the areole independently of 9.

The type of the genus *Othria* Westw., *Othria augias* (H. S.), *Auss. Schm.* I. f. 18 (1853), comes in most characters very close to *Phasis noctilux* Wlk., the type of *Phasis* Wlk., *Lep. Het. B. M.* II. p. 312 (1854), but has vein 10 originating beyond the areole, while in *Phasis* it arises from the areole. K. J.

1. *Vein* 10 *to the forewings stalked with* 8 *and* 9 (*often with* 7. 8. 9).

d. African forms.—Here come the genera *Xanthospilopteryx* Wllgr., *Massaga* Wlk., *Schausia* Karsch (see Karsch, *Ent. Nachr.* 1895. pp. 345. 346).

There are in the Tring Museum twenty-eight specimens of *X. africana* Butl., of which four are aberrant in having an orange spot in the black marginal border to the hindwings near the anal angle. In one of these specimens that spot is indicated, under a lens, by four reddish scales on the upperside of the left wing, while on the right wing it is represented by about a dozen scales; below, the spots are entirely absent from either left or right hindwing. The second example has above on both wings a very few scattered orange-red scales, whereas below the spot is well marked. In the other two specimens the spot is conspicuous above and below. Out of twelve specimens of *X. fatima* Kirby, five show a more or less obvious trace of that spot, especially below. This proves, I believe, that the occurrence of such a spot cannot be used to separate specifically specimens with and without that mark which are otherwise the same. *X. perdrix* Druce (=*eoa* Mab.) is, therefore, only an aberration of *africana* Butl., which itself is perhaps the red form of one of Walker's species.

We have a *female* of *X. hornimanni* Druce, from the Gold Coast, in which the basal and median white spots are confluent with one another along the costal, median, and submedian nervures, thus forming a large triangular patch that includes a black spot in the cell and another behind it. The markings on the wings of *Xanthospilopteryx* vary, in fact, a good deal. In *X. superba* Butl., for example, the spot before the middle of the inner margin is in our series of twenty-three specimens quadrate, or is prolonged along the submedian nervure, assuming the form of a broad comma, sometimes merging together with the second spot of the post-median row, or is reduced to a rather narrow oblique streak; in one example this spot is quadrate on one wing, linear on the other. The median band of *X. butleri* (Wlk.), of which species we have fifteen specimens, is often complete, sometimes it is constricted at the median nervure, and not rarely it is even widely interrupted; and so on. I fear that

a good number of the species based on slight differences in the shape of the markings, and on the red, yellow, or white colour of the hindwings, are mere aberrations.

Massaga delicia Butl., and *M. demena* Druce, *Ann. Mag. N. H.* (6). XIV. p. 23 (1895), belong to the genus *Misa* Karsch, *Ent. Nachr.* 1895. p. 349. K. J.

7. **Massaga angustifascia** Rothsch. sp. nov.

FEMALE.—*Upperside:* all four wings black with an oily green gloss, the veins being strong metallic green. Wings crossed by a single convex cream-coloured band, situated about 1 millimetre beyond the cell of forewing, measured at the upper median vein. The band on forewings stops at the costal nervure, where it is narrowest, while it is widest at the discoidal nervules, being here a little more than 2 millimetres. At the apex of forewings the fringe is white, otherwise dark.

Palpi, except third joint, head, anterior coxae, anterior femora, and prothorax crimson; tip of abdomen yellow; rest of body oily green.

Underside of wings similar to above, but veins on hindwings from base to edge of band of same colour as band.

Expanse: forewing AM 29 mm.; EM 15 mm.; PM 21 mm.
„ hindwing „ 20 „ ; „ 14 „ ; „ 14 „

Hab. Old Calabar; 1 ♀.

Differs from *virescens* Butl. in the narrower band, it being uniformly wide on both wings and well outside the cell, and in the cream veins on underside of hindwings. W. R.

e. Indian forms with vein 10 of forewings being stalked with 8 and 9.

Here belong *Chelonomorpha* Motsch., *Buryena* Wlk., and a number of new genera.

Immetalia Jord. gen. nov.

♂ ♀. Front of the head scarcely with an indication of the usual conical processus, without a circular ridge or with only a trace of it. Palpi almost naked, *i.e.* clothed with short hairs, terminal joint at least three times as long as broad. Antennae a third shorter than the costal margin of the forewings, distinctly clubbed in either sex. Tibiae naked, or almost so.

Neuration: forewing with vein 10 stalked with 8 and 9; vein 3 close to 4 from hinder angle of cell; 2 from near hinder angle of cell; second partition of median vein* shorter than the respective portion of the outer margin. Hindwings with veins 3 and 4 together from lower angle of cell; 2 from near hinder angle of cell, as on forewing.

Male with the anal segment large, and the upperside of the abdominal margin of the hindwings clothed with long, often partly erect, hairs.

Type: *I. saturata* (Wlk.), *Lep. Het. B. M.* XXXI. p. 54 (1864) (Buru, *nec* Gilolo, *nec* Key); Swinh., *Cat. Lep. Het. Orf.* I. p. 162. n. 753. t. 5. f. 1 (1892) (Buru).

Comes nearest to *Xanthospilopteryx* Wllgr., from which it differs in the longer and naked terminal joint of the palpi, the less gibbose forehead, and in the

* "Second partition" of the median nervure is the portion between veins 2 and 3.

shorter second partition of the median nervure to the forewings, this partition in *Xanthospilopteryx* being longer than the respective portion of the outer margin.

Chelonomorpha Motsch. is distinguished from the new genus by the presence of a conical frontal horn, the more hairy palpi, hairy abdomen, and again the longer second partition of the median vein to the forewings.

Felder's *I. doleschalli* is a synonym of *saturata* (Wlk.). Besides *saturata* the following species must come in the new genus :—

Immetalia longipalpis (Kirsch), *Mitth. Mus. Dresd.* I. p. 130. n. 141. t. 7. f. 12 (1877) (Rubi, N. Guinea). As said above (p. 27), this species varies in the colour of the bands from white to orange, and is also not constant in the size and shape of the markings. It has received five names :—

1. *I. longipalpis* (Kirsch) is based upon a *female* with the band of the forewings yellow and that of the hindwings orange.

2. *I. brujini* (Oberth.), *Ann. Mus. Civ. Gen.* XV. t. 4. f. 6 (1880) (*no description, no habitat*), is based upon a *female* with the band white on either wing.

3. *I. doreana* (Swinh.), *Cat. Lep. Het. Oxf.* I. p. 164. n. 762. t. 5. f. 4 (1892) (Dorey), is based upon a *female* (according to the figure), not a *male* as Swinhoe says, with the bands white and rather narrow, that of the forewings being also rather longer than in ordinary examples.

4. *I. cynaspes* (Druce), *Ann. Mag. N. H.* (6). XIV. p. 22 (1895) (N. Guinea), is described from a *male* with the bands white, and a *female* with the band on the forewing white and that on the hindwing orange.

5. *I. prochyta* (Druce), *l.c.* (N. Guinea), is a *female* with the band on either wing orange.

William Doherty found all these forms together at Humboldt Bay, Dutch N. Guinea, September to October 1892. The *male* sex has apparently the bands always white, as is the case in *I. saturata* (Wlk.). Our series of twenty-one specimens exhibits a good deal of variation in the extent of the bands.

Immetalia bernsteini Voll., *Tijdschr. v. Ent.* VI. p. 132. t. 9. f. 1 (1863) (Morotai), and *josioides* Wlk., *Lep. Het. B. M.* XXXI. p. 54 (1864) (Gilolo), are the same; Swinhoe, *Cat. Lep. Het. Oxf.* p. 162. n. 752 (1892), gave *josioides* Wlk. already as a synonym of *bernsteini*. K. J.

8. **Immetalia bernsteini angustiplaga** Rothsch. subsp. nov.

Male and *female*: this form differs from typical *bernsteini* Voll. in the much longer band of the forewings and the much narrower patch of the hindwings, and in the luteous apical fringe being more conspicuous; a striking difference also is that the patch of the hindwings gradually becomes narrower till it ends up almost in a point at the anal angle, while in the typical form it is uniformly wide.

Hab. Batchian (W. Doherty, March 1892); 1 ♂, 1 ♀. W. R.

9. **Immetalia meeki** Rothsch. sp. nov.

Male differs from *longipalpis* (Kirsch) in the band of the forewings being 3 millimetres wide, and reaching from the costa to almost the anal angle, just crossing submedian vein. It is of almost equal breadth from costa to lower median vein, while beyond to the submedian it is much narrower. Discal orange area of

hindwings reduced from the base so as to form a distinct band, 5 millimetres wide, reaching the costa.

Of *longipalpis* I only know of white *males*, while of *females* I have white ones, some with white on forewings and orange hindwings, and others all orange; while my three *males* of *meeki* have deep buff bands to forewings and orange bands on hindwings.

Expanse: forewing AM 27 mm.; EM 16 mm.; PM 19 mm.
„ hindwing „ 19 „ ; „ 17 „ ; „ 12 „

Hab. Fergusson Island, D'Entrecasteaux Islands (Meek, November 4th to 18th, 1894); 3 ♂. W. R.

10. **Immetalia cyanea** Rothsch. sp. nov.

Male and Female.—*Upperside:* forewings deep blue, with basal line below the costa and a spot in the cell of bright metallic blue green scales. Hindwings also blue, but with a more greenish tint. All wings in certain lights have a strong metallic lustre.

Underside: blackish brown, with strong blue gloss in side light.

Underside of palpi except third joint, a line in front of and one behind the antennae, white; legs deep brown with blue gloss; body deep blue; tip of abdomen rufous.

Expanse: forewing AM 25 mm.; EM 16 mm.; PM 19 mm.
„ hindwing „ 17 „ ; „ 17 „ ; „ 12 „

Hab. Biak, Geelvink Bay, Dutch New Guinea (W. Doherty, 1892); 1 ♂, 2 ♀. W. R.

11. **Immetalia celebensis** Rothsch. sp. nov.

Female.—*Upperside:* forewings differ from *saturata* (Wlk.) in having the orange band of equal breadth from the costal to the third median nervure, whence it is contracted towards the angle of inner margin; this band also stands more than two millimetres away from cell, while in *I. saturata* (Wlk.) it touches apex of cell. On the basal half of forewings there are four blue transverse lines, the two outer ones stopping short within the cell, and there are also two less distinct blue lines running along the lower median and submedian veins. Fringe white both at apex and inner angle, while in *saturata* (Wlk.) it is only white at apex. Hindwings black as in *saturata*, but with whole of fringe white.

Underside as above, but blue markings absent.

Underside of first and second joints of palpi, sides of forehead, centre of vertex, and three lines on the upperside of thorax white. Underside of thorax, coxae, femora, and inner side of tibiae ochre-yellow. Abdomen entirely black, while in *saturata* (Wlk.) the tip is reddish orange.

Expanse similar to that of *I. saturata* (Wlk.).

Hab. S. Celebes (W. Doherty, August and September 1891); 3 ♀. W. R.

Immetalia celebensis Rothsch. has the stem of veins 8, 9, 10 to forewings very short, while in *saturata* (Wlk.) and allies it is long; the frontal circular ridge is obvious; vein 3 of the hindwings is a very little removed from 4, and the femora have long and dense hairs beneath.

The species of *Iunonetalia* Jord. can be distinguished as follows:—

a. Disc of hindwings without band or patch.

*a*¹. Forewings with band.

*a*². Thorax black beneath:

1. *I. saturata* (Wlk.) from the Southern Moluccas. Walker also gives Gilolo and Key as "habitat" of *saturata*, but these islands are most certainly inhabited by different—at least subspecifically different—forms. The band of the forewing is variable in length in the Amboina specimens; it is always widest in the middle. Bands of *male* white, those of *female* orange.

*b*². Thorax yellow beneath, striped with white above:

2. *I. celebensis* Rothsch. from Celebes.

*b*¹. Wings deep blue, without bands:

3. *I. cyanea* Rothsch. from Biak Island.

b. Disc of hindwings with white, orange, or orange-red patch or band.

*c*¹. Underside of palpi yellow.

*c*². Patch to hindwings penetrating into the cell, broader than the black basal area of the wing:

4. *I. bernsteini* Voll. from Morty and Halmaheira. Bands of either sex orange.

A *male* from Gani, S. Halmaheira, captured by W. Doherty, has a much shorter band than our only Gilolo *female*; the latter is identical with a *female* from Morty (Morotai) and agrees well with Vollenhoven's figure, which represents a *female*.

*d*². Patch to hindwings bandlike, not touching cell, narrower than black basal area of wing:

5. *I. bernsteini angustiplaga* Rothsch. from Batjan.

*d*¹. Palpi black, usually with white scales at the outside.

*e*². Patch of hindwings penetrating into the cell, broader than the black basal portion of the wing:

6. *I. longipalpis* Kirsch from Dutch New Guinea. In the *male* the band to the forewings is mostly less oblique than in the *female*; the band reaches sometimes from the costa to beyond the submedian vein, while in other specimens it reaches only from near the subcostal nervure to the lower median nervule; mostly the band is broadest in the middle, as in *I. saturata* (Wlk.), but there occur also examples with the band being anteriorly of even breadth and gradually tapering off behind.

*f*². Band of hindwings not touching cell, narrower than the basal black area:

7. *I. meeki* Rothsch. from Fergusson Island. K. J.

Fleta Jord. gen. nov.

♂ ♀. Differs from *Iunonetalia* Jord. in the second joint of the palpi being clothed with long hairs, in the abdomen and femora being also hairy, especially strongly so beneath, and in the areole of the forewings being minute.

♂: hindwings clothed with hairs at the longitudinal median fold.

Type: *Fleta belangeri* (Guér.), Bélang. *Voy. Ind. Or.* p. 506. t. 5. f. 3 (1834) (Java).

Easily recognised by the minuteness of the areole, which latter is often reduced to a point. In *F. belangeri* vein 5 of the hindwings stands nearer to 4 than to 6, its base being distinctly depressed. *Agarista moorei* Feld., *Reise Novara* II. *Lep.* t. 107. f. 4 (1874) (Java), finds its place for the present best in this genus, though it has vein 5 of the hindwings coming from the middle of the discocellulars. *F. moorei* (Feld.) is distinguished, besides the position of that vein, by vein 2 of the forewings standing nearer to 3 and by the black border to the hindwings above being broadest in front, while in *belangeri* it is widest behind.

In the type-specimen of *F. moorei* (Feld.) vein 11 of the left forewing is connected with the areole by a bar, so that there are two areoles.

This genus is highly inconvenient as regards the delimitation of the family of *Agaristidae* (see p. 25). K. J.

Exsula Jord. gen. nov.

♂ ♀. Forehead without a conical processus. Third joint of palpi somewhat shorter than in *Immetalia* Jord.; second joint hairy, the hairs as long as, or longer than, the terminal joint. Femora hairy.

Neuration: forewing nearly as in *Immetalia* Jord., but with the second partition of median nervure longer than the respective portion of outer margin. Upper discocellular veinlet of hindwing straight, the second one concave or nearly straight; vein 3 close to 4, but not stalked with it; vein 5 only slightly longer than the median cell (measured from base of wing to middle of discocellulars).

Type: *Exsula dentatrix* (Westw.), *Cab. Or. Ent.* p. 68. t. 33. f. 5 (1848) (Assam). Distinguished from *Chelonomorpha* Motsch. especially by the absence of a conical processus from the forehead; from *Immetalia* Jord. by vein 2 of the forewings being remote from 3, and by the hairy first and second joints of the palpi; from *Fleta* Jord. by the position of vein 3 of the forewings again, by the much larger areole and the straight upper discocellular veinlet to the hindwing. The cell of the hindwings is longer than in the allied genera.

Besides *dentatrix* Westw. two more species come in this genus: *E. victrix* (Westw.) and *orientalis* (Butl.). Our series of *E. victrix* (Westw.) confirms Hampson's statement, *Moths of India* II. p. 150. n. 1556 (1894), that *silhetensis* (Butl.) and *tyrianthina* (Butl.) are not specifically different from *victrix* (Westw.). K. J.

Crinala Jord. gen. nov.

♂. Palpi hairy, except third joint; the latter very short, about half as long again as broad (♂). Forehead with obsolete circular ridge, without conical processus. Tibiae naked. Hindwings above clothed with hairs except near outer margin.

Neuration: forewings with the areole longer than half the breadth of cell at apex; vein 3 from before hinder angle of cell, 4 nearer to 5 than to 3; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with veins 3 and 4 close together, but not stalked; second partition of median nervure longer than lower discocellular veinlet; discocellulars together slightly curved.

Type: *Crinala mimetica* Rothsch. sp. nov.

The short terminal joint of the palpi, and vein 3 of the forewings standing a millimetre short of the apex of the cell, distinguish this genus at once from its allies. K. J.

12. **Crinala mimetica** Rothsch. sp. nov.

Male.—*Upperside:* forewings blackish brown, with the usual blue spots in cell and on discocellulars. All the discoidal and median nervules, and the subcostal, are white from the cell to about half their length; there is a white streak on the submedian fold, and another on the submedian vein. These streaks form a band similar to that of *Mussaga monteirona* Butl. and *Phasis radians* (Feld.); this resemblance induces me to call the insect *mimetica*, though, of course, it is not a case of so-called "mimicry." Hindwings dark brown, with a distinct velvety black gloss produced by long hairs. There are some very faint submarginal white lines on the nervures, and the fringes of both pairs of wings are white, slightly sprinkled with black scales, mostly on the front wings.

Underside: forewings chocolate-brown, with faint traces only of white scales on the nervules. Hindwings as above.

Hinder edge of head, collar, palpi, except third joint, all coxae, four anterior femora, underside of anterior tibiae and of abdomen orange; rest of body bluish black.

Expanse: forewing AM 26 mm.; EM 17 mm.; PM 20 mm.
„ hindwing „ 20 „ ; „ 17 „ ; „ 13 „

Hab. N. Luzon (John Whitehead); 1 ♂. W. R.

Crinocula Jord. gen. nov.

♂ ♀. Palpi hairy; hairs of third joint, which is about half as long again as broad, sparse and shorter. Eyes clothed with hairs. Forehead devoid of a conical processus. Femora and abdomen, especially beneath, rough with long hairs.

Neuration: forewings with minute areole; vein 3 close to 4; second partition of median nervure shorter than the respective portion of outer margin. Hindwings with second partition of median nervure scarcely as long as the lower discocellular veinlet, which is slightly longer than the upper one and is more oblique; veins 3 and 4 from angle of cell.

Type: *Crinocula kinabaluensis* Rothsch. sp. nov.

Distinguished from all Agaristids known to me by the hairy eyes. K. J.

13. **Crinocula kinabaluensis** Rothsch. sp. nov.

Male and Female.—*Upperside:* forewings black, with very faint indications of the usual blue spots. A very narrow oblique band of cream-colour crosses the forewing just outside cell from the costal vein to the lower median nervure. Hindwings black, with a large discal rufous orange patch extending from about centre of cell to halfway between cell and outer margin, and from abdominal margin to near costal vein; this patch is rounded anteriorly, and emarginate behind lower median vein.

Underside as above, but band of forewings extends farther and is half as wide again, and at the base are white scales and retinaculum is yellow, while discal patch of hindwings extends to the base, where it is paler, and reaches anteriorly from the base to middle of costa.

Upperside of head and thorax black, with many grey hairs. Palpi whitish, as also a ring round eyes. Rest of body below yellow, including legs. Abdomen above darker yellow, with black middle line. Claspers of ♂ entirely black.

Expanse: forewing AM 18 mm.; EM 11 mm.; PM 13 mm.
„ hindwing „ 13 „ ; „ 12 „ ; „ 10 „

Hab. Kina Balu, N. Borneo; 1 ♂, 1 ♀ (obtained from Messrs. Staudinger & Bang-Haas) W. R.

Scrobigera Jord. gen. nov.

♂ ♀. Forehead without distinct conical processus. Palpi hairy, except terminal joint, which is more than three times as long as broad. Femora hairy.

♂ with a longitudinal middle fold to the hindwings densely filled with long hairs; anal segment very large.

Neuration: forewing with vein 3 arising before the apex of cell; interspace between 3 and 4 twice as wide as that between 4 and 5. Discocellular veinlets to hindwings arched, forming together an angle the point of which is directed towards the outer margin; vein 5 originating from this point; the fold of median cell is forked, and by joining the discocellulars circumscribes together with them a rhomboidal space; veins 3 and 4 either together from angle of cell—*amatrix* (Westw.), or 3 before the apex of cell—*clymene* (Boisd.).

Type: *Scobigera amatrix* (Westw.), *Cab. Or. Ent.* p. 68. t. 33. f. 4 (1848) (Assam).

Easily recognised by vein 3 of the forewings arising before apex of cell, and by the peculiar form of the discocellulars of the hindwings.

Other species of this genus are:—

Scrobigera albomarginata (Moore), *flaviciliata* (Boisd.), *semperi* (Feld.), *clymene* (Boisd.), *hesperioides* (Wlk.), and *vulcania* (Butl.). *S. albomarginata* (Moore) and *opheltes* (Druce) (syn.: *candidemarginata* Pouj.) are not separable as species, as there exist all intergradations between the two forms; the Andaman specimens have apparently the white border never so wide as it occurs amongst Burmese examples; *opheltes* (Druce) has to stand as aberration of *albomarginata* (Moore).

S. flaviciliata (Boisd.) is unknown to us.

With *S. semperi* (Feld.) (1874), based on a *female*, Swinhoe's *milionata*, *Cat. Lep. Het. Oxf.* I. p. 162. n. 754. t. 5. f. 2 (1892), described from a *male*, is identical.

S. clymene (Boisd.) varies considerably in the size of the markings on the forewing: in the Java specimens the two median spots are usually well separated at the median vein, but sometimes they touch one another; in Malacca specimens the spots are slightly separated; in Burmese and Assamese examples the spots form an uninterrupted, but at the veins constricted, band; these latter specimens are Walker's *proxima*, which I must treat as a subspecies of *clymene* (Boisd.).

The spot in the apical half of the forewing of *S. clymene* (Boisd.) has disappeared from the upperside in the Bornean representative, which I identify with Butler's *pulchra*, *Ann. Mag. N. H.* (4). XV. p. 143. t. 13. f. 4 (1875). Butler gives as habitat of *pulchra* Muhrut, India; Hampson, *Moths of India* II. p. 150 (1894), writes "? Meerut." In the Tring Museum are certain *females* from Borneo which agree very well with the figure and description of *pulchra*. The fringe of the hindwings of *pulchra* is said to be white; none of our specimens have it entirely white, but our series of *S. clymene* (Boisd.) includes examples with the fringe all white and others with the fringe all black, so that the extent of white at the fringe is certainly not of specific value in these forms. Therefore I do not hesitate to consider the habitat "Muhrut, India," as erroneous, the more so as the British Museum did not receive the type of *pulchra* directly from the collector, but got it as a "second-hand specimen."

On the underside of the forewings of *pulchra* there is only one band as above, or there appears another, short and linear, band outside the cell between the subcostal and upper median veins, either well marked or faint, separated from the median band or connected with it in front and behind; in one *female* this additional

band, which corresponds to the subapical short band on the upperside in *clymene* (Boisd.), is represented above by a number of white scales, and this confirms my opinion that *clymene* and *pulchra* are very closely allied insects and perhaps will be proved one day to be geographical forms of the same species.

The *males* in the Tring Museum vary, moreover, in the length and width of the orange-red patch to the hindwings. In one *male* the portion of the patch before the longitudinal fold is reduced to a point, in a second specimen it is a little larger, and in a third it is still larger and of half the size of that in Oberthür's figure of his *Epistème standingeri, Et. d'Ent.* XIX. p. 22. t. 3. f. 15 (1894) (Kina Balu), and increases in other examples gradually till it reaches the size of the patch of Oberthür's figure. The *male* specimens with the patch to the hindwings smallest agree well with some North Bornean *females* in our collection, which themselves do not differ from Swinhoe's figure of the type of *S. hesperioides* (Wlk.) in *Cat. Lep. Het. Oxf.* I. p. 162. t. 5. f. 3 (1892). Though we have in the Tring Museum no intergraduates between *hesperioides* (Wlk.) and *pulchra* (Butl.) in the *female* sex, but only in the *male* sex, I must treat the examples with large orange-red patch to the hindwings and those with a small patch as mere aberrations of one species, of which the eldest name is *hesperioides* (Wlk.). The synonymy of *S. hesperioides* (Wlk.) is therefore as follows:—

Scrobigera hesperioides (Wlk.).

Eusemia hesperioides Walker, *Journ. Linn. Soc. Lond.* VI. p. 86 (1862) (Sarawak).
♀. *Eusemia tricolor* Butler, *Ann. Mag. N. H.* (4). XV. p. 142 (1875) (Sarawak).

ab. *pulchra* (Butl.); patch to hindwings broader than in the typical form.

♀. *Eusemia pulchra* Butler, *l.c.* p. 143. t. 13. f. 4 (1875) ("Muhrut, India," *loc. err.*).
♂ ♀. *Eusemia standingeri* Oberthür, *Et. d'Ent.* XIX. p. 22. t. 3. f. 15 (♂) (1894) (Kina Balu).

K. J.

14. **Scrobigera niveifasciata** Rothsch. sp. nov.

Female.—*Upperside:* all four wings black; anterior pair with an oblique white transverse band crossing the wings from the costa almost to the inner angle, stopping short just on the submedian nervure. This band is straight and crosses the cell 1 millimetre short of the apex, and has a breadth of 3 millimetres at each end and 2 on the disc; one blue spot on discocellular nervules and another inside the band. Fringe white at apex of anterior and posterior wings.

Underside same as above, the band being identical in shape and position, but the two blue spots absent.

Head, thorax, and abdomen above black: head edged all round with white ring; palpi, legs, and middle of underside of abdomen orange, slightly sprinkled with brown on top joint of palpi and upperside of tibiae and tarsi.

The hindwings are suddenly emarginate between lower discoidal and upper median nervures.

Expanse: forewing AM 32 mm.; EM 20 mm.; PM 24 mm.
„ hindwing „ 24 „ ; „ 21 „ ; „ 15 „

Hab. "Borneo"; 1 ♀ (ex Coll. Felder).

This species differs especially from *semperi* (Feld.) in the much narrower band to forewings, which is the same above and below and is white instead of orange, by the absence of the blue gloss to hindwings and abdomen, by the less extent of white fringe to hindwings, and by the entirely yellow legs and underside of abdomen. W. R.

15. **Burgena chalybeata** Rothsch. sp. nov.

Male.—*Upperside:* forewings black, with an intense and brilliant blue gloss in side light, washed over with a glittering metallic fiery sheen. A little away from the base there is a band of lavender-blue, 6 millimetres wide at the costal and 4 at the inner margin. Hindwings same colour, but without markings.

Underside: forewings as above, but bar wanting, and three small spots of pale blue, one in apex of cell, the two others bordering apex of cell.

Palpi black with a white side line; head black with white border to eye. Hairs of coxae and femora ochraceous; rest of body black with a blue gloss.

Expanse: forewing AM 22 mm.; EM 14 mm.; PM 15 mm.
„ hindwing „ 15 „ ; „ 13 „ ; „ 10 „

Hab. New Britain (Capts. Cotton & Webster); 1 ♂. W. R.

16. **Burgena amoena** Rothsch. sp. nov.

Female.—*Upperside:* forewings similar to *B. chalybeata* mihi, but the metallic sheen more green and less fiery; a pale blue spot beyond the centre of cell; a discal bandlike patch crosses the wings between the subcostal vein and the inner margin, 4 millimetres wide in centre, which is white, while at each end the band is pale blue. Hindwings unicolorous, deep greenish blue, as in *chalybeata*.

Underside as above, but the gloss is much less strong and the spot in cell is not round but linear, and the bandlike patch is of uniform width, while above it is much constricted towards the subcostal vein.

Palpi, head, thorax, legs, and abdomen as in *chalybeata*, as is expanse.

Hab. Kinnigunang, New Britain (Ribbe); 1 ♀.

I have described this species as distinct from *chalybeata*, because in the genus *Burgena* no case of sexual dichromism is known; and certainly there is in the family *Agaristidae* no such extreme case as this would be. W. R.

Cruria Jord. gen. nov.

♂ ♀. Forehead with a conical processus bearing a strong circular ridge. Antennae slender, very feebly thickened between middle and tip, scarcely longer than half the length of the forewing. Terminal joint of palpi naked, at least four times as long as broad; rest of palpi hairy, but hairs not longer than third joint. Legs very slender, tibiae naked.

Neuration: forewings with vein 10 nearer to 9 than to the areole; vein 3 from below apex of cell, 4 nearer to 5 than to 3; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with both discocellulars oblique; vein 3 distinctly from before angle of cell; second partition of median nervure of the length of the lower discocellular veinlet.

Type: *Cruria donowani* (Boisd.), *Voy. Astrolabe, Lép.* p. 176. n. 7 (1832) (Australia).

Easily distinguished from *Phalaenoides* Lewin by vein 10 of the forewings being stalked with 8 and 9. The *females* are generally darker than the *males* in this genus, and seldom have the costal margin of the forewings ochreous, as it is in the *males*.

I refer to *Cruria* the following species: *donowani* (Boisd.), *neptunides* (Butl.), *darwiniensis* (Butl.), and *tropica* (Luc.), *Proc. Linn. Soc. N. S. W.* (2). VI. p. 302 (1891) (Tropical Queensland).

With *C. tropica* (Luc.) is identical *Agarista platyxantha* Meyr., *Tr. R. Soc. S. Austr.* XIV. p. 194 (1891) (Queensland).

Meyrick, *l.c.*, mentions an *Agarista kochi* which I fail to find published anywhere.

William Doherty obtained a pair of *Cruria donowani* (Boisd.) in Dili, Timor, in May 1891, which agree so well with typical *donowani* that we cannot even subspecifically separate them from Australian examples. K. J.

Comocrus Jord. gen. nov.

♂ ♀. Forehead with a short conical processus bearing a circular ridge. Palpi with long hairs, except third joint, which is about four times as long as broad. All the tibiae tufted with long hairs. Breast and abdomen rough with long hairs.

Neuration: forewings with vein 10 from nearer to 9 than to areole; vein 9 of about double the length of the stem of 8 and 9; vein 3 from a little before apex of cell, 4 nearer to 5 than to 3; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with upper discocellular veinlet arched, shorter than the second one, which is oblique and straight; second partition of median nervure as long as lower discocellular veinlet; veins 3 and 4 from lower angle of cell.

Type: *Comocrus cortortus* (Wlk.), *Lep. Het. B. M.* XXXI. p. 45 (1864) (Australia).

Distinguished from the allied genera by the tibiae bearing long hairs at the outer edge; from *Agarista* Leach and *Phalaenoides* Lew. it differs in vein 10 to the forewings being stalked with 8 and 9, instead of coming from the areole as in those genera. K. J.

The Indo-Australian genera with vein 10 of the forewings being stalked with 8 and 9 can be distinguished as follows:—

a. Third joint of palpi twice as long as broad, or shorter.
  a^1. Eyes clothed with hairs. *Crinocula* Jord. gen. nov.
  b^1. Eyes naked. *Crinala* Jord. gen. nov.
b. Third joint of palpi three (or more) times as long as broad.
  c^1. Middle and hind tibiae with long hairs. *Comocrus* Jord. gen. nov.
  d^1. Middle and hind tibiae without long hairs.
    a^2. Veinlike fold within cell to hindwings forked, joined to the discocellular veinlets, and encircling together with them a rhomboidal space. *Scrobigera* Jord. gen. nov.
    b^2. Veinlike fold not forked.
      a^3. Forehead with a conspicuous truncate cone.
        a^4. Abdomen above at base with tuft of hairs; discocellular veinlets to hindwings deeply concave, lower one longer than the second partition of the median nervure. *Chelonomorpha* Motsch.
        b^4. Abdomen above at base without tuft of hairs; discocellular veinlets to hindwings feebly incurved; lower discocellular nervule not longer than the second partition of the median nervure. *Cruria* Jord. gen. nov.
      b^3. Forehead convex, without conical processus.
        c^4. Antennae only one-fifth shorter than the forewing. *Burgena* Wlk.
        d^4. Antennae one-third shorter than the forewing.

a^5. Second joint of palpi with short hairs. *Immetalia* Jord. gen. nov.

b^5. Hairs of second joint of palpi as long as third joint.

a^6. Second partition of median nervure to forewings longer than the respective portion of the outer margin. *Exsula* Jord. gen. nov.

b^6. Second partition of median nervure to forewings shorter than the respective portion of the outer margin. *Fleta* Jord. gen. nov.

Some more genera will in future come in this group, one for *Agarista darna* Druce, *Ann. Mag. N. H.* (6). XIV. 22 (1895), and another perhaps for *Aegocera tripartita* Kirby, which species has, according to Hampson's figure in *P. Z. S.* 1892. p. 191, vein 10 of the forewings stalked with 7, 8, and 9.

About *Hecatesia* Boisd. see p. 51. K. J.

f. American forms with vein 10 *of the forewings stalked with* 8 *and* 9.

Here belong only three genera: *Othria* Westw., with *O. augias* (H. S.) as type, *Euschirropterus* Grote, and a new one.

Othria amalthea (Dalm.) and *columbina* Westw. have vein 10 of the forewing arising from the areole, according to Westwood, and belong therefore to the genus *Phasis* Wlk.

Of *Euschirropterus poeyi* Grote we have a *male* from Jamaica, captured by C. B. Taylor, which agrees with our only Cuban specimen, but is somewhat smaller.

Laquea Jord. gen. nov.

♀. Forehead as broad as the eyes are high, faintly narrowed behind (♀), convex, without horn, but with subcircular ridge. Antennae slender, slightly thickened towards tip, joints well marked under a lens. Second and third joints of palpi with long hairs, third joint about twice as long as broad (♀). Middle and hinder tibiae with long hairs at the outer side. First joint of posterior tarsi visibly curved.

Neuration: forewings with vein 10 stalked with 8 and 9, stalk short; 9 originating much nearer to 10 than to middle of 8; 6 from areole, not from cell; second partition of median nervure of the length of the respective portion of the outer margin. Hindwings with second partition of median nervure of half the length of the lower discocellular veinlet.

Type: *Laquea argentata* (Druce), *Ann. Mag. N. H.* (6). XIV. p. 23 (1894) (Mexico).

Comes nearest to *Euschirropterus* Grote, but is easily distinguished by vein 10 of the forewing originating between areole and vein 9, whereas in *Euschirropterus* Grote vein 10 branches off from 9 as in *Hecatesia* ♂, which is quite an exception amongst the *Agaristidae*. *Euthisanotia* Hb., to which genus *argentata* has been referred by the author, has vein 10 arising from the areole.

We have only Jamaica specimens before us, which agree very well with typical *argentata* from Central America, except in the border to the hindwings being slightly narrower near the anal angle than in Druce's specimens.

Laquea argentata (Druce) bears a rather close resemblance to *Copidryas gloveri* G. & R., which species has, however, a long frontal horn and vein 10 arising from the areole. K. J.

2. *Vein* 10 *of forewings arising from areole* (for 1 see p. 30).

Here come more than half the number of the species of *Agaristidae*, and most of the species seem structurally so closely allied that it is very difficult to give a delimitation of the genera.

g. African forms with vein 10 *from the areole.*

Hampson, *Moths of India* II. p. 149 (1894), differentiates *Aegocera* Latr. and *Mimensemia* Butl. from the other Indian *Agaristidae* by the absence of vein 5 from the hindwings. This statement, I think, is erroneous. In all our specimens of *Aegocera* and *Mimensemia* that vein is present. Karsch's Aethiopian genus *Aegoceropsis*, *Ent. Nachr.* 1895. p. 348, said to be distinguishable from *Aegocera* Latr. by the presence of vein 5 on the hindwings, must accordingly sink as a synonym.

Aegocera norma Karsch, *l.c.*, is, as the author has already suggested, the same as *A. affinis* Druce, *Ent. M. Mag.* XX. p. 155 (1883), according to the description and figure of *norma* and the type-specimen of *affinis* Druce. The middle and hinder tibiae of *affinis* Druce and *ferrida* Wlk. are on the upperside clothed with long hairs.

In the Tring Museum is a *male* of *Misa memnonia* Karsch, *l.c.*, from Bathurst, West Africa, which agrees perfectly with Karsch's description and figure of the *female*, but has the white band on the forewings above of even width.

Of *Misa delicia* (Butl.), described as a *Massaga* and standing under this genus in Kirby's *Catalogue*, we have four *males* and three *females* from Accra, Gold Coast. These *females*, which structurally differ from the *males* in the slender and long terminal joint of the palpi, agree well with those described (as query *females* of *delicia*) by Aurivillius in *Ent. Tidskr.* 1892. p. 186, and confirm the statement of the learned author that in the *female* of *delicia* the outer edge of the band on the forewings is not strongly angulate, and that the band on the hindwings is wider than in the other sex.

Karsch, *l.c.*, p. 348, says of his new genus *Mitophrys*: "Vein 2 of the hindwings originating very close to vein 3." This statement, I think, is incorrect, as it does not apply to the type of the genus, *M. menete* (Cram.), the second partition of median nervure being longer than the lower discocellular veinlet in this insect, while in all the other species referred to *Mitophrys* by the author, as far as I could examine them, that partition is much shorter than the veinlet [*trimeni* (Feld.), *tricolor* (Druce), *tigrina* (Druce), *halaris* Karsch]; *M. rubida* (Feld.) agrees in this respect with *menete* (Cram.). The forehead of the *males* of *Mitophrys* Karsch is said by Karsch to be narrowed behind. This, again, is not correct, as it does not apply to the type of the genus, *M. menete* (Cram.). Moreover, the narrowed forehead is met with in the *males* of several species which are referred by Karsch to *Aegoceropsis* Karsch = *Aegocera* Latr., namely in *A. norma* Karsch (type of *Aegoceropsis* Karsch, and = *affinis* Druce), *ferrida* Wlk., *obliqua* Mab., and also in the Indian *Aegocera binacula* Wlk., not in *A. venulia* (Cram.) and *rectilinea* Boisd. The third and last character by which *Mitophrys* is differentiated by the author from the allied genera is the slenderness of the antennae. As, however, the antennae of *Aegocera venulia* (Cram.) and *rectilinea* Boisd. are in either sex decidedly thicker than in *A. ferrida* Wlk. and *obliqua* Mab., it is very difficult to draw a parting line between sections 13 and 18 of Karsch's key to the Aethiopian genera, and we are, in fact, quite at a loss to say whether the new species described below stands better in *Mitophrys* Karsch or in *Aegocera* Latr. There may be generic differences between the type-

species of *Aegocera* Latr., *Aegoceropsis* Karsch, and *Mitophrys* Karsch, but those which Karsch gives are partly not prominent enough (form of antennae), partly incorrect (absence of vein 5 from hindwings, narrowness of forehead in front of antennae in ♂, position of vein 2 to hindwings).

Aegocera elegantula Mab., *Ann. Soc. Ent. Belg.* 1893. p. 56; Mab. & Vuill., *Nov. Lep.* 12. p. 157. t. 22. f. 2 (1895), is nothing else but *A. trimeni* Feld. with the discal area of the hindwings pure white; in typical *trimeni* the hindwings are slightly tinged with orange; in *tricolor* Druce they are orange. These three forms occur together in Natal, and are certainly not specifically different, as intergradations prove.

Mitophrys fabricata Karsch, *Ent. Nachr.* 1895. p. 355. t. 2. f. 4, from "Nieder-Guinea," is based on a specimen of *Aegocera tigrina* Druce with the marginal region of the forewings black instead of reddish brown. In the figure of *tigrina* the thorax and base of abdomen are unicolorous; this is the case only in strongly rubbed specimens. *Tigrina* has the same dark thorax striped with white, and the same black dorsal line to the abdomen, which we find mentioned in the careful description of *fabricata*; but the abdomen of *fabricata* is said to be yellow with a black dorsal line; our good specimens of *tigrina* have the posterior segments black, edged with white. Judging from the photograph of the only specimen of *fabricata* which Karsch possessed when he described the species, this specimen is rather worn, and therefore the difference in the colour of the abdomen of *fabricata* and *tigrina* could very well be due to the bad condition of the type of *fabricata*. The markings of the forewings are in our series of thirteen specimens so variable that the differences shown in this respect by the figures of *tigrina* Druce and *fabricata* Karsch are of no importance whatever. One of our thirteen specimens has the marginal region of the forewings coloured like *fabricata* Karsch; all the others, mostly from the same place (Gaboon), have it like *tigrina* Druce. The small white spot between the lower median nervules to the forewings stands often isolated, as in the type of *tigrina* Druce; sometimes it is merged together with the subapical band, as in *fabricata* Karsch; and in one of our specimens it is absent. The linear white mark at the apex of the cell is in some cases three times as broad as in others. The submedian yellowish band is often dilated at the submedian nervure, as in Karsch's figure; sometimes it is of even breadth and does not reach that vein; in other examples it is club-shaped, as in Druce's figure. On account of the marginal region to the forewings being black, *fabricata* Karsch might be kept separate as an individual aberration of *tigrina* Druce, unless it could be proved by the presence of characters not mentioned in the description and not to be seen in the figure that it is distinct. K. J.

17. **Aegocera dispar** Rothsch. sp. nov.

Male.—All four wings black. Forewings with a minute white dot at the base. A triangular white patch one-fourth from the base extends obliquely from below the costa to the submedian vein, not quite 3 millimetres in breadth at the widest point. One-third from the apex the forewings are crossed by a second oblique white band, 2 millimetres in breadth, which extends from the costal nervure to the second median vein. Near the white basal dot below the costa is a small patch of blue scales; a linear spot of blue is situated just beyond the middle of the cell, and a longer one on the discocellular veinlets. There is also an indistinct blue line outside the subapical white band, and another along the lower median vein, a few scattered blue scales being also on the submedian vein. Hindwings with a large discal white

patch, which extends from near the base to half-way between the cell and the outer margin, gradually widening out as it approaches the margin; its outer edge is strongly convex, indented at the lower median vein, and is limited on one side by the subcostal vein and on the other by the submedian fold.

Underside of wings as above, but without blue scales.

Body black; palpi, except the black tip of first joint, head, prothorax, and a few hairs on each side of the anterior part of mesothorax, also anterior coxae and inner side of first pair of legs, golden orange.

Female.—Larger than *male*. Subbasal white patch almost or entirely wanting; hindwings black, and extreme tip of abdomen yellow.

Expanse: forewing,	♂,	AM	20	mm.;	EM	11	mm.;	PM	14	mm.
„ „	♀,	„	23	„ ;	„	14	„ ;	„	17	„
„ hindwing,	♂,	„	14	„ ;	„	13	„ ;	„	11	„
„ „	♀,	„	17	„ ;	„	15	„ ;	„	13	„

Hab. Wassein, E. Africa (Mathews, April 1889); 1 ♂, 3 ♀.

The antennae are thicker and in the ♂ less pointed than in *A. menete* (Cram.), but thinner than in *venulia* (Cram.). Vein 2 of the hindwings stands as close to vein 3 as in *A. trimeni* Feld. The terminal joint of the palpi is shorter than in *menete* (Cram.). W. R.

18. **Hespagarista echione** Boisd. ab. **funebris** Rothsch. ab. nov.

Differs from typical *echione* Boisd. by the absence of the luteous spots on both pairs of wings. That this is only a melanistic aberration of *H. echione* is shown by the blue spots being in exactly the same position, and the luteous patches being indicated by scattered yellow scales. Head, palpi, legs, thorax, and abdomen identical with typical form.

Hab. Wassein, E. Africa (Mathews, April 1889); 1 ♀. W. R.

19. **Rothia simplex** Rothsch. sp. nov.

Female.—*Upperside:* forewings black, fringe at apex white. At apex of cell the forewings are crossed by an oblique band of creamy white extending from the subcostal to the submedian nervure. This band, at its widest part, has a breadth of 5 millimetres, and at the lower median nervule is 4 millimetres from outer margin. At the base of the forewings are situated a number of creamy dots and a dull dark metallic spot. Hindwings black, with fringe white at apex, and with large discal creamy patch exteriorly rounded, reaching the costal vein and the abdominal margin, where it is 3 millimetres short of the base. Along basal half of costa runs a creamy streak joined to the discal patch. Width of black border 9 millimetres at vein 7 and 4 millimetres at submedian.

Underside: forewings similar, but without the basal spots, and in one of my two specimens there is situated in the cell a round white spot, while from the base along the inner margin runs a streak of cream-colour. Hindwings as above, but discal patch extending to base and the black border extending along the costal margin to near the base.

Palpi, head, and thorax black, with two, four, and eight white spots respectively. Underside of thorax, legs, and abdomen orange-yellow; anal tuft and basal spot

above and below on the preanal segment black or nearly so, as well as the last abdominal segment on upperside.

Expanse: forewing AM 31 mm.; EM 17 mm.; PM 23 mm.
„ hindwing „ 23 „ ; „ 18 „ ; „ 15 „

Hab. Morondava, Madagascar (Last); 2 ♀.

Differs from *R. pales* (Boisd.), *R. epipales* (Mab.), and *R. micropales* Butl. in the large creamy discal patch on hindwings and the longer terminal joint of palpi. From *R. agrius* (H.S.) it is distinguished especially by the much larger creamy area to the hindwings and the entirely yellow upperside of the abdomen. W. R.

20. **Rothia lasti** Rothsch. sp. nov.

MALE.—*Upperside:* forewings black, with one white dot at the base and two in the cell. From the subcosta to the lower median vein, a millimetre beyond the cell, is an oblique transverse white patch, the anterior half much narrower than the lower half. At the base of the wings are indications of the usual blue spots. Hindwings black, with a more or less rounded white discal patch between the subcostal and submedian veins, greatest width of which is about 5 millimetres. This patch is often indented along the veins.

Underside as above.

Palpi, head, and thorax black, with two, four, and eight white spots respectively. Black hairs of thorax slightly intermixed with orange ones; abdomen black. Hairs of thorax below and legs orange.

Expanse: forewing AM 19 mm.; EM 11 mm.; PM 15 mm.
„ hindwing „ 15 „ ; „ 13 „ ; „ 10 „

Hab. Morondava, Madagascar (Last); 10 ♂, 3 ♀.

All the white markings vary much in size in the individual specimens. W. R.

21. **Rothia eriopis** H.S. ab. **carminata** Rothsch. ab. nov.

The yellow disc of hindwings of *eriopis* is in this aberration bright carmine-red. This is neither a local nor a sexual variation, as I have one *male* and six *females* of *carminata*, as well as two *males* and three *females* of typical *eriopis*, all from Morondava, Madagascar. W. R.

22. **Rothia nigrescens** Rothsch. sp. nov.

MALE.—*Upperside:* forewings black and shaped and marked as in *R. simyra* Westw., but the indentations of white band at the veins are deeper, and there are one or two small creamy dots in cell. Hindwings black, the fringe spotted with white, as in *R. zea* (H.S.).

Underside as above, but distinguished at once from all other *Rothia* by the entirely black hindwings.

Palpi, head, and thorax black, spotted as in other *Rothia*. Upperside of abdomen black. Underside of body and legs orange; tarsi above black.

Expanse: forewing AM 27 mm.; EM 16 mm.; PM 18 mm.
„ hindwing „ 18 „ ; „ 15 „ ; „ 12 „

Hab. Morondava, Madagascar (Last); 3 ♂. W. R.

Arrothia Jord. gen. nov.

♂♀. Forehead with a thin conical horn raised obliquely forwards and sharply truncate at the tip; diameter of horn at tip scarcely one-eighth of the breadth of forehead. Antennae distinctly thickened beyond middle, with the extremity slender, a little thicker than those of *Aegocera tigrina* (Druce). Third joint of palpi naked, almost longer than the second joint (♀).

Neuration: vein 9 to forewings arising a little beyond middle of 8; veins 3, 4, 5 as in *Aegocera* Latr. and *Rothia* Westw. Second partition of median vein longer than the respective portion of the outer margin. Hindwings with veins 3 and 4 together from lower angle of cell; second partition of median nervure shorter than lower discocellular veinlet.

Type: *Arrothia bicolor* Rothsch. sp. nov.

Differs from *Aegocera* Latr. and *Rothia* Westw. in vein 9 of the forewings standing beyond middle of vein 8, instead of arising from between middle of 8 and areole, and in the thin and long horn of the forehead. From *Pais* Hübn. it is distinguished by the horn again, and by the long and naked third joint of the palpi; from *Paida* Jord. gen. nov. by the shape of the frontal horn, the position of vein 9 to the forewings, and by the shorter second partition of the median vein of the hindwings. K. J.

23. **Arrothia bicolor** Rothsch. sp. nov.

Female.—*Upperside:* forewings, basal half buffish yellow, reaching at costal margin 1 millimetre short of middle, while on inner margin it reaches one-fourth short of the inner angle; the outer edge of the yellow area is convex, and from base of wing to half its extent is much shaded with black scales; outer half of wing black. Hindwings similar, but yellow area less shaded with black scales, black area narrowest behind.

Underside of wings as above, but yellow area brighter and not shaded with black scales.

Antennae, palpi, head, underside of body, and last two segments of abdomen black; upperside of thorax orange and of abdomen yellow.

Expanse: forewing AM 20 mm.; EM 11 mm.; PM 15 mm.
„ hindwing „ 15 „ ; „ 13 „ ; „ 10 „

Hab. Morondava, Madagascar (Last); 1 ♀. W. R.

Arctiopais Jord. gen. nov.

♂♀. Forehead narrowed behind in ♂, almost parallel in ♀, anteriorly convex with a sharply raised circular ridge, of which the diameter is longer than a third the breadth of the forehead. Antennae thicker than in *Aegocera menete* (Cram.), thinner than in *Aegocera cenulia* (Cram.). Palpi long in either sex; second joint strongly hairy, third joint naked, about eight times as long as broad, of the length of the basal joint of the foretarsi in ♂ and ♀. In ♂ hindtibiae and -tarsi and long spurs of the former clothed with long hairs; in ♀ hindtarsi and long spurs of hindtibiae almost naked.

Neuration: costal nervure to forewing parallel to costal margin to a little beyond apex of cell, where it rather suddenly turns towards the margin; vein 10 arising from between middle and apex of areole; stem of 8,9 short; veins 3, 4, 5 as in *Aegocera* Latr. and *Rothia* Westw.; second partition of median nervure as long as the respective portion of the outer margin. Hindwings as in *Aegocera trimeni* Feld.

Type: *Arctiopais ambusta* (Mabille), *Bull. Soc. Ent. Belg.* XXV. p. 55 (1881) Madagascar).

Most nearly related to those species of *Aegocera* Latr. which have, in the *male*, the front of the head narrowed behind, but differs from them in the terminal joint of the palpi being in either sex of equal length and as long as the first joint of the anterior tarsi. The long terminal joint of the palpi of *A. ambusta* misled Mabille to describe the insect as a species of HYPSA Hb.!! The hinder tarsi and long spurs of the posterior tibiae being clothed with long hairs seems to be a character peculiar to this genus and the American genus *Euschirropterus* Grote. In *Aegocera trimeni* Feld. and *tigrina* (Druce) the basal joint of the hindtarsi bears in the *males* some long hairs on the upperside; in the *male* of the only species of the new genus all the joints are hairy, but less densely so than the hindtibiae. K. J.

Paida Jord. gen. nov.

♂ ♀. Forehead produced into a tripartite horn, of which the middle part is much longer than the two lateral parts, a little turned upwards and sharply pointed. Antennae thinner than in *Pais* Hübn. Palpi slender, first and second joints moderately hairy, third joint not hairy (as it is in *Pais*), long, four times as long as broad. Middle and hinder tibiae clothed with long hairs at the upper- and underside.

Neuration: vein 9 of forewings originating between areole and middle of vein 8; veins 3, 4, 5 as in *Aegocera* Latr.; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with veins 3 and 4 together from lower angle of cell; second partition of median vein longer than the lower discocellular veinlet.

Type: *Paida pulchra* Trimen, *Tr. Ent. Soc. Lond.* (3). I. p. 524 (1863) (Damaraland). We have 2 ♂ from "South Africa" and a ♀ from Weenen, Natal (caught in January 1895) of this handsome insect.

Paida differs from *Pais* Hübn. in the structure of the head and the long and naked terminal joint of the palpi. From *Aegocera* Latr. and allies the new genus can easily be distinguished by the horn of the head. K. J.

24. **Godasa rufodiscalis** Rothsch. sp. nov.

MALE.—*Upperside:* forewings chocolate-brown, passing into reddish chocolate towards the margin, covered with a number of small blue patches, especially one at the base behind the costa, one beyond the middle of cell, another on the discocellular veinlets, and three before the submedian vein. There are eight small white spots close to the outer margin, the last being the largest. Hindwings black, with a large discal patch, broadest at the abdominal margin, of a bright rufous colour. It extends anteriorly to the submedian vein. The outer black area of hindwings has a width of 2 millimetres at anal angle and 5 millimetres at the submedian vein; the inner edge of rufous patch is indented with black upon the discocellulars.

Underside black-brown. Forewings without any markings, and hindwings showing rufous patch very distinctly as above.

Head, palpi, thorax, legs, first, second, and last segments of abdomen, a series of dorsal and abdominal spots black; tip of first and second joints of palpi, three spots on the anterior tibiae, and tips of all tarsal joints white. Rest of abdomen yellow.

Expanse: forewing AM 20 mm.; EM 11 mm.; PM 14 mm.
„ hindwing „ 14 „ ; „ 11 „ ; „ 10 „

Hab. Madagascar; 1 ♂.

Easily distinguished from *Godasa sidae* (Fabr.) by the colour and pattern. W. R.

This species differs from *Godasa sidae* (Fabr.) structurally in vein 7 of the hindwings being joined to vein 8 in the ordinary way, as in *Episteme* Hübn., while in *sidae* the juncture of those veins takes place farther from the base and the veins remain close together for more than a millimetre. K. J.

b. Indo-Australian forms with vein 10 *arising from the areole.*

Agarista Leach, *Zool. Misc.* I. p. 37 (1815).

To this genus I refer only *A. agricola* Don. (as type of the genus), *biformis* Butl., *daemonis* Butl., and a new species described below by Mr. Rothschild. These species are characterised by the antennae being strongly clubbed in either sex, by all the femora being rough with long hairs, and by some peculiarities in the neuration:—

The upper discocellular veinlet of the forewings is strongly concave; the second partition of the median nervure is on the forewing much longer than the respective portion of the outer margin, and on the hindwing only half the length of the lower discocellular veinlet; vein 5 of the hindwings has the base feebly but visibly bent towards vein 6, while in the allied genera vein 5 is either straight at base or faintly curved towards vein 4. K. J.

25. **Agarista timorensis** Rothsch. sp. nov.

♂. Differs from *A. agricola* Don. in the subapical band of spots being white, not orange, and in the cellular patch being very narrow. The red band of the hindwings is replaced by a partly obliterated row of whitish spots. Underside shows same differences.

Hab. Oinainisa, Dutch Timor (W. Doherty, November and December 1891); 1♂.

Eventually, when we possess material from all the lesser Sunda and Papuan Islands, I feel sure *Agarista biformis* Butl., *A. daemonis* Butl., and my new *A. timorensis* will all have to rank only as subspecies of *A. agricola* Don., but at present no intergraduated forms are known. W. R.

Phalaenoides Lewin, *Lep. Ins. N. S. Wales* p. 2 (1805).

The species which are generically identical with *Ph. glycinae* Lew., the type of the genus, differ from *Agarista* Leach in the middle and hinder tibiae being clothed in *male* and *female* with long hairs in the middle on the upperside. In neuration *Phalaenoides* Lewin comes very close to *Agarista* Leach; the second partition of the median nervure to the forewings is, however, shorter, that of the hindwings longer than in *Agarista*, and vein 5 of the hindwings is at the base straight, or feebly bent backwards. The antennae are less clubbed than in *Agarista*, and in the ♀ much thinner than in the ♂. The tibiae are not so hairy in this genus as they are in *Zalissa* Wlk. [= *Sendyna* Stretch according to Hampson, *Moths of India* II. p. 155 (1894)].

Phalaenoides Leach contains a good many heterogeneous forms which ought to be removed from this genus. *Ph. funebris* (Moore) and *vithoroides* (Leech)—the latter stands under *Episteme* Hb. in Kirby's *Catalogue* p. 29. n. 51—have setiform antennae in both sexes, and the terminal joint of the palpi is very short; in these characters the two species (or are they geographical forms of one species?) agree with *Zalissa longipennis* (Wlk.). In *Ph. megisto* (Boisd.), *pamphilia* (Stoll), *goldiei*

(Druce), and the new species described below, the antennae are also not thickened towards apex, and these species differ, moreover, from typical *Phalaenoides* in the middle and hinder tibiae, though not naked, bearing no tuftlike clothing of long hairs in the middle. *Phalaenoides roeberi* (Ribbe), *milete* (Cram.), *mutatus* (Wlk.), *confertus* (Wlk.), all under *Phalaenoides* in Kirby's *Catalogue*, and *Epistene pagenstecheri* (Röb.) of Kirby's *Cat.*, must be referred to *Ophthalmis* Hb. on account of the slender and naked middle and hinder legs which they have in common with *O. lincea* (Cram.).

Phalaenoides affinis Boisd. will in future come into another (new) genus: the antennae are in the ♂ feebly, but visibly, biserially serrate; those of the ♀ appear to be simple and setiform, as in *Ph. funebris* Moore.

The *male* of *Phalaenoides albamedia* (Luc.), *Proc. Linn. Soc. N. S. Wales* (2). VI. p. 301 (1891) (Brisbane), has a peculiar stridulating organ which reminds one of that of *Hecatesia* Boisd., but is situate on the hindwings. Within and before the cell of the hindwings, along the subcostal nervure, the membrane of the wing is dilated, denuded on the underside, where it forms a deep furrow, covered with one layer of scales only on the upperside, and transversely ribbed like the vitreous mark in *Hecatesia* ♂; on the forewing there is before and behind the median nervure a similar, but much less developed, organ. By examining the legs of this species I found that the first joint of the hinder tarsi is much thicker in the ♂ than in the ♀, and is provided above, a little towards the inner side, with a row of obviously raised transverse ridges, which I did not meet with in the ♀, nor anywhere else amongst *Agaristidae*, and which, when pressed during flight against the ribbed membrane of the vitreous mark, might very well serve to produce a buzzing sound similar to that observed by Meyrick in *Hecatesia fenestrata* Boisd. (see Hampson, *P. Z. S.* 1892. p. 190). In consequence of the development of that stridulating organ the anterior part of the cell to the hindwings (between longitudinal fold and subcostal nervure) is broader than in other *Agaristidae*, and hence the upper discocellular veinlet longer than the lower one. Notwithstanding that in the other sex the stridulating organ is entirely absent, the lower discocellular veinlet to the hindwings is also here visibly shorter than the upper one, a character which one might suppose to be inherited from the *male*, or, as in the ♂ of *Ph. glycinae* (Don.) without stridulating organ the lower discocellular veinlet is likewise, though almost imperceptibly, shorter than the upper one, at least to be influenced by the presence, in ♂, of that vitreous mark.

Vein 5 of the hindwings of *albamedia* (Luc.) is parallel to vein 4; it is rather curved at two-thirds of its length from the outer margin, and thence becomes straight. The hindtibiae are without long hairs in the middle. The basal third of the costal margin of the forewings is in either sex more dilated than in any other species of *Phalaenoides* Lewin. The spines of the first joint of the hinder tarsi are less developed in the ♂ than in the ♀. K. J.

26. **Phalaenoides inconspicua** Rothsch. sp. nov.

Differs from *P. goldiei* (Druce), *Ann. Mag. N. H.* (6). XIV. p. 21 (1894), in the following characters:—

It is somewhat larger; the apices of both fore- and hindwings are black, not white. The oblique white patch on forewings is broader and has a strong projection at lower angle of cell; the small white spot in the cell is wanting, as are also the blue

dots at the base. On the hindwings the white discal patch is about three times the size of that in *P. goldiei*, and, unlike in that species, reaches the abdominal margin. Collar and shoulders edged with grey, not yellow; abdominal tuft black above, pale buff below, not entirely orange, as in *goldiei*. Underside of abdomen all white, not banded, as in the other species. Terminal joint of palpi shorter.

Hab. Humboldt Bay, Dutch New Guinea (W. Doherty, September and October 1892); 1 ♂. W. R.

In this species the second partition of the median nervure to the hindwings is of half the length of the lower discocellular veinlet. The antennae are not thickened towards the apex. The forehead is somewhat produced and bears a subcircular ridge. The third joint of the palpi is longer (♂) than the forehead is broad. K. J.

27. **Ophthalmis basalis** Rothsch. sp. nov.

Female.—*Upperside:* forewings differ from *O. mutatus* (Wlk.) in having a row of three white subbasal spots instead of two, and in the two central white spots being much larger, that between the lower median and submedian veins having a length of 4 and a breadth of 3 millimetres. Hindwings are at once distinguishable from those of all allied forms by the presence of a large white basal area; this area does not quite reach either the base or the apex of cell between costa and median vein, being here 5 millimetres wide, while between the median vein and abdominal margin it reaches from the base to within 5 millimetres of the outer margin at the lower median vein, including a black dot just behind the latter vein.

Underside shows a faint line connecting the lowest subbasal spot and the lower of the two central spots. Middle of underside of abdomen yellow; otherwise similar to *O. mutatus* (Wlk.). Size somewhat larger than that of *O. mutatus* (Wlk.).

Hab. Mangola, Sulla Islands (Dr. Platen); 1 ♀. W. R.

28. **Mimeusemia perakana** Rothsch. sp. nov.

♀. Differs from *M. albicilia* Hamps., *Moths of India* II. p. 160 (1894), in the more reddish maroon ground-colour of forewings, in the larger and more oblique subbasal white patch, which is more than twice as broad before submedian vein than at the costa; the two median patches are joined together to form an uninterrupted band. On the hindwings the baso-abdominal area is pure white, while the discal white spot is larger than in *albicilia* and on the underside is connected with basal area by a long white streak. Basal black patch on abdomen much extended.

Hab. Padang Rengas, Perak; 1 ♀. W. R.

Agarista semyron H.S. is most nearly related to the species standing under *Mimeusemia* Butl., and ought to be referred to that genus. *Mimeusemia* Butl. is scarcely separable from *Phalaenoides* Lewin in the present extent of the latter. In the typical species of *Mimeusemia*, in *M. persimilis* Butl. from Japan, the second partition of the median vein to the forewings is decidedly longer than in *peshwa* Moore and the other species.

Hampson, *Moths of India* II. p. 155 (1894), says of the genus *Zalissa* Wlk. (= *Sadyra* Stretch acc. to Hampson) that the terminal joint of the palpi is very short, and that the tibiae are without spines. The first character applies only to *Z. longipennis* Moore and perhaps some allied species, while in other species, for

example in *Z. noctuina* (Butl.) from Japan, the third joint of the palpi is very long; in the ♀ of *Z. transiens* (Wlk.) it is at least four times as long as broad, and can, therefore, by no means be called short. The second character, if its meaning is "tibiae without spurs," is stated by mistake, I think; all the species of *Zalissa* which we have possess the usual spurs to the tibiae. The position of vein 7 to the forewings, which Hampson has incorrectly made use of in the key to the Indian genera of *Agaristidae*, is variable in *Zalissa*; it originates either from the apex of the areole, or, in specimens of the same species—*f. e. transiens* (Wlk.) -is stalked with 8 and 9. K. J.

Longicella Jord. gen. nov.

♂ ♀. Forehead with a short conical truncate processus; diameter of subcircular ridge one-third or less the breadth of forehead. Antennae feebly thickened towards apex in ♂, almost filiform in ♀, with the tip very slender. Second joint of palpi with the hairs not longer than the third joint; the latter naked, longer than the forehead is broad, about four times as long as broad. Middle and hind tibiae not clothed with long hairs.

Neuration: vein 3 of forewings from before angle of cell; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with vein 3 also from before angle of cell; second partition of median nervure longer than the lower discocellular veinlet; vein 5 shorter than the cell is long.

Type: *Longicella mollis* (Walker), *Lep. Het. B. M.* VII. p. 1774 (1856) (East Indies and Malacca).

Differs from all allies in vein 3 of either wing arising from before the apex of the cell, and in vein 5 to the hindwings being shorter than the median cell is long (measured along the middle fold).

L. decipiens (Butl.), *Ann. Mag. N. H.* (5). XIV. p. 34 (1884) (Nias), is only a subspecies of *L. mollis* (Wlk.) and occurs in Nias and Sumatra: the extent of the black spots is so variable that *mollis* and *decipiens* run into one another.

L. luctifera (Boisd.), *Spec. Gén.* I. t. 14. f. 4 (1836) (Java), belongs in this new genus; it has at first sight a different appearance, but the markings correspond in position very well with those of *mollis* (Wlk.). K. J.

Hecatesia Boisd., *Mon. Zyg.* p. 11 (1829).

The figures which Westwood, *Trans. Linn. Soc. Lond.* (2). I. p. 199. t. 33. f. 1 *e* (1877), and Hampson, *P. Z. S.* 1892. p. 190. f. 2, give of the peculiar neuration of the *male* of *H. fenestrata* Boisd. do not agree with one another. I have compared our eighteen *male* specimens of *fenestrata* Boisd. and *thyridion* Boisd., and find that both figures are incorrect, and that Westwood's figure comes nearer the truth than Hampson's does. In Hampson's figure *H. fenestrata* Boisd. has no areole, veins 6, 7, 8, and 9 are stalked together, and 10 is free; Westwood's figure shows correctly the long areole, but the position of veins 6, 7, and 8, and that of the upper discocellular veinlet, are erroneous. According to our specimens, the *males* of *fenestrata* and *thyridion* have a very long and narrow areole, reaching from close to the origin of vein 11 to beyond the apex of the cell; vein 11 arises much nearer the base of the wing than is shown in Westwood's figure. Veins 7 and 8 come from the apex of the areole, 9 and 10 are stalked together (not with 8); vein 6 arises from apex of cell,

not from areole; middle part of discocellular veinlets between veins 5 and 6 is obliterated in our specimens, or is at least so feeble that I cannot see it under a strong lens.

Two *female* specimens of *Hecatesia fenestrata* in our collection, and a specimen of this sex of *thyridion* in Mr. Herbert Druce's collection, show that the neuration in Westwood's figure of the *female* of *H. thyridion* (*l.c.* t. 33. f. 4) is so far correct, as vein 10 arises from the areole and 8 and 9 are stalked together.

The antennae of *thyridion* Boisd. are much more pointed than those of *fenestrata* Boisd.; the terminal joint of the palpi is longer and naked. The terminal joint of the palpi of *fenestrata* is much too short in Westwood's figure.

Hecatesia Boisd. is placed by Kirby in his *Catalogue* at the end of the *Castniidae*; in this Kirby follows Westwood, *l.c.*, who pointed out, in opposition to Boisduval, that *Hecatesia* was much more nearly allied to *Castnia* Fbr. than to *Eusemia* Dalm. and *Aegocera* Latr. Westwood was, however, entirely wrong, and Boisduval, Druce, Hampson, etc., were and are right in treating *Hecatesia* as an Agaristid. *Hecatesia* disagrees with *Castnia* nearly in every respect, while there is nothing in its structure which might justify one in removing it from the typical Agaristids.

The American insect described by Druce as *Hecatesia falcata*, *Biol. Centr. Amer., Lep. Het.* I. p. 35. t. 5. f. 23 (♂). 24 (♀) (1883) (Panama), must certainly be referred to another (new) genus. As we have, however, no *females* of this *falcata*, I abstain from proposing a genus for it, but give the following note on the structure of the *male*:—

Differs from *Hecatesia* Boisd. as follows: terminal joint of palpi shorter; antennae gradually thickened, much less abruptly clubbed; all the tibiae clothed with long hairs; hinder wings with the abdominal region dilated (recalling the hindwing of *Euploea*).

Neuration: areole short and extremely narrow; vein 10 from areole, not stalked with 9; veins 8 and 9 stalked together; second partition of median nervure twice as long as the respective portion of the outer margin; same partition on hindwings longer than lower discocellular veinlet. As the veins near the anterior angle of the cell to the forewings are so close together that a simple woodcut would not give a right idea of the position of veins 10, 9, 8, and 7, and the form of the inconspicuous areole, we propose to give a figure of the venation on one of the plates of this journal when an opportunity occurs.

The stridulating organ on the forewings of *H. falcata* Druce is scaled on either side of the wing. K. J.

Haase, *Iris* I. p. 323 (1888), says of the peculiar organ on the forewing of the *male* of *H. fenestrata* Boisd. that probably in the live specimen the thickened costal margin approaches the scaled portion of the wing by means of the vitreous membrane being depressed, and that it is removed by the wing being excessively spread out when the specimen is set. This is erroneous; unset specimens have the vitreous mark the same as set specimens. Haase, regarding this stridulating organ as being a scent-producing one, had to find a fold for scent-producing scales. K. J.

i. American forms with vein 10 *of the forewings arising from the areole.*

Agarista subulosa Feld. from California and *A. noctuiformis* Möschl. from Porto Rico, both with (?) under *Metagarista* in Kirby's *Catalogue*, are very closely allied if

not identical insects. They have, of course, nothing to do with the genus *Metagarista*, and agree with none of the present genera of *Agaristidae*, and will require a genus of their own. They differ structurally from *Copidryas* G. & R., to which genus they come nearest, in the forehead bearing a short conical processus with circular ridge and being narrower than the eyes are high (when viewed from front side), and in the second partition of the median nervure to the hindwings being shorter than the lower discocellular veinlet. In the *male* of *sabulosa* Feld. and *noctuiformis* Möschl. the forehead is narrowed behind as in *Aegocera trimeni* Feld. and allies. K. J.

Diamuna Walker, *Lep. Het. B. M.* XII. p. 960 (1857).

We have two *female* specimens (from Venezuela and British Guiana) of an Agaristid which is apparently the same as *Diamuna sevora* (Stoll), *Pap. Ex.* IV. p. 235. t. 398. f. *l* (1782) (Surinam), though they have not the peculiar patch on the forewings as shown in Stoll's figure. They exhibit the following structural characters which I think necessary to point out, as Walker's diagnosis of *Diamuna* is a very vague one :—

♀. Front of the head a half narrower than the large eye (when viewed from the front side) is high, conically produced, with a sharp subcircular ridge. Palpi strongly hairy, terminal joint scarcely longer than broad. Antennae almost filiform, not reaching apex of cell to forewings; dilatation towards apex scarcely noticeable. All the tibiae strongly hairy.

Neuration: similar to that of *Phasis* Wlk., but second partition of median nervure to forewings half as long again as the respective portion of the outer margin; same partition to hindwings longer than lower discocellular veinlet. Vein 7 to hindwings, though touching 8, distinctly separate from 8 by a furrow, its basal partition thicker than in *Phasis* Wlk. and most other Agaristids.

Differs from *Phasis* Wlk., to which *Diamuna* Wlk. comes nearest, in the thin antennae, the narrower forehead, the larger eyes, the longer second partition of the median nervure to either wing, the hairy middle and hind tibiae, and in vein 7 to the hindwings being thicker at base and being separate from 8 by a furrow when touching it. K. J.

Clitis Walker, *Lep. Het. B. M.* XII. p. 961 (1857).

A ♂ specimen without locality in the Felder collection agrees fairly well with Stoll's figure of *Clitis proserpina* (Stoll), *Pap. Ex.* IV. p. 239. t. 399. f. *i* (1782) (Surinam). It has the short and thin antennae of *Diamuna* Wlk., and is similar to that genus in the form of head and eyes, and in the long second partition of the median nervure; but vein 7 of the hindwings is confluent for about 1 millimetre with vein 8 *beyond* the basal third of the cell; the basal partition of vein 7 is well developed.

In the narrow forewings and broad hindwings *Clitis proserpina* (Stoll) reminds one of *Hecatesia falcata* Druce. The underside of the abdomen is in our ♂ specimen clothed along either side with long hairlike scales, which are broadest at the tips, and being turned over the middle of the abdomen give the underside of the latter a strongly woolly appearance. The hindwings are furnished above at the basal portion of the costal margin with long hairs, covered by the abdominal margin of the

forewings, which is hairy underneath; these hairs represent probably a secondary sexual character analogous to that of *Patula* Guen. K. J.

Group III.—*Antennae pectinate or serrate; forewings with areole.*

k. African forms.—Here belong *Pristoceraea* Karsch and *Ovios* Wlk. (see Karsch, *Ent. Nachr.* 1895. p. 349). K. J.

l. Indo-Australian forms.

There was hitherto only one genus in this section, *Apina* Wlk., with one species, *A. callisto* Wlk.; I add a new genus based upon *Aegocera cornigera* Butl., and in future a third one must be erected for *Phalaenoides affinis* (Boisd.).

Ipana Jord. gen. nov.

♂ ♀. Forehead broadest in front of antennae, its supra-oral edge produced, with a flattened, somewhat recurved, and at the tip truncate or rounded horny processus, which is excavate above and convex below. Antennae biserially serrate in ♂, serrations very short and broad, scarcely narrower at the tip than the respective antennal joint is long; in ♀ the serrations are feeble, but can be noticed under a moderate lens, especially towards the apex of the antennae. Second joint of palpi clothed with elongate scales, which are shorter than the joint is long; third joint naked, about two or three times as long as broad. Hairlike scales on mid- and hindtibiae much shorter than the long spurs. Abdomen hairy only at tip.

Neuration: forewings with vein 10 from between middle and apex of areole; stalk of 8. 9 shorter than areole; second partition of median nervure longer than the respective portion of the outer margin. Hindwings with lower discocellular veinlet a little longer than, or as long as, the second partition of the median nervure.

Type: *Ipana cornigera* (Butler), *Tr. Ent. Soc. Lond.* 1886. p. 381 (Gayndah and Peak Downs).

Agarista diversa Wlk., *Lep. Het. B. M.* XXXI. p. 49 (1864) (N. Australia), belongs probably also in this new genus, which has nothing to do with *Aegocera* Latr., but comes close to *Apina* Wlk. *Apina* Wlk. differs from *Ipana* gen. nov. in the pectinations of the antennae being much longer, in the legs and palpi being clothed with long hairs, and in vein 2 of the forewings standing farther from the lower angle of the cell.

Ipana cornigera (Butl.) has been recorded from N. Australia and British New Guinea. William Doherty obtained some specimens of either sex at Oinainisa, Dutch Timor, November and December 1891, which do not seem to us to be subspecifically separable. This is the second case amongst *Agaristidae* of Timor and North Australia being inhabited by the same insect. *Agarista timorensis* Rothsch. sp. nov. (p. 48) may be quoted as a third case, indicating a relationship of the Timorese fauna to that of North Australia. K. J.

m. American forms with pectinate or serrate antennae.

The number of genera of this section is much greater in the Neotropical and Nearctic regions than in the Eastern hemisphere.

The genera *Aucula* Wlk., *Tr. Ent. Soc. Lond.* (3). I. p. 253 (1862), *Pycnodontis* Feld., and *Leiosoma* Feld. are closely allied to one another. In *Aucula* Wlk. the second partition of the median nervure to the fore- and hindwings is much longer than in the two uncharacterised Felderian genera. *Pycnodontis* Feld. has in the ♂ the antennae more shortly pectinate than *Leiosoma* Feld.; the latter, if really distinct from *Pycnodontis*, requires a new name, as *Leiosoma* has been preoccupied at least four times. I prefer to treat *Leiosoma* Feld. as a synonym of *Pycnodontis* Feld.

To *Aucula* Wlk. belongs *Diamuna adrasta* Druce, *Biol. Centr. Amer., Lep. Het.* I. p. 334. t. 30. f. 20 (1889) (Mexico). K. J.

Caularis Walker, *Lep. Het. B. M.* XII. p. 801 (1857).

I give the following description of this genus :—

Forehead with a thin conical horn, which is truncate at the tip, and is here about one-tenth as broad as the forehead. Antennae biserially pectinate, branches long, those of the fifth joint already longer than the joint is broad, those of the middle joints more than three times as long as the respective joints are broad. Second joint of palpi hairy; third joint more than twice as long as broad, nearly naked. Legs slenderer than in *Pycnodontis* Feld., otherwise similar.

Neuration: similar to that of *Pycnodontis* Feld. Discocellulars of hindwings concave before vein 5, straight and strongly oblique behind it; vein 5 therefore from below the deepest point of the discocellulars; second partition of median vein to hindwings shorter than the respective portion of the outer margin.

Type: *Caularis undulans* Wlk., *l.c.*

I do not know the genus *Robinsonia* Grote from Cuba, but it seems to me to have some affinities to *Caularis* Wlk. K. J.

We insert here, at the end of the *Agaristidae*, the description of a new species of *Sarothroceras* Mab., a genus of doubtful position.

29. **Sarothroceras sordidus** Rothsch. sp. nov.

Male.—*Upperside:* forewings differ from *S. pallida* (Druce) = *alluaudi* Mab. in the more dirty drab-brown ground-colour, and in the dark sepia-brown subbasal patch being much smaller; on the inner margin it has a length of 7½ millimetres, while in *S. pallida* it is 12, and in *S. rhomboidea* Weymer it is still bigger. Anteriorly its point reaches the hind end of the cell, and its outer edge is concave. The transverse whitish band of *pallida* is here much more ill-defined, being scarcely paler than the ground-colour of the wing, and is wider, extending to the angle of the inner margin. The apical spot is more defined, owing to the paler ground-colour of the wing. Hindwings as in *pallida*, but the discal area not red but yellow, and so densely powdered with drab scales as to be very indistinct and faint.

Underside similar to *pallida*, but discal area of hindwings yellow, and the outer margin broader.

Female.—Similar to *male*, but with the subbasal patch on forewings larger, its outer edge straight, and the pale band outside it almost as pale as in *pallida*.

Hab. Gold Coast: 2 ♂, 1 ♀.

This, as well as *rhomboidea* Weym., *St. E. Z.* 1892. p. 104, on receipt of more material, may prove to be only aberrations of *pallida* (Druce), but at present I prefer to keep the three species separate. W. R.

CHALCOSIIDAE.

30. **Histia nivosa** Rothsch. sp. nov.

Male.—*Upperside:* forewings white, costa and apical area brownish black; the latter 8 millimetres wide at apex, and running to a point at the submedian vein above the inner angle. Median nervure also black. Hindwings white, outer margin black.

Underside same as above, but costal margin of hindwings also black.

Antennae black, head red, collar same, with black dot on each side. Thorax beneath and abdomen red, the latter with five series of black spots.

Female.—Only differs from *male* in that the black of apical area does not reach the apex of cell.

Shape as in *H. selene* Kollar, but wings shorter and blunter.

Hab. Kina Balu, N. Borneo (obtained from Messrs. Staudinger & Bang-Haas); 1 ♂, 1 ♀. W. R.

31. **Canerkes javanicus** Rothsch. sp. nov.

Male.—Differs form *C. euschemoides* Moore in the borders to the nervures being violet instead of metallic blue-green, in the transverse yellow band being split up into spots and not joined to the basal yellow area, in the white spots of the apical half of forewings being much smaller, and in the yellow of both pairs of wings being orange-ochraceous.

Hab. Mount Gede, Java (Fruhstorfer, August 1892, 4000 feet); 1 ♂. W. R.

32. **Isbarta pandemia** Rothsch. sp. nov.

Female.—*Upperside:* forewings straw-white at basal half, with veins marked black. Apical half black, with veins picked out in dull steel-blue. One-fifth from the apex is a transverse row of almost obliterated grey spots between the nervures; this row curves inwards, so that at inner angle the distance from margin is least. There is also a white patch between the two lower median nervures. Hindwings—basal fourth lavender-grey, with red of underside shining through; rest of wing smoky black, with a large creamy discal patch shading off into primrose-yellow, and reaching from abdominal margin, where it is 10 millimetres wide, to the subcostal vein, and shading off into basal grey area.

Underside: forewings black, with steel-blue gloss on veins, a large creamy patch in cell, two beyond it, and one between the two submedian veins. The transverse row of subapical spots white, and much more distinct than above. Hindwings black, with veins and apex steel-blue; a large triangular basal patch of red extends from the abdominal margin to the middle vein of cell. A primrose-yellow spot in apex of cell, and two subapical ones. A large triangular primrose patch reaches from abdominal margin, where it is widest, to vein 5, towards which it rapidly diminishes; in its anterior part it is cut up into spots by the black veins.

Body above pale steel-blue, abdomen beneath greyish white.

Another *female* has the forewings in basal half nearly glaucous, the creamy white scaling having almost vanished.

Expanse: forewing AM 33 mm.; EM 19 mm.; PM 25 mm.
„ hindwing „ 25 „ ; „ 20 „ ; „ 19 „

Hab. Kina Balu, N. Borneo (obtained from Messrs. Staudinger & Bang-Haas); 2 ♀.

This strange and beautiful species is an exact mimic in appearance and marking of *Delias pandemia* Staud., after which I named it. W. R.

ARCTIIDAE.

33. **Eligma malgassica** Rothsch. sp. nov.

♀. *Upperside:* forewings—the brown costal area narrower than in the other species of *Eligma*, its hind edge faintly bordered with yellow; it is, close to the base and again 9 mm. from the base, dilated rectangularly, then is parallel to costa for about 8 or 9 mm.; at apex of cell it is indented, and from there becomes somewhat broader again for about 3 or 4 mm., and then runs towards the apex of the wing, this apical portion being dentate at the veins; the three basal black spots of the other species are here not rounded, but transverse, and form an interrupted zigzag line; the subbasal black line of *E. hypsoides* Wlk. and *duplicata* Auriv. is very thin, strongly undulate, and not interrupted; the black line on the posterior part of the disc runs from the inner margin to the base of vein 3, being twice strongly curved, then turns round in the direction of the two black spots which stand between veins 3 and 5, so as to form with them an almost continuous line; in the curve behind apex of cell the line is double. The submarginal black spots are linear, transverse, and oblique. The middle of the wing behind the costal brown area is whitish, as in *hypsoides* Wlk., while the rest of the wing is fawn-colour, with a whitish zigzag band outside the subbasal black line and two more zigzag lines between discal black line and outer margin. Hindwings yellow, as in the other species, with a brownish black outer border, which has at apex a breadth of 6 mm., runs a little along costa, and is strongly tapered off behind, scarcely reaching as far as extremity of vein 1^b.

Underside: forewings yellow from base to 4 mm. beyond apex of cell, apical region brown. Hindwings as above, marginal border shorter.

Outline of wings nearly as in *E. narcissus* (Cram.).

Palpi, head, thorax, abdomen, and legs similar to those of *E. duplicata* Auriv.

Expanse: forewing AM 30 mm.; EM 14 mm.; PM 21 mm.
„ hindwing „ 22 „ ; „ 20 „ ; „ 12 „

Hab. Morondava, Madagascar (Last); 2 ♀.

This species is easily distinguished from the African *E. hypsoides* Wlk. and *duplicata* Auriv., *Ent. Tidskr.* 1892. p. 191. f. 1^b, by the apex of the hindwing being without a white patch, and from the Indian *E. narcissus* (Cram.) by the outline of the costal area of the forewings, the subbasal black line, the form of the discal line, the much narrower black border to the hindwings, and on the underside by the basal two-thirds of the forewings being yellow. W. R.

34. **Eligma narcissus indica** Rothsch. subsp. nov.

♀. Differs from typical *E. narcissus* (Cram.) from China as follows: forewings shorter and broader; if we take the breadth of the wing as 1, the length is $2\frac{1}{2}$ in *indica* and 3 in *narcissus*; outer margin much less oblique between veins 1 and 3; the white colour behind the costal area is more extended, and the posterior region of the wing is of a paler isabella colour; the anterior portion of the median interrupted transverse black line is shorter and broader, and the submarginal spots are

more prominent. On the hindwing the bluish black border is deeper concave between veins 4 and 7 than in the *female* of *narcissus*, and therefore appears more convex at vein 2.

Below, the forewings and the apex of the hindwings are paler in colour, and have a feebler bluish gloss.

Hab. Nilgiri Hills, S. India; 3 ♀. W. R.

35. **Eligma narcissus javanica** Rothsch. subsp. nov.

♀. Smaller than *narcissus*, forewings similar in shape; anterior portion of the transverse black median line as in *indica*; blue-black apical area of hindwings broader, evenly concave, at vein 4 only 1 millimetre short of cell. Dorsal black spots of abdomen very small.

Hab. Java; 1 ♀. W. R.

36. **Eligma narcissus philippinensis** Rothsch. subsp. nov.

♀. Forewings somewhat broader than in *narcissus*; emargination of outer margin to hindwings less obvious. Submarginal spots of forewings much larger than in the other subspecies; anterior portion of black interrupted median line forming a rounded dot; white longitudinal streaklike area as in *indica*; blue-black apical region of hindwings as broad as in *javanica* and of the same shape. Posterior tibiae without a black spot.

Hab. Mindoro; 1 ♀. W. R.

Oberthür describes and figures in *Et. d'Ent.* XVII. 1893. p. 32. t. 1. f. 6, a beautiful moth from Usambara, German East Africa, as *Eligma laetepicta*, which has a quite different aspect from the other species of the genus. We recently received a *female* specimen of this insect from Nguela, Usambara, which, on examination, proves that *laetepicta* Oberth. can very well be referred to *Eligma* Hb., as it exhibits only the following slight structural differences: the areole is broader, vein 7 comes from below the apex of the areole, and vein 6 stands farther from the areole than in *narcissus*, *duplicata*, and *malgassica*.

The species of *Eligma* Hb. hitherto known to science (and all contained in the Tring Museum) can be distinguished as follows:—

A. Forewing with two yellow transverse bands. *E. laetepicta* Oberth. from East Africa.

B. Forewing without those bands.

a. Apex of hindwing with a white patch.

a^1. Forewing with a single transverse line running from beyond middle of hindmargin to apex of cell. *E. hypsoides* Wlk. from West Africa. We have 2 ♀ from the Lower Niger.

b^1. Forewing with that line double. *E. duplicata* Auriv., *Ent. Tidskr.* 1892. p. 191. f. 1^b, from Cameroons.

b. Apex of hindwing without white patch.

c^1. Forewing beneath yellow, with apical third brown. *E. malgassica* Rothsch. sp. nov. from Madagascar.

d^1. Forewing beneath brown with blue gloss, extreme base yellow. *E. narcissus* (Cram.) from China and its subspecies from South India, Java, and Mindoro. K. J.

AGANAIDAE (=HYPSIDAE).

We include in this family only the forms allied to *Asota* Hb. (= *Hypsa* Hb.) which are characterised especially by the presence of a proboscis and by veins 7 and 8 of the hindwings being connected by a bar near the middle of the cell, and differ in the first character from the *Lymantriidae* and in the second from the *Arctiidae*. With Hampson, *Moths of India* I., we have to exclude from the *Aganaidae* the following genera of Kirby's *Catalogue of Heterocera* I. pp. 383—393 :—

1. *Sebastia* Kirby, *l.c.* p. 383 (1891) is Arctiid. New synonym: *Moorea* Hampson, *l.c.* II. p. 33 (1894).
2. *Eligma* Hb. is Arctiid. (*s.l.*).
3. *Bapata* Wlk. ,,
4. *Agaposoma* Feld. ,,
5. *Stenognatha* Feld. ,,
6. *Caryatis* Hb. ,,
7. *Godasa* Wlk. is Agaristid.
8. *Calpenia* Moore is Arctiid.
9. *Migoplastis* Feld. ,,
10. *Zaracha* Wlk. ,,
11. *Eggbolis* Boisd. ,,

Meyrick, *Proc. Linn. Soc. N. S. Wales* 1886. p. 758, brings *Nyctemera* Hb. and *Anerila* Wlk. to the *Aganaidae*; we cannot agree with him that these genera are more nearly allied to *Asota* Hb. than to other Arctioid moths. *Digama* Moore is regarded by Meyrick as an unattached genus differing from *Asota* "essentially in having vein 8 of the hindwings approximated but not connected to the upper margin of cell." This statement is quite correct as regards *Digama hearseyana* Moore, the type of the genus, and the only Australian species hitherto known, *D. marmorea* Butl., but does not apply to several other species standing at present under *Digama*, for example *D. insulana* Feld. and *marchali* Guér., and, therefore, we shall in this paper treat *Digama* as an Hypsid, and give a fuller explanation of the Hypsoid characters of this genus at the end of the family.

A revision of the *Aganaidae*, exclusive of *Digama* Moore, has been given by Snellen in *Tijdschr. v. Ent.* XXXI. p. 109 (1888), and we should restrict ourselves to a few notes about some oversights and errors in that excellent paper, if it were not for Kirby's *Catalogue of Heterocera* and Hampson's *Moths of India*, the authors of which works do not seem to have taken any notice of Snellen's classificatory results. The Indian AGANAIDAE, exclusive of *Digama*, are divided into three genera by Hampson and into nine by Kirby, while Snellen enumerates them under five well-characterised genera. As our researches show that Hampson unites under *Hypsa* a number of very heterogeneous forms, and that several of the genera in Kirby's *Catalogue* are identical, and also prove that Snellen's division of the family into five genera is not quite correct, we shall dilate a little longer upon this family, the more so as, besides the genera, the species also are in rather a great muddle. K. J.

Agape Snellen.

Hypsa, Walker (*nec* Hubner), *Lep. Het. B. M.* II. p. 455 (1854).
Agape Felder, *Reise Novara Lep.* II. (1874) (*nom. nud.*); Snellen, *Tijdschr. v. Ent.* XXXI. pp. 115. 116 (1888).

This is a very peculiar genus, and stands quite isolated amongst the Hypsids in the absence of the cavity from the forewing and the corresponding patch of scabrous scales from the upperside of the hindwing which are found in the allied genera. Snellen was the first to find this out; Meyrick, *Proc. Linn. Soc. N. S. Wales* 1886. p. 771, has *Agape chloropyga* (Wlk.) under the genus *Hypsa*, which he characterises *inter alia* by the presence of that supposed stridulatory organ; Hampson has *Agape* also as a synonym of *Hypsa*. *Agape* differs, moreover, in the absence of the costal retinaculum in the *male*, either sex only having the retinaculum at the median nervure, which is again an exception amongst *Aganaidae*. The antennae are similar to those of *Asota* Hb. described on p. 61. The terminal joint of the palpi is shorter than the second joint. Vein 7 of forewings originates from the apex of the areole, or is shortly stalked with 8. 9; veins 6 and 7 of the hindwings are shortly stalked or arise from a point.

To *Agape* Snellen belong two species, *chloropyga* (Wlk.) and *leonina* Butl.; the other two species which stand in Kirby's *Catalogue* under *Agape*, *javana* Cram. and *celebensis* Hopff., have nothing to do with this genus.

The Moluccan and Australian specimens of *A. chloropyga* (Wlk.) can generally be distinguished from one another by the shape of the exterior brown spot on the forewings. In our extensive series of *chloropyga* (Wlk.) from Queensland that spot is round and always well defined; out of our thirteen specimens from Amboina it is only in one example rounded, in all others it is anguliform or it is so much prolonged as to form a complete band which extends from the costal to inner margin, as described by Snellen, *l.c.* The two spots beyond cell are sometimes very feebly marked in Moluccan examples, and on such specimens *A. analis* Wlk. seems to be based.

Of *Agape leonina* Butl. there are two *males* only in the Tring Museum from New Britain, which differ from the *male* of *chloropyga* (Wlk.) in the black spots on the thorax being very feeble, and in the two preanal segments of the abdomen being ochreous with bluish black basal marks instead of being above entirely blue-black.

A *male* specimen from Alu Island, Solomon Islands, captured by Captains Cotton & Webster, has a complete brown transverse band across the basal fourth of the wing, and another band in the apical fourth similar to that of the above-mentioned variety of *chloropyga* (Wlk.); the spots on the thorax are scarcely traceable under a lens; the spot on the first joint of the palpi is very small and isabella-colour, not black; the blue-black colour at the bases of the abdominal segments is reduced, and absent from the preanal segment.

Another *male* from Lifu, Loyalty Islands, is still more different from *leonina* Butl. The thoracic spots are entirely obliterated; the eighth and ninth abdominal segments are above much more extended bluish black, in fact the upperside of the eighth segment is bluish black with only the hinder edge yellow. As this Lifu example is, besides, smaller and has broader forewings than *leonina*, it belongs most probably to a subspecies of *leonina*; we can, however, not give a name to it until we have more material. K. J.

Aganais Boisd.

Phalaena Noctua, Drury, *Illustr. Nat. Hist.* II. Index (1773).
Noctua, Fabricius, *Syst. Ent.* p. 595 (1775).
Phalaena Bombyx, Stoll, *Pap. Ex.* III. p. 173 (1782).
Damalis Hubner (*nec* Fabricius, 1805), *Verz. bek. Schm.* p. 172 (1822 ?) (*e.p.*).
Aganais Boisduval, *Voy. Astrolabe, Ent.* p. 248 (1832) (*e.p.; nomen nudum*) ; id., *Faune Ent. de Madagascar* p. 96 (1833) (*e.p.*) ; Hopff., *Monatsb. Königl. Akad. Wiss. Berlin* 1857. p. 422 ; id., Peter's *Reise Moz., Ins.* p. 432 (1862).
Hypsa group 8, *Lacides* Walker, *Lep. Het. B. M.* II. p. 456 (1854).
Hypsa, subgenus *Lacides*, Butler, *Tr. Ent. Soc. Lond.* 1875. p. 321.
Hypsa, subgenus *Aganais* (part), id., *l.c.* p. 322.
Hypsa, group B (*Aganais* Butler), Snellen, *Tijdschr. v. Ent.* XXXI. p. 125 (1888).
Lacides, Moore, *Lep. of Ceyl.* II. p. 53 (1883) : Kirby, *Cat. Lep. Het.* I. p. 385 (1891).
Pseudhypsa Kirby, *l.c.* p. 384 (1891).
Hypsa, Section II. (*Lacides*), Hampson, *Moths of India* I. p. 504 (1894).

The distinguishing characters of this genus lie especially in the structure of the antennae. Snellen, as well as Hampson, says of the antennae of the *male* only that the fasciculae are long ; the important differences between the *male* and *female* antennae of *Aganais* and those of *Asota* (= *Hypsa*) have not yet been noticed, though these differences are obvious under a weak lens. In *Aganais* Boisd. the joints of the antennae of either sex are cylindrical, as can be seen from a section through the antennae, and in the *male* each joint (except the apical ones) bears on each side a long processus of even breadth, which itself is furnished dorsally at the tip with a bristle. In *Asota* Hb. the antennae of either sex are compressed ; a transverse section of the *female* antennae has an ovate outline, with the lower end often acute, each joint being rounded at the upperside, and carinate, or nearly so, at the underside ; in the *male* of *Asota* Hb. the cariniform portion of the under surface is high, which can easily be noticed by looking at the antennae from the side ; as the edge of the carina is shorter than the respective joint, there is an interspace between the carinae of every two joints, which gives the antennae of the *male* in a side view the appearance of a broad-toothed saw. The cariniform portion of the joints is covered with fine hairs and bears a pair of bristles, while the dorsal portion is scaled and is furnished on each side with a longer bristle, varying in length and thickness according to sex and species. In *Aganais* ♂ the lateral processus originate from the ventral side of the joint and are hairy beneath ; the bristles at their extremities are homologous to the dorsal bristles in *Asota*. Further notes about the antennae of *Asota* and figures will be found under this genus.

Boisduval introduced the name of *Aganais* first in *Voyage de l'Astrolabe* 1832, but did not give a description of the genus ; the species which he describes there under *Aganais* are generically different from his two species described under *Aganais* in *Faune Ent. de Madagascar* p. 96. Boisduval applied the name nearly to all *Aganaidae* he knew ; Butler and Snellen restricted it to the species allied to *borbonica* Boisd. ; Kirby gives *caricae* Fabr. as type, and includes in it a great number of Indo-Australian forms. As *Aganais* of *Voyage de l'Astrolabe* is a *nomen nudum*, we dare not take it into consideration ; under *Aganais* of *Faune Entomologique de Madagascar* only two species are mentioned by name, *borbonica* and *insularis*, which are *male* and *female* of one species. Type of *Aganais* is, therefore, doubtless *borbonica* Boisd., and *Pseudhypsa* Kirby has to sink as a synonym. To *Aganais* Boisd. belong the following Hypsids of Kirby's *Catalogue*: *Pseudhypsa speciosa* (Drury), *subretracta*

(Wlk.), *aphidas* (Hopff.), *undulifera* (Wlk.), *borbonica* (Boisd.); *Lacides ficus* (Fabr.); *Aganais insularis* Boisd.

Pseudhyppa ambusta (Mab.) is an Agaristid (see p. 46).

As *Lacides ficus* (Fabr.) can by no means be kept generically separate from *Aganais borbonica* Boisd., *Lacides* must sink as a synonym.

Aganais insularis Boisd. has been treated by Herrich-Schäffer, *Samml. auss. Schm.* f. 118, and Saalmüller, *Lep. von Madagascar* p. 160, as the *female* of *borbonica* Boisd.; Butler, *l.c.* p. 323, Snellen, *l.c.* p. 132, and Kirby, *l.c.* p. 387, regard it as a close relative of *Asota egens* (Wlk.) and bring it accordingly into a different genus or section respectively. The structure of the antennae of *insularis* is the same as in *Aganais speciosa* ♀, *ficus* ♀, and the other forms mentioned above; *insularis* is therefore doubtless an *Aganais*. Further, as of *borbonica* only *males* and of *insularis* only *females* are known, and both insects inhabit the same districts, it is also beyond doubt that these two *Aganais* are really *male* and *female* of the same species.

Aganais aphidas (Hopff.) is the same as *subretracta* (Wlk.), as already mentioned by Butler, *l.c.*; Kirby gives it again as a distinct species.

Aganais speciosa (Drury) is a very variable species. Drury's figure is rather bad, especially in respect to the pattern of the forewings; his description is much better, and leaves no doubt that *speciosa* is that form of *Aganais* which has the hindwings pure white. Our series of forty specimens of African *Aganais* includes so many individuals which are intermediate between *speciosa*, *subretracta*, and *undulifera* that we cannot draw a parting line between these forms, and have accordingly to unite them to one species; the four forms are not restricted to certain districts, but occur all over tropical and South Africa, and are therefore mere individual aberrations. The hindwings are white, yellowish white, or orange; they are unicolorous or have a minute black point near anal angle, or a black anguliform mark instead of that point; the apex is with or without black border; this border is very narrow or broad, reaches to near anal angle or is shorter; the forewings are isabella-colour or are ochraceous like the hindwings, with the usual basal patch of a faintly deeper tint. K. J.

37. **Aganais speciosa** (Drury) ab. **unicolor** Rothsch. ab. nov.

This is the most conspicuous aberration, having the ground-colour of both wings ochraceous; the black spots at the base of the forewings as in *speciosa* (Drury). I have 1 ♂ from Natal and 1 ♀ from Namaqualand. The various forms of *speciosa* have to stand as follows:—

1. Hindwings pure white: *speciosa* (Drury).
2. ,, white or ochraceous, with black border: ab. *undulifera* (Wlk.).
3. ,, ochraceous, without black border: ab. *subretracta* (Wlk.).
4. Fore- and hindwings ochraceous: ab. *unicolor* Rothsch. W. R.

(To be continued.)

FURTHER NOTES ON MY REVISION OF THE *PAPILIOS* OF THE EASTERN HEMISPHERE, EXCLUSIVE OF AFRICA.

By THE HON. WALTER ROTHSCHILD.

DR. O. STAUDINGER has sent me a series of very interesting Indo-Australian Papilios, especially aberrant specimens, out of his rich collection, which enables me to publish the following additional notes to my Revision of the Eastern Papilios in Vol. II. of NOVITATES ZOOLOGICAE. I take the opportunity of thanking Dr. Staudinger very much, and hope that he will forgive me that the first note about the specimens is a correction of his "Berichtigung" in *Iris* VIII. p. 283 (1896).

18 (*c*). **Troides oblongomaculatus celebensis** (Wall.); Rothsch., *l.c.* p. 214.

Staudinger's "Berichtigung," *l.c.*, induces me to comment on my short note about *celebensis* in order to show to the reader what we really know of this form.

I divided *Troides oblongomaculatus* into four subspecies:—

1. *oblongomaculatus* (Goeze) from the Southern Moluccas;
2. *bouruensis* (Wall.) from Buru;
3. *celebensis* (Wall.) from S. Celebes and Saleyer;
4. *papuensis* (Wall.) from New Guinea.

The *male* of *celebensis* is characterised by Wallace, *Tr. Linn. Soc. Lond.* XXV. p. 39 (1865), as follows:—

"*c.* Local form *Celebensis*.—*Male:* wings a little more pointed than in *O. Helena*; yellow patch of lower wings extending nearer to the posterior margin, and bounded towards the abdominal margin by the first branch of the median nervure. Beneath, having the nervures between the discoidal cell and the outer border ashy-margined.

"*Female* not known.

"*Hab.* Macassar (Celebes) (*Wall.*)."

Wallace's example or examples are apparently lost, and, to our knowledge, there never came other specimens from Celebes, except a *female* from North Celebes (Minahassa) in Dr. Staudinger's collection. From the island of Saleyer, however, a good series of specimens of both sexes has been sent to Dr. Staudinger by his collector, and of these I have six before me. The Saleyer *males* have *all* the narrower black outer border, or, as Wallace's expression is, the "yellow patch extending nearer to the posterior margin," and are by this character at once distinguished from all Moluccan examples which stand at my disposal. Most of the Saleyer *males*, not all, have, moreover, the veins of the hindwings within the yellow area more or less obviously bordered with black, a character which is sometimes conspicuously

indicated also in Moluccan *oblongomaculatus*. In *Iris* IV. p. 74 (1891) these Saleyer specimens have been described as "var. *leda*" by Dr. Staudinger, who had at that time overlooked that there was already a *leda* Wall. and that the Celebes form had already received the name of *celebensis* in 1865, and the author gave as chief character of his new "var. *leda*" the thickly black veins of the hindwings, adding, however, that in one of his Saleyer *males* the veins are scarcely thicker black than in ordinary Moluccan individuals. In my Revision I treated that "var. *leda* Staudinger," as a synonym of *celebensis* Wall. for the following reasons:—

1. Wallace's description applies exactly to all those Saleyer specimens which have the veins to the hindwings not unusually broadly black.

2. Wallace's description gives the principal character by which *all* the Saleyer, and, according to Wallace, the South Celebes specimens (of course, as far as they have become known to science), are distinguishable from the Moluccan specimens; whereas

3. the characters by which Dr. Staudinger differentiates his "var. *leda*" are found only in the greater number of the individuals, *not* in all examples.

4. We know the Celebes form only from Wallace's description, and as this description gives the chief distinguishing character of the Saleyer specimens, there is no reason to regard the Saleyer specimens as subspecifically different, until material from Celebes proves this to be the case, though certainly the specimens with broadly black veins form an interesting aberration.

I objected to rename that aberration—the name of *leda* was preoccupied—since I consequently should have had to bestow names upon a great number of aberrations of other yellow *Troides*.

In *Iris* VIII. p. 283 (1896) Dr. Staudinger renames his "var. *leda*," and calls it *thestius*. I hope it will be clear enough, from the above explanation, that the black-veined *thestius* have to stand as aberrations of *celebensis* (Wall.), and not the reverse, as Dr. Staudinger puts it.

There are two collectors at present exploring Celebes, and it is to be hoped that they will succeed in procuring a series of specimens of *celebensis*.

The *female* from North Celebes (Minahassa) which Dr. Staudinger mentions, *Iris* VIII. p. 283, and which he has been kind enough to lend me for inspection, differs from the Saleyer *females* especially in the black upper- and underside of the forewings, the latter being below marked with a large white patch near hinder margin (before and behind submedian nervure), and bearing indistinct and rather small white patches near the nervules in the submarginal area; further, in the discal yellow spots being somewhat shorter and the postcellular spot somewhat larger than in Saleyer *females*, in the discal cone-shaped black markings being obviously longer and the submarginal yellow spots standing nearer the margin.

Perhaps this *female* belongs to a North Celebesian subspecies of *oblongomaculatus*.

Staudinger, *l.c.*, says, in respect to the names *oblongomaculatus* and *helena*: "Zum Schluss bemerke ich noch, dass, nach Rothschilds sehr gründlichen Untersuchungen, Helena Linné die später von Cramer als Pompeus beschriebene Art sein soll, . . ." If my explanation about this matter (Nov. Zool. II. p. 212) does not prove that *helena* L. *is* the same as *pompeus* Cram. (not "sein soll"), I am sorry to say that I cannot add a word to my explanation, as to dilate any longer upon the subject certainly would be a waste of words and time, and would not open those eyes which are kept closed.

107. **Papilio acheron** Smith; Rothsch., *l.c.* p. 331.

♀. In Dr. Staudinger's collection, from Kina Balu. Differs from the *male* especially in the larger ochreous area in the anal region of the underside of the hindwings; this area is extended to the margin and includes three marginal, two submarginal, and three subdiscal round black patches; behind subcostal nervule there is a small ochraceous submarginal spot.

121 (*h*). **Papilio canopus tenimberensis** Rothsch. subsp. nov.

A *male* specimen in Dr. Staudinger's collection differs from the other subspecies of *canopus* Westw. as follows :—

Of the size of large specimens of *canopus* Westw. Band to forewings as in certain examples of *hypsiclides* Rothsch.; the two first spots largest, the following two somewhat shorter, the other four nearly equal in size. The band on the hindwings nearly as in *P. hipponous* Feld.; spots 3 and 4 the longest, measuring 9 mm., the first spot larger than the last one; anal orange spot indistinct; no submarginal spots.

On the *underside* the band of the forewings is broader than above, especially spots 5 to 8; the hindwings have a complete series of sharply defined more or less orange-coloured submarginal spots, as in *canopus* Westw.

Tails long and strongly spatulate, much broader than in *hypsiclides* Rothsch. and *canopinus* Rothsch.

The form of the tail and the broad band of the hindwings are the principal characters of this subspecies.

Hab. Timorlaut (Holz *leg.*); 1 ♂ in coll. Staudinger.

125 (*g*). **Papilio polytes nicanor** Feld.; Rothsch., *l.c.* p. 354.

Dr. Staudinger sent me several *females* from Batjan which are of the pattern of the *male*, and prove that *nicanor* ♀ is not monomorphic, but dimorphic. The two forms of the *female* I propose to call :—

(g^1): ♀-f. *manzer* mihi.
Similar to the *male*.

(g^1): ♀-f. *typicus* mihi.
Equivalent to *P. polytes alphenor* ♀-f. *alphenor* Cram.

Types in my collection.

Of the first *female*-form Dr. Staudinger possesses a specimen in which the submarginal spots to the hindwings are enlarged and the discal spots reduced; the discal and submarginal spots are connected with one another by means of scattered buffish scales on the upperside; beneath, these buffish scales are so dense between veins 2 and 5 that there are longitudinal bands in the posterior cellules. The marginal spots of the forewings are enlarged in this specimen, chiefly those near hinder angle.

In a specimen of the second form of the *female* the submarginal red spots of the hindwings are confluent with the discal red markings, and form long and broad longitudinal streaks.

Both these varieties are homologous to that of *theseus* figured by De Haan in *Verh. Nat. Gesch. Ned. overz. bez.* t. 8. f. 3 (1840) from Borneo, which he named *melanides*.

129 (*a*). **Papilio castor** Westw.; Rothsch., *l.c.* p. 358.

The discal indistinct whitish buff patches on the forewings form sometimes a complete series, which extends from the costal to the hinder margin.

135A. **Papilio veiovis** Hew.; Rothsch., *l.c.* p. 503.

In a *female* of Dr. Staudinger's collection, from the Minahassa, the white colour is much more reduced than in my *female* from South Celebes. Are the North and South Celebes *veiovis* subspecifically different? *Males* from North Celebes are unknown to me.

139 (*a*). **Papilio paradoxus** (Zink.); Rothsch., *l.c.* p. 371.

♀. *Upperside:* forewings mummy-brown, marginal region paler; with a series of small submarginal whitish spots. Hindwings paler than forewings, with a series of hastate discal dirty white spots half-way between cell and outer margin, and with another series of lunate submarginal spots.

Underside paler than upperside; submarginal spots milky white; discal markings of hindwings less distinct.

One specimen in Dr. Staudinger's collection from Lawang, East Java (Holz *leg.*).

139 (*b*). **Papilio paradoxus niasicus** Rothsch., *l.c.* p. 372.

I recently received a second example of the *female* which agrees perfectly with that described in Vol. II. of Nov. Zool.

139 (*c*). **Papilio paradoxus telesicles** Feld.; Rothsch., *l.c.* p. 372.

Dr. Staudinger sent me a beautiful series of varieties of this *Papilio*, which proves that the variability of *telesicles* is still greater than I have shown in my Revision. The most obvious form among Staudinger's material is the following:—

♀-ab. *albostriatus* Rothsch. ab. nov. Wings above mummy-brown. Forewings with a feeble purplish gloss in marginal region; disc with long white streaks, which are joined to the submarginal spots; cell with a well-defined white spot in lower angle of apex, and some indistinct longitudinal whitish streaks. Hindwings with long and broad white discal streaks, which reach from cell to close to submarginal white lunules; cell with three white longitudinal lines, which are more or less merged together.

Underside with the white markings larger and less shaded with brown at the edges; submarginal spots milky white.

Hab. Labuan, N. Borneo (Waterstradt *leg.*); 1 ♀ in coll. Staudinger.

146 (*a*). **Papilio paris** L.; Rothsch., *l.c.* p. 385.

John Watson, Esq., sent me for inspection a *male* of *P. paris* L., which is in so far highly interesting as it has on the lower median nervule of the forewing a narrow hairy streak which is homologous to the hairy patches of *P. polyctor* Boisd. and *bianor* Cram. The occurrence of that peculiar *male* character in *paris* proves again what we have said in several places in the Revision, that this secondary sexual character cannot be made use of in characterising genera.

156 (*b*). **Papilio lorquinianus philippus** Wall.; Rothsch., *l.c.* p. 393.

♀. Differs from that sex of *lorquinianus* Feld. in the same way as the *male* does. Submarginal green streaks shorter than in *lorquinianus*; blue-green area more extended; submarginal spots to hindwings more green, and submarginal pale area of forewings beneath less triangular, being broader behind and narrower in front than in that race.

A specimen of this sex from Ceram is in Dr. Staudinger's collection.

170 (*c*). **Papilio antiphates decolor** Standing.; Rothsch., *l.c.* p. 413.

Amongst my unset Lepidoptera I found a number of *antiphates* collected by A. Everett in July, at the Limbang River, N.W. Borneo, which belong partly to the subspecies *decolor*, partly to *alcibiades*. The two Borneau examples alluded to in the Revision, and doubted by me to be correctly labelled, can therefore very well be from Borneo.

172. **Papilio ornatus** Rothsch., *l.c.* p. 414.

♀. Similar to the *male*; somewhat larger, and the black mark at inside of the orange one between lower median nervules on underside of hindwings much reduced.

A specimen of this sex from Halmaheira in Dr. Staudinger's collection.

173. **Papilio androcles** Boisd.; Rothsch., *l.c.* p. 416.

♀. Does not essentially differ from the *male*.

A specimen in Dr. Staudinger's collection from Minahassa, N. Celebes (Dr. Platen *leg.*).

174. **Papilio dorcus** De Haan; Rothsch., *l.c.* p. 417.

♀. Like the *male*.

Staudinger's specimen, from Minahassa, N. Celebes (Dr. Platen *leg.*), has a short black mark behind the costal margin within the white median band, as it is present in one of my *males*.

176. **Papilio stratiotes** Smith; Rothsch., *l.c.* p. 417.

♀. The same as the *male*.

A specimen from Kina Balu, N. Borneo, in my collection.

177 (*a*). **Papilio aristeus** Cram.; Rothsch., *l.c.* p. 418.

♀. A specimen from Batjan, in Dr. Staudinger's collection, is rather larger than my *males*; the white discal area is much more reduced, and the submarginal lunules of both wings are, above, very obscure.

180 (*a*). **Papilio rhesus** Boisd.; Rothsch., *l.c.* p. 425.

♀. Staudinger's specimen from Minahassa, N. Celebes (Dr. Platen *leg.*), has all the bands narrower than they are in my *males* from S. Celebes, and the submarginal spots of the forewings above are more shaded with brown scales.

198 (*g*). **Papilio agamemnon plisthenes** Feld.; Rothsch., *l.c.* p. 453.

Dr. Staudinger's specimens from Batjan belong to *guttatus*, not to *plisthenes*; my two "Batjan" *plisthenes* are, therefore, not from that island.

202 (*b*). **Papilio macareus indicus** Rothsch., *l.c.* p. 457.

I received a second *female* of this Indian subspecies from Upper Burma from H. Fruhstorfer, which is not so brown as that described in the Revision, but has the white streaks as large as they are in the *male*.

210. **Papilio leucadion** Stauding.; Rothsch., *l.c.* p. 461.

♀. The pale markings are larger than in the *male*; the oblique black line traversing the apex of the cell to the hindwings is very feeble.

A specimen from Batjan (Dr. Platen *leg.*) in Dr. Staudinger's collection.

PRELIMINARY DESCRIPTIONS OF SOME NEW BIRDS FROM THE MOUNTAINS OF SOUTHERN CELEBES.

By ERNST HARTERT.

IN a very fine collection made by Mr. Alfred Everett are some very interesting birds, which are new to science, and which are characterised in the following notes. The most interesting fact illustrated by Mr. Everett's collection is the affinity to the avifauna of the mountains of Borneo which some of the species show. Besides these new forms, the collection contains a number of the species described by Mr. J. Büttikofer in the *Notes of the Leyden Museum* 1893, such as *Merula celebensis*, *Stoparola meridionalis*, *Rhipidura teysmanni*, and *Pachycephala meridionalis*, and all those recently discovered by Messrs. Sarasin in the same country and described by Messrs. A. B. Meyer & L. W. Wiglesworth in the *Abhandl. und Berichte des Königl. Zoolog. und Anthropol. Ethnogr. Mus. Dresden*, i.e. *Zosterops anomala*, *Cryptolopha sarasinorum*, *Melilestes celebensis meridionalis*, and *Pachycephala bonthaina*.

A full list of the collection will be given in the next number of this journal.

1. **Androphilus everetti** sp. nov.

Supra rufo-brunneus, stria superciliari grisea, regione auriculari fusco-grisea, albido striata, gutture albido, pectore griseo, abdomine medio albicante-brunneo, corporis lateribus, regione anali, tibiis subcaudalibusque rufo-brunneis. Long. tot. cr. 140—150 mm., al. 55—59, cand. 56—59, tars. 23, culm. 16, digit. med. 23.

Hab. Bonthain Peak, South Celebes.

This bird, of which a series of both sexes was collected in October 1895, on Bonthain Peak and the hills surrounding it, at elevations of from about 2500 to above 6000 feet, is of great interest.

It agrees with *Androphilus accentor* Sharpe from Mt. Kina Balu in Borneo (the type of which is before me) in all essential characters, and especially in having *only ten rectrices*, a most important character first pointed out quite recently by Mr. Ogilvie Grant. In the shape of the wing it agrees also fairly well with *A. accentor*, the first primary being about three quarters of the second in length, the fourth, fifth, sixth, and seventh nearly equal and longest, the whole wing very full and rounded. The outer rectrices are about half as long as the central, and they gradually increase in length towards the middle. The rectrices are loose and soft, much as in *Sphenoeacus*. The sexes are similar in colour. The tarsus is clothed with large scales, which are very distinct at the lower end, but partly fused in the middle of the tarsus.

Above dark rufous brown, darker and less rufous on the head and neck. A fairly well defined grey superciliary line. Chin and throat greyish white; ear-coverts dark brownish grey, with white shaft-lines. Primaries deep brown, bordered with rufous brown outside. Breast dark greyish. Sides of body, under tail-coverts, thighs, and vent rufous brown. Under wing-coverts dark brown. "Iris chocolate brown. Bill black, base of mandible pale brown. Legs and claws olive-brown." (A. Everett.)

2. **Chlorocharis squamiceps** sp. nov.

Capitis superioris plumis nigro-brunneis, argenteo-griseo marginatis, medio anguste albo lineatis, notaeo reliquo fusco-viridi. Gulae plumis albidis, nigrescente marginatis. Abdomine flavo, corporis lateribus virescentibus, subcaudalibus flavis. Long. tot. cr. 120—125 mm., al. 63—65, caud. 47—50, culm. 15.

Hab. Bonthain Peak, Celebes.

A large series collected by Mr. Everett's men on Bonthain Peak in elevations of 6000 feet and above. This species agrees structurally very well with *Chlorocharis emiliae* Sharpe. This latter genus is one of the many genera of birds the characters of which were not fully described when introduced into science. Convenient as this method is to the describer, it is very inconvenient and makes working nearly impossible to those ornithologists who are not so fortunate as to have specimens of the new genus at their disposal.

"Genus simile generi '*Cyanoderma*' dicto, sed caudâ magis quadratâ nec rotundatâ." This is all the description (*Ibis* 1888, p. 392) of the genus, though the coloration of the species is carefully described and a good figure is given. I, however, with the type and a number of other specimens before me cannot at all agree that "*Chlorocharis*" has any relation whatever to *Cyanoderma*, a genus most closely allied and hardly generically separate from *Mixornis*. There is no resemblance in the wing-formula, no resemblance in the structure of the plumage, nor any in coloration, form of tail, etc. In fact the structure almost entirely agrees with that of the genus *Zosterops*. To this latter genus, in my opinion, *Chlorocharis* is closely allied, but not to any of the *Timeliidae*.

The present new species is dark green above, brightest on the rump, top of head blackish-brown, each feather with a distinct narrow whitish shaft-line and margined with silvery grey. Ear-coverts yellowish silvery white. Chin and throat whitish, the feathers of the latter with blackish margins. Chest dirty yellow. Abdomen yellow, sides of breast and abdomen olive-green. Under tail-coverts yellow. Primaries and rectrices blackish, outer webs edged with the colour of the rump, inner webs with brownish white. Under wing-coverts whitish. Bill black, feet brown. The sexes seem to be entirely alike.

3. **Cataponera turdoides** gen. et sp. nov.

Genus ex affinitate generum "*Garrulax*," "*Rhinocichla*," et "*Allocotops*" dictorum, sed cauda fere aequali distinguenda. Ala rotundata, remige primo dimidio secundi, sexto longissimo. Digitus medius paullum tarso brevior. Tarsus lamina perpetua vestitus, imo parte paucis tantum scutellis. Naribus oblongis, plumis usque ad nares attingentibus. Spatium postoculare calvum. Rictus et mentum setis ornatis. Typus est:—

Cataponera turdoides.

Colore supra olivaceo-brunneo, capite dilutiore. Stria supraocularis lata a rostri basi usque ad occiput vergens. Subtus brunneo-olivaceo, abdomine pallidiore, imo fere albescente, subcaudalibus brunnescentibus, pallidiore striatis. Rostro aurantiaco. Mento albido. Long. tot. cr. 250 mm., al. 113, caud. 105, culm. 24, tars. 35, dig. med. cum ungue 32.

Hab. Bonthain Peak.

Above dark olive-brown, more olive on the interscapulium, back, and rump, more brown on the wings and tail, and lighter on the head, especially on the forehead. Underside and sides of the head brownish olive, much paler on the abdomen and nearly whitish on the lowest abdomen. Chin very pale, almost whitish ; some feathers at the angle of the mouth and just below the chin with blackish tips. A broad black stripe running from the lores over the eye towards the nape. A triangular spot behind the eye bare. Under tail-coverts olive-brown with whitish shaft-stripes. Under wing-coverts greyish olive. Bill orange. Feet orange-yellow (in skin).

Several specimens from Bonthain Peak, 6000 feet and above.

Altogether of a much Thrush-like appearance. The tail is nearly square, the outer tail-feathers only about 9 mm. shorter than the central pair. The feathers of the forehead reach in two angles towards the nostrils, which are large, oblong, and but partly covered by a membrane. The gape *and the feathers of the chin* have short bristles.

The generic name is given in reference to the difficulty and hardships connected with the shooting of these birds in the great altitudes they inhabit.

4. **Siphia omissa** sp. nov.

The *Siphia* from Celebes has hitherto been considered the same as *Siphia banyumas* (Horsf.), but Messrs. A. B. Meyer & Wiglesworth have already noticed that a *female* they got from Messrs. Sarasin has "hell röthlichbraunen Zügelstreif."* This is indeed the most striking specific difference, *i.e.* that the adult *female* has the lores pale orange rufous and that this colour meets on the forehead, while the adult *female* of *S. banyumas* has two white spots on the lores, sometimes tinged with yellowish, which are widely separated from each other on the forehead. Besides this the ear-coverts are of a very deep blue, almost blackish, in *S. banyumas*, while they are brown with pale shafts and tinged with pale bluish posteriorly in *S. omissa*. The *males* of the two species are very much alike, but the upper part of the throat, just below the black chin, is not perceptibly paler than the rest of the throat in *S. omissa*, while there is a distinct though tiny white spot in *S. banyumas* and the whole throat is darker in *S. omissa*. Besides this the brighter blue colour of the forehead and line above the eye is much lighter and more distinct in *S. omissa*, where it may be said to be of a dark azure-blue. The upper surface too of the *female* is a little paler than in the *female* of *S. banyumas*, while there is very little difference in the colour of the upperside in the *males*. Of *S. omissa* I have before me a series of both sexes and young from the hills of Indrulaman, about 2500 feet high, just below Bonthain Peak (types), and a pair from the lake of Tondano, collected for Dr. A. B. Meyer in 1892. Wing : ♀ 72—73, ♂ 75—78 mm.

* *Abh. und Ber. Kön. Zool. und Anthrop. Mus. Dresden* No. 8. p. 9 (1895).

ON A NEW SPECIES OF *ATEUCHUS* (*ACTINOPHORUS*) FROM AUSTRALIA.

By JOHN W. SHIPP.

Actinophorus leei sp. nov.

BLACK, shining. Clypeus six-dentate, with the margin much reflexed and emarginate. Occipital carina raised and smooth; two transverse carinae cross the disc towards the centre, where they become obsolete, being much plainer near the eyes; disc slightly raised in the centre between the carinae. Head coarsely and irregularly punctured; near the margins the punctures have run together, and are elongated near the front margin of the clypeus. Posterior portion adjoining the thorax is very finely rugose. The margin of the clypeus is furnished with a number of porrect pitchy hairs. Maxillary palpi four-jointed.

Thorax rounded at sides; anterior margin sinuate, emarginate, and smooth, the lateral margins crenulate and fringed with porrect pitchy hairs; posterior margin slightly produced in centre, forming an almost obsolete scutellery projection, with a row of large punctures round the whole of the margin except the projection in the centre, and each puncture with a small porrect bristle standing in it.

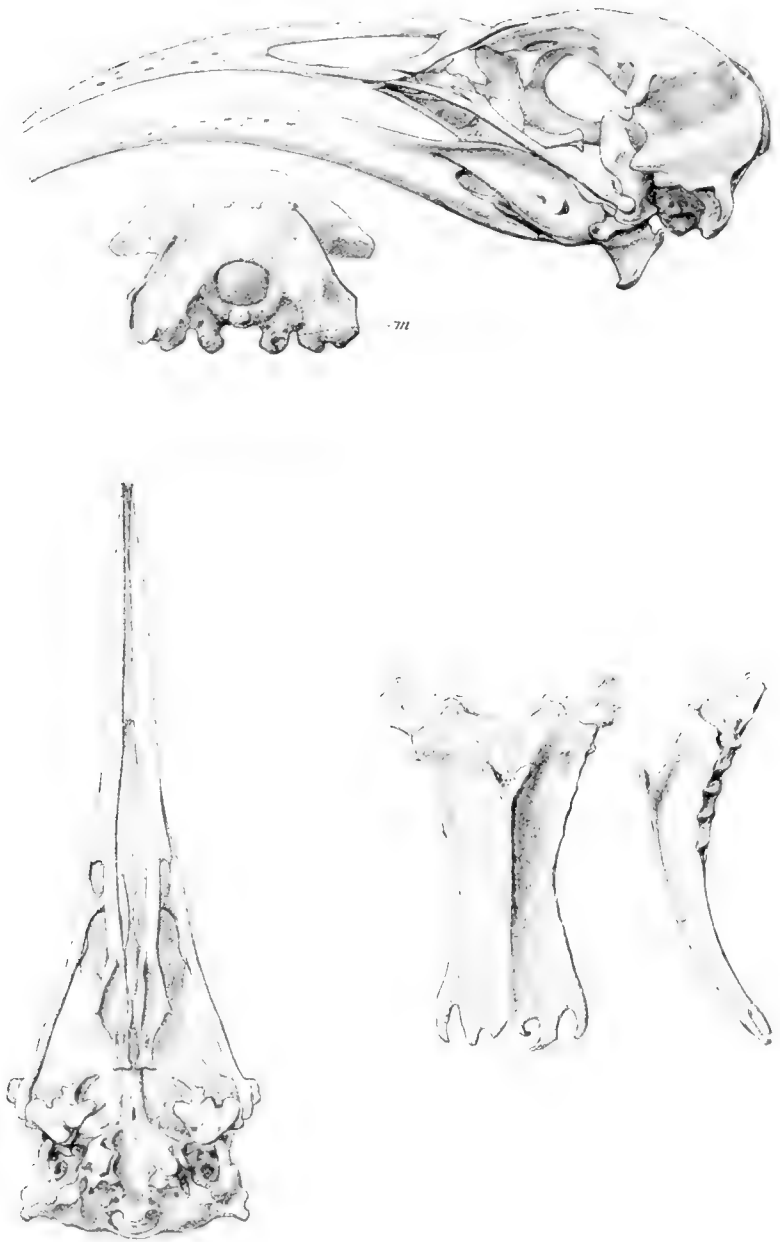
Thorax asperate, very sparingly punctured with fine punctures, and slightly pilose. A large cicatrix on each side near the lateral margins, with the discal side raised into a small obtuse point.

Elytra granulo-asperate and six-striate, the striae being formed of a series of elongated punctures, which are very plainly marked, the punctures being rather deep. Interstices sparingly punctured, but the punctures are very fine. Sutural ridges smooth and glabrous; the first interstice is transversely wrinkled on the disc and near the apex. Margins of elytra distinctly emarginate, the margins being smooth, but the fold between the two marginal carinae is very thickly and coarsely punctured. Pygidium very finely granulo-asperate, and emarginate. Legs hairy; anterior femora finely punctate; anterior tibiae four-dentate on outer margin, with the inner margin finely crenulate and a row of porrect hairs down the whole length of the disc. Intermediate and posterior femora sparingly punctured with large punctures, but quite glabrous on the underside near the apex. Hind tibiae and tarsi as in *Actinophorus* Creutz. Abdomen smooth; sternum with a few large punctures scattered round the edges, almost impunctate on the disc, an impressed longitudinal furrow on the disc, the keel being ridged in the centre. Sides of abdomen covered with long pitchy hairs.

Long. corp. 18 mm.

Hab. Swan River, West Australia (type in the Tring Museum).

This is the only *Ateuchus* coming from the Australian Region with which I am acquainted, and it certainly shows that the *Ateuchinae* have extended their range over a larger area than the majority of writers believed. Up to the present time this is, I believe, the only specimen of *Ateuchus* (s.g. *Actinophorus*) which has been obtained south of the Indian or Oriental limit, and most probably why New Guinea and Australia are so deficient in *Ateuchinae* is consequent upon the dearth of animal stercore.



DIAPHORAPTERYX HAWKINSI Forbes.

$\frac{1}{3}$ NAT. SIZE.

ON THE EXTINCT BIRDS OF THE CHATHAM ISLANDS.

Part I.—THE OSTEOLOGY OF *DIAPHORAPTERYX HAWKINSI*.

By C. W. ANDREWS, F.G.S.

(Plate III.)

In March 1892 Dr. H. O. Forbes announced, in a telegram to *Nature*,* that he had received from the Chatham Islands, a group lying about 500 miles east of New Zealand, a skull of a species of *Aphanapteryx*, for which he proposed the name *Aphanapteryx hawkinsi*. He subsequently† paid a personal visit to the islands, and succeeded in obtaining a large collection of bird remains, including the more important parts of the skeleton of *Aph. hawkinsi*, as well as of several other extinct forms. These he has since named and in part described in various journals. In a paper in the *Ibis* (1893, p. 254), following the advice of Prof. Newton, he referred *Aph. hawkinsi* to a new genus, *Diaphorapteryx*; but afterwards (*tom. cit.* p. 450), having himself examined the specimens on which Milne-Edwards founded *Aphanapteryx broecki*, he reverted to his original opinion and withdrew his new name.

During last summer, through the kindness of the Hon. Walter Rothschild, I had an opportunity of examining an immense collection of bird remains from the Chatham Islands, consisting of many thousands of bones, mostly in good condition, and including numerous skulls and other portions of the skeleton of *Diaphorapteryx*. In addition to the isolated bones, there are one or two more or less complete skeletons which are of great value for purposes of determination. The great bulk of the collection consists of remains of recent seabirds, such as Albatrosses, Cormorants, and Penguins; but, in addition to *Diaphorapteryx*, there are many other extinct forms, including some large species of *Fulica*, (?) *Cabalus dieffenbachii*, *Palaeocorax moriorum*, and there are also a few seal bones, some human metapodials and phalanges, remains of rats and mice and of fish, but I have not found any reptilian bones whatever.

Examination of so large a mass of material has rendered it possible, not only to obtain nearly complete skeletons of several of the extinct species, but also to form a fairly accurate idea of the degree of individual variation occurring in some of them. In the present paper I propose to consider the skeleton of *Diaphorapteryx hawkinsi* only, the other species being reserved for a future communication.

OSTEOLOGY OF *DIAPHORAPTERYX HAWKINSI* Forbes.

The skull.—Comparison of the skull with those of *Ocydromus* and *Cabalus* shows at once its great similarity to them. The most noticeable differences are—(1) the greater proportionate length of the beak; (2) the larger and more clearly defined temporal fossae; (3) the more strongly developed paroccipital, mammillary, postorbital, and other bony processes. The last two characters are clearly correlated with the increased size and weight of the skull and mandible, which render necessary larger

* Vol. XLV. 1892, p. 416. † *Nature*, Vol. XLV. 1892, p. 580.

and more powerful muscles, and consequently more strongly marked surfaces and processes for their attachment.

The *foramen magnum* is oval, with its long axis vertical; it is slightly flattened below and constricted in the middle by a pair of small processes which arise just within its margin and project forwards and inwards. It resembles that of *Aptornis*, but differs from those of *Ocydromus*, *Cabalus*, *Hypotaenidia*, and *Erythromachus*, which are as wide or wider than high, and have a nearly straight lower border. The occipital surface above the foramen slopes more forwards than in the smaller Ocydromine rails, apparently owing to the relatively smaller size of the cerebellum. In this respect there is more resemblance with *Aptornis*. From the upper edge of the foramen a rounded occipital ridge, most strongly developed in the larger skulls, runs up to the lambdoidal crest. This latter is strongly developed; in its middle portion it runs transversely in a straight line, and does not dip down towards the *foramen magnum*, as in *Aptornis*. Laterally it is confluent with the temporal ridge and forms the hinder border of the temporal fossae; its lower portion constitutes the outer border of the immense paroccipital processes. These project considerably below the occipital condyle, and are much larger than in any other rail I have examined, though *Aptornis* approaches them in this respect. Their ventral border is divided by a semicircular incision into a larger outer and a smaller inner lobe. In *Aptornis* there is no trace of this arrangement; but in *Ocydromus* and *Cabalus* the small paroccipital processes are distinctly bifid.

The cranial roof as far as the middle of the orbits is convex; but anteriorly the frontals are depressed in the middle line, the depression being deepest just behind their junction with the premaxillae. Among the smaller rails this character is best developed in *Ocydromus* and *Cabalus dieffenbachii*, a nearly complete skeleton of which is in the collection. The interorbital region of the frontals is much shorter and broader in *Diaphorapteryx* than in the smaller Ocydromines; in *Porphyrio*, on the other hand, it is considerably wider; while in *Aptornis*, owing to the extension backwards of the nasals and premaxillae, it is practically wanting.

The temporal fossae are very large and deep; they extend well up into the roof of the skull, and are there separated by a space about equal to the width of the frontals between the orbits, but varying somewhat in different individuals. Posteriorly the temporal ridge is confluent with the lambdoidal crest, as above mentioned; anteriorly in runs on to the outer surface of the postorbital process, enclosing a sort of lobe of the main fossa. In the smaller Ocydromines this anterior lobe is usually a separate muscle impression, marked off from the temporal fossa by a more or less clearly defined ridge.

As in *Ocydromus*, *Cabalus*, and *Hypotaenidia*, the upper border of the orbit is thick and truncate as far back as the postorbital process; in *Erythromachus* it is rounded. The postorbital processes are very large, but do not extend downwards to join the zygomatic processes of the squamosals, as in *Aptornis*; in *Erythromachus* these processes are extremely small. The posterior wall of the orbit bears a very deep and clearly defined depression for the lachrymal gland, similar to that seen in *Ocydromus* and *Cabalus*, but much more strongly developed.

The interorbital vacuity is of much the same form as in *Ocydromus*: just above its anterior margin is the aperture of the tube in which runs the olfactory nerve; in the smaller rails the channel for this nerve remains completely open.

The posterior portion of the basitemporal platform is not prominent and inflated as in the smaller forms, but is slightly concave from side to side, and lies about

on a level with the lower edge of the occipital condyle, from which it is separated by a very slightly marked precondylar fossa. At the sides it is raised into the very large and prominent mammillary processes (*m.*) to which Mr. Forbes has drawn attention: they extend below the paroccipital processes, and are separated from them by a deep cleft at the bottom of which the *vagus foramen* opens. In the smaller rails the mammillary processes are very slightly developed; in *Aptornis* they are carried far below the level of the occipital condyle, owing to the peculiar arrangement of the precondylar region, which is directed downwards nearly at right angles to the long axis of the skull. The anterior portion of the basitemporal platform is somewhat inflated, and is united laterally with the prominent pretemporal wing.

The rostrum resembles that of *Ocydromus*. At its base, immediately in front of the eustachian opening, there is a small longitudinal cleft, apparently the remnant of the pituitary space.

The form of the tympanic cavity is very similar to that of *Cabalus* or *Ocydromus*, differing only in the deepening of its posterior wall consequent upon the increased size of the paroccipital process. The pretemporal wing above mentioned forms a large rounded prominence, internal to the articular surface for the inner head of the quadrate.

The ethmoidal region also closely resembles that of *Ocydromus*, but the antorbital plate is somewhat less developed. In all the skulls I have examined the lachrymal has been lost.

The beak is very long and decurved, but both the length and curvature are subject to considerable individual variation. The relation of the premaxillae and nasals to one another and to the frontals is the same as in *Ocydromus*. The narial opening, though large, is less in proportion to the size of the skull than in the smaller Ocydromines; and the increased length of the beak in the fossil is entirely due to the elongation of the premaxillae in front of the nostril, this prenarial portion being rather more than half the total length of these bones measured along the facial process. In this elongation of the beak *Cabalus sylvestris*, among living Ocydromine rails, approaches the fossil most nearly. The palatal surface of the united premaxillae is channeled by a deep longitudinal groove, narrowing somewhat from behind forwards.

The maxillo-palatine plates and the palatines are very Ocydromine, but the scroll-like portion of the latter bones is more decurved and inrolled at the edges. Mr. Forbes has pointed out that the posterior ends of the palatines do not meet in the middle line beneath the rostrum, but this may be merely due to the loss of the pterygoids allowing them to spring apart in the dry skull. The vomer, which is very rarely preserved (it is present in a specimen in the Natural History Museum), is relatively shorter than in *Ocydromus*, and does not appear to have anchylosed with the palatines.

The quadrate has the articular surface for the mandible similar to that of *Ocydromus* or *Cabalus sylvestris*, but its orbital process is proportionately larger.

The mandible much resembles those of *Aphanapteryx* and *Erythromachus*, but there are some well-marked differences. Anteriorly it is much more sharply decurved (in this respect, however, as in *Erythromachus*, there is considerable variation), and the symphysial portion seems to be wider and much less compressed than in *Aphanapteryx*.

The articular region is proportionately larger and more massive than in that genus; the outer articular surface projects beyond the ramus, and the inner is broader and apparently more continuous with the outer. The posterior border of the

angular process is more nearly vertical, and it projects to a less degree posteriorly and more ventrally than that of the Mauritian bird. The points of difference from *Erythromachus* are much the same.

As already mentioned, there is considerable individual variation in size, both in the skull and other portions of the skeleton of this species. Indeed Mr. Forbes has suggested that there may really be several distinct species. But examination of more than twenty skulls and a very large series of limb-bones shows that there is, in fact, only one, the interval between the largest and the smallest individuals being completely bridged over by many intermediate varieties. The table appended will give some idea of the variations in the size of skull and mandible :—

Skull.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
Length from tip of beak to middle of occipital condyle	144	144	142	141	135	135	135	134*	134	130	129	124	122	120
Width between the ends of the postorbital processes	47	46	47	48	48	...	47	46	49	47	44	43	41	42
Greatest width between the outer edges of paroccipital processes	43	...	44	45	42	42	40	42	43	40	39	37	38	40*
Least width of frontals between orbits	20	17	19	20	19	17	18	19	19	17	17	17	16	17
Width of temporal fossae in a horizontal line from tips of postorbital processes	23	25	26	23	25	25	24	22	22	22	28	20	22	22
Length of cranio-facial axis	60	58*	60	57	58*	51*	60*	58	...	...	55	50*	52	...
Length of roof of cranium	50	51	55	52	53	49	51	51	53	50	48	45	44	...
Greatest length of premaxillae	100	90	99	96	94	99	95	92	92	95	89	86	88	85
Length of nasal aperture	35	35	36	34	32	37	32	33	33	33	30	30	32	32
Length of beak in front of nasal aperture	52	43	52	50	49	48	49	46	47	48	48	45	45	45
Least distance between the upper ends of the temporal fossae	17	18	18	15	15	15	17	18	20	19	14	17	18	17*
Width of articular surface of quadrate	13	...	14	13	14	12	12	14	...	...	13	12	...	...

Mandible.	1	2	3	4	5	6	7	8	9	10
Length of mandible	127	126	125	124	120*	119	118	110	110	108
Greatest height of mandibular ramus	16	15	17	16	15	15	13	13	13	14
Length of symphysis	43	41	40	40	38	45	38	40*	38	34
Greatest width of symphysis	8	9	8	9	10	8	8	8	8	8

Numbers marked with an asterisk are only approximate.
The skulls in columns 3 and 8, and mandibles in 3 and 4, are in the British Museum.

These considerable individual differences in the size of the skull and mandible are accompanied by equal differences in the dimensions of the other portions of the skeleton, measurements of some of which will be given below.

Most flightless birds appear to be subject to this great variability; for instance, it is well marked in *Didus*, *Pezophaps*,* *Erythromachus*, and among the *Dinornithidæ*, although in the last case its extent is apt to be underestimated, owing to the practice of giving distinct names to forms differing slightly in size only. Its cause must be

* See A. and E. Newton, "On the Osteology of the Solitaire" (*Phil. Trans.* Vol. CLIX. 1869, p. 356), where the probable cause of this variation is discussed.

sought in the changed conditions under which such birds exist. In the first instance the absence of enemies on the insular areas inhabited by them leads to the loss of the power of flight through the reduction of the wing by disuse, or by the natural selection of the less strongly flying individuals; by this profound change of habit the organism is thrown out of equilibrium with its environment, and variations, eliminated under ordinary circumstances, survive. The reason why these variations tend towards an increase of bulk may be that the expenditure of energy is much less. It must, however, be pointed out that very great differences of size also occur among ordinary birds within the limits of a species. In an important paper* published in 1871, J. A. Allen has shown that individual variation in the size of the body to the extent of from fifteen to twenty per cent. often occurs in many species of North American Passeres, while in particular measurements the range may be much greater. In different skulls of *Diaphorapteryx* the beaks are commonly dissimilar, not only in size but also in form (degree of curvature, etc.), but since in the above-quoted paper somewhat similar differences are shown to occur in such species as *Mniotilta varia* and *Quiscalus versicolor*, there can be no excuse for establishing new species on the strength of such variations.

Vertebrae.—No complete vertebral column has been found, the most perfect series only consisting of sixteen vertebrae, and of these some may not belong to the same individual as the rest; there is, therefore, some doubt as to the precise number in the various regions of the column, but, partly from examination of a large series of odd vertebrae, and partly from comparison with *Ocydromus*, I conclude that there were 13-14 true cervicals and 2 cervico-dorsals. Of the number of dorsals it is impossible to be certain; none were anchylosed with one another.

The *atlas* is very similar to that of *Ocydromus*, but the neural arch is proportionately much broader and the hypapophysis is larger.

The *axis* has a much larger and more massive neural spine than that of *Ocydromus*, and the hypapophysis, instead of forming a sharp keel-like outgrowth, is expanded at its hinder end into a ⊥-shaped structure. In the next vertebra (3rd) the median bar of the ⊥ is much reduced, and the two lateral processes come off from the hinder portion of the centrum almost independently, being only united by a transverse ridge which represents the remnant of the median hypapophysis. In the next vertebra (4th) the paired hypapophyses rise quite separately from the hinder end of the centrum, and project nearly vertically downwards, enclosing a channel for the carotid (?), just as the catapophyses on the 7th, 8th, and 9th cervicals do. In all the smaller rails the hypapophysis on the anterior cervicals is simple; in *Aptornis* on the 2nd, 3rd, and 4th it is ⊥-shaped, but in no case are there two distinct hypapophyses, as in the present species.

On the fourth cervical there is a well-developed interzygapophysial bar enclosing a large interzygapophysial foramen. This does not occur in any of the other vertebrae.

On the fifth the catapophyses appear, and in the succeeding five or six vertebrae they gradually increase in size, and approach one another till they nearly completely enclose a carotid canal. In the last vertebra in which they occur they are reduced in size and rise from a common base, and in the following vertebra they are replaced by a median forwardly projecting hypapophysis similar to that seen in *Ocydromus*. In the succeeding vertebrae this process is gradually reduced in size. In the last cervical, the two (?) cervico-dorsals, and first one or two dorsals, in addition to the

* *Bull. Mus. Comp. Zoology*, Harvard, Vol. II. p. 186.

hypapophysis, there is a pair of ventral processes standing immediately below the parapophyses. The centra of the posterior cervicals and anterior dorsals are perforated by pneumatic foramina.

In the cervical region behind the fourth vertebra the neural spines are almost obsolete, but in the (?) last cervical there is a short and broad one, and in the succeeding cervico-dorsals and dorsals they form large nearly rectangular plates closely similar to those of *Ocydromus*. The exact number of dorsals is uncertain—none of them anchylosed with one another, but the last is fused to the lumbo-sacral series. These latter will be referred to in the description of the pelvis.

The ribs, of which six pairs are united with the sternum, are very broad and solid at their upper ends; in all cases the uncinate processes are lost, having apparently been but loosely connected with the hinder border of the rib.

In its general structure the *sternum* very closely resembles that of *Erythromachus*, *Ocydromus*, and *Cabalus*, but the keel is much more reduced than in any of these, and seen from the side is similar to that of *Aphanapteryx broecki*, lately figured by Newton & Gadow.* In the larger specimens the apex of the keel is bifurcate, as in *Ocydromus*, but in the smaller individuals only a trace of this structure is visible; in *Cabalus sylvestris*, *C. dieffenbachii*, *Erythromachus*, and *Aphanapteryx* the apex of the crista is simple. The coracoid grooves are widely separated from one another, and their lower lips are not connected by any ridge: in *Ocydromus*, *Cabalus dieffenbachii*, and *Aphanapteryx* there is always a more or less distinct ridge between them; *Cabalus sylvestris* approaches the fossil most nearly in this respect. The antero-lateral processes are very large, and the tubercles for the attachment of the sterno-coracoid ligaments are prominent, much more so than in *Aphanapteryx*. In some specimens the concavity of the upper surface of the sternum is much deeper than in others. There are facets for the attachment of six pairs of sternal ribs.

Comparative Dimensions (in Millimetres) of the Sterna in several Flightless Rails (Measurements of two Specimens of that of Diaphorapteryx are given) and of Hypotaenidia celebensis, Rallus aquaticus, and Tribonyx mortieri.

	Diaphorapteryx.		Erythromachus.	Ocydromus.	Cabalus sylvestris.	♂ Cabalus dieffenbachii.	Hypotaenidia celebensis.	Rallus aquaticus.	Tribonyx mortieri.
Width between end of antero-lateral processes	† 45	42	26	29	23	22	20 approx.	16 approx.	41
Width between inner ends of coracoid grooves	11	11	3	6	5	5	2 approx.	2	4
Width between anterior rib articulations	35	32	21	22	20	19	16 approx.	14 approx.	37
Width at narrowest part	17	17	10	11	11	...	10	6	22
Greatest length (from top of antero-lateral processes to end of external xiphoid processes)	68	68	...	50	48	47	47	40	72
Length in median line	58	55	46	40	38	36	47	38	62
Height of keel (measured from inner surface to highest point)	6	5	8	7	8	10	12	13	11 ap.

* "On Additional Bones of the Dodo and other Extinct Birds of Mauritius," *Trans. Zool. Soc.* Vol. XIII. (1893), Pl. XXXV. Figs. 14–16.

† This is the specimen figured.

The posterior region is unlike that of any other ralline sternum I have examined, and is subject to considerable individual variation. Instead of the short median and deep lateral notches, bounded externally by long slender lateral processes which project far beyond the median ones, there are here a median and two pairs of shallow lateral notches, bordered by three pairs of short processes. Both the notches and the processes are very irregular and inconstant in form; in some specimens the external notch is converted into a fenestra, and the inner pair of processes are almost obsolete.

The *coracoid* is very similar to that of *Ocydromus*, but is relatively shorter, and is thicker in proportion to its length; it also has a much smaller, indeed almost rudimentary procoracoid process, while the acrocoracoid is larger and more swollen; its lower extremity is wider, and it has a fairly prominent lateral (hyosternal) process. There is a supra-coracoid (subclavicular) foramen, below which the inner border is sharp and somewhat irregular; the inner angle is produced into a sharp angular process. The posterior surface of the bone is hollowed by an extensive sterno-coracoid impression.

The dimensions of the coracoids associated with the figured sternum are:—

Length, 40 mm.; greatest breadth, 16 mm.; least ditto, 5 mm.

Expressed, according to Fürbringer's method, in terms of the average length of a dorsal vertebra (11 mm.), its length is roughly 3·5, its breadth 1·5.

The *scapula* differs only from that of *Ocydromus* in being somewhat less curved in having a somewhat more expanded distal end and a more massive articular end, with a smaller acromium process. Its length, in the same individual as that to which the coracoids above described belong, is 65 mm., its greatest breadth (at the articular end) 12 mm.; or, expressed in terms of the length of a dorsal vertebra, 6 and 1 nearly.

As already mentioned, the scapula and coracoid above described belong to the same individual, and the most interesting point about them is that, when they are placed in their natural position relatively to one another as nearly as their articular surfaces allow one to judge, they make an angle of nearly 130° with one another, a much larger one than occurs in any other carinate bird except perhaps *Aptornis*. In most *Carinatae* the angle is less than a right angle, but in *Ocydromus* and *Didus* rather greater. The coraco-scapular angle of *Hesperornis* is about the same as in *Diaphorapteryx*. Much importance has been attached to the form of this angle, since in all the *Ratitae* it is very obtuse (from 130—160 degrees), while in the flying birds it is, as already stated, less than a right angle; but in such forms as *Diaphorapteryx*, *Ocydromus*, and *Didus*, in which the power of flight has been lost, the accompanying increase in this angle appears to be merely the mechanical result of the reduction in length of the coracoid or of the increase in the size of the thorax, or of both. It is possible that, owing to the difficulty of determining the precise position of the bones with regard to one another, the size of the angle may be found to be somewhat overestimated; but I do not think this is the case to any serious extent.

The *humerus* has the characteristic twisted appearance of that of the Ocydromine rails. It is about equal in length to that of *Aphanapteryx broecki*, recently figured by Newton & Gadow,* but it is considerably stouter and has more massive articular ends; the shaft is also less curved, and the median tubercle is larger. A blunt ectepicondylar process projects beyond the border of the bone. In

* *Loc. cit.*, Pl. XXXV. Figs. 17, 18.

an *Oeydromus* in which the bone is about the same length as in the fossil, the shaft is much more slender; and in *Cabalus sylvestris* and *C. dieffenbachii*, in which, however, the bone is much smaller, its proportions differ from the fossil in the same way.

The ulna is similar in structure to that of *Oeydromus*, but is considerably shorter and thicker; there is a deep depression for the *brachialis anticus*, and the points of insertion of the secondaries are well marked.

The radius is also shorter and thicker than in *Oeydromus*.

The *metacarpus* is extremely short and stout, and the proximal end is disproportionately large. The second metacarpal is very much thicker than the third, which is laterally compressed. The first metacarpal is less prominent than in *Oeydromus* and *Cabalus*, and forms a rectangular prominence. At the post-axial end of the pulleylike surface for the carpals there is, on the outer side, a very large deep pit into which the outer end of the "cuneiform" fits when the manus is flexed upon the forearm.

THE LENGTH IN MILLIMETRES OF THE PRINCIPAL BONES OF THE WING.

	Diphorapteryx.	Aphanapteryx.	Erythromachus.	Oeydromus.		Cabalus sylvestris.	C. dieffenbachii.	Hypotaenidia celebensis.	Tribonyx hortoni.
				a.	*b.*				
Humerus	57–68	60–66	45–50	47	53	52	45	47	66
Ulna	44	...	37–42	36	37·5	42	...	42	49
Radius	40	...	37	32	32·8	38	31	40	45
Metacarpus . . .	27	...	24 (?)	24	28 approx.	28	22	29	37

In a skeleton of *Diphorapteryx* in which all the wing-bones probably belonged to one individual the respective lengths of humerus, ulna, radius, and metacarpus are 65, 44, 40, 27 mm.

Except that it is considerably broader in proportion to its length, the *pelvis* is very like that of *Oeydromus*. The obturator notch is, however, more rounded, and the ischiadic foramen somewhat different in form. The supra-acetabular crest of the ilium is more strongly developed than in *Oeydromus*, *Erythromachus*, and *Cabalus*, but behind the acetabulum the ridge is smaller than in those birds, and is not produced outwards into a pointed process overhanging the surface for the ischio-femoral muscle. In the preacetabular region the lower borders of the ilia are less concave than in *Oeydromus*; the upper borders unite above the neural spines to form a crest strongly convex from before backwards. In some specimens the ilio-neural canals remain open posteriorly; in others they close. As in *Oeydromus* and *Cabalus sylvestris*, the upper surface of the sacrum behind the iliac crest is somewhat depressed and concave from side to side; there is a number of irregularly placed interosseous foramina. The pectineal processes are very small.

The first of the fused vertebrae which constitute the "sacrum" has its neural spine almost completely overlapped by the ilia; it bears capitular and tubercular facets for articulation with a free rib, and really belongs to the thoracic region. The succeeding five vertebrae (lumbar) are united with the ilia by their transverse processes, which increase in size from before backwards; in *Erythromachus* and

Cabalus dieffenbachii there are only four such vertebrae, but *Ocydromus* resembles the fossil in this respect. Behind the interacetabular fossae come three vertebrae with long slender processes; in the smaller rails there are usually only two. Behind these again there are two vertebrae with short stout transverse processes abutting against the inflected border of the ilium. There are in all fourteen vertebrae in the "sacrum." As in other rails, the posterior renal fossae form large pocket-like recesses, partly floored by an inflected portion of the ilia.

The dimensions (in millimetres) of six specimens of the pelvis were :—

	1	2	3	4	5	6
Extreme length of ilium	106	103	101	100	96	92
Width between antitrochanters	49	50	48	47	46	44
Least preacetabular width	21	22	21	21	21	19
Length of sacrum	86	88	80	77	77	75

In the *femur* the curvature characteristic of the rails is well marked. The only points in which it differs from that of *Ocydromus* are—(1) it is somewhat stouter in proportion to its length; (2) at the lower end of the *linea aspera* there is a short cristiform ridge, running obliquely to the median angle of the inner condyle, and forming the inner border of the comparatively shallow popliteal fossa (this crest is also wanting in *Aphanapteryx* and *Erythromachus*, but is well developed in *Fulica*); (3) the surface for the fibula does not form a groove, but is a mere shelf. The points of attachment of the sling for the tendon of the *biceps cruris* are well marked, as are all the muscle impressions.

The femora of *Aphanapteryx* and *Erythromachus* also closely resemble the fossil, but judging from the figure, the former appears rather straighter. In *Aptornis* the femur is proportionately considerably stouter, is nearly straight, and has a deep popliteal fossa.

The length of this bone ranges from about 90 to 106 mm., the largest specimen thus being roughly 18 per cent. larger than the smallest. The average size of thirty-three specimens was 97·4 mm.; in a specimen of that size the width of the distal end is 23 mm., of the proximal end 22 mm., and of the middle of the shaft 8·5 mm.

The *tibio-tarsus* is extremely like that of *Aphanapteryx broecki*, and consequently, as Milne-Edwards has shown in his valuable paper on that bird, it is very similar to the tibia of *Ocydromus*. The shaft, however, appears to be somewhat straighter, and the extremities, particularly the lower, more massive; the upper articular surface is proportionately wider from side to side, and the outer and inner glenoid facets are separated behind by a wider notch. As in *Aphanapteryx*, there is a deep fossa between the inner glenoid facet and the base of the anterior cnemial crest; this latter rises above the articular surface to a somewhat greater degree than in the Mauritian bird.

The channel for the tendon of the *peroneus profundus* is only slightly marked, the retinaculum remaining unossified in all the specimens I have seen. The fibular crest is prominent, and the lower end of the fibula reached down to about the junction of the middle and lower thirds of the bone. The length of this bone varies from 122 to 140 mm., the longest specimen measured being about 15 per cent. longer than the shortest. The average length of twenty-eight specimens was 130 mm. In

a specimen 135 mm. long the width of the proximal articular surface is 21, of the distal end 19, and of the middle of the shaft 8.

The *fibula* is greatly expanded at its upper extremity; opposite the lower end of its union with the fibular crest is a large rough surface for the insertion of the *biceps cruris*. Its lower portion is styliform, and extended to about the commencement of the lower third of the tibia. The fibula associated with the tibia of which the measurements have just been given is 80 mm. long, and its upper end is 13 mm. wide.

It is in the *tarso-metatarsus* that the differences between *Diaphorapteryx* and *Aphanapteryx* are most emphasised, that of the former being short and stout, that of the latter comparatively long and slender; it has, however, been suggested by Forbes that the tibia and metatarsus described by Milne-Edwards may not belong to the same species.

As in most rails, the inner glenoid surface is higher than the outer, and there is a prominent intercondylar tubercle; the whole proximal articular surface is considerably more extended transversely than in *Aphanapteryx* and *Ocydromus*. The talon forms apparently a much more prominent mass than in *Aphanapteryx*, but the specimen figured by Milne-Edwards is said to be somewhat broken. In the arrangement of the crests it is very closely similar to *Ocydromus* in most specimens; but in some the inner crest is much produced backwards and curves somewhat outward towards the main ridge, while the intermediate one is almost absent. The peculiar hypotarsus of *Aptornis*, which consists of two high crests meeting posteriorly and enclosing a large canal, may have originated in this way. On the anterior surface of the bone the two interosseous foramina open at different levels, the inner being the higher; in many specimens this inner interosseous channel has no aperture on the posterior surface of the bone. On the inner side of the inner foramen there is a well-marked channel for the tendon of the *extensor communis digitorum*. The inner rugosity for insertion of the *tibialis anticus* is considerably the larger; in some specimens the two are completely confluent.

The shaft of the bone is much flattened from before backwards; there is a very large surface for the attachment of the hallux. There is a large foramen for the adductor of the outer digit. The distal trochleae are very large and set wider apart than in the smaller rails, and even than in *Ocydromus*, in this respect resembling *Aphanapteryx*; the inner trochlea is greatly reflected backwards.

The whole bone diverges from the normal ralline form in its short stout shaft and its expanded extremities; in these respects it approaches the metatarsus of *Aptornis*, which has been still further modified in the same direction, and differs from our fossil in the form of its talon, in the fact that its glenoidal cavities are nearly at the same level, in possessing a still broader and more flattened shaft, and in the arrangement of the distal trochleae. Owen regarded it as modified for "rasorial" purposes, and perhaps *Diaphorapteryx* had to a less extent adopted similar habits.

The length of this bone ranges from 63 to 78 mm. in length, the longest being about 24 per cent. longer than the shortest. The average size of fifty-five specimens was 69 mm. In a specimen 70 mm. long the width of the proximal end is 20 mm. and of the distal 21 mm.; the antero-posterior diameter of the middle of the shaft 6 mm., that from side to side 10 mm.

In the following table the relative lengths of the femur and metatarsus compared with the tibia in various birds is given, the latter being taken as 100 in all cases:—

	Femur.	Metatarsus.
Diaphorapteryx hawkinsi	74	54
Aptornis defossor	71	41
Tribonyx mortieri	65	63
Aphanapteryx broecki	65 (?)	67
Erythromachus leguati	62	59
Ocydromus fuscus	70	56
Cabalus sylvestris	72	58
Hypotaenidia celebensis	80	64
Fulica atra	60	57
Rallus aquaticus	64	62

A comparison of the relative proportions of the fore and hind limbs in *Diaphorapteryx* and other birds may be of some interest, and the following table shows this approximately, the length of the leg being taken as 100 :—

	Wing.
Diaphorapteryx hawkinsi	44 approx.
Ocydromus fuscus	46·5
Tribonyx mortieri	48
Erythromachus leguati	52 approx.
(?) *Cabalus dieffenbachii*	52
Cabalus sylvestris	58
Hypotaenidia celebensis	59·5
Rallus aquaticus	64
Fulica atra	82

In making this calculation the length of the wing is taken as the sum of the lengths of the *humerus*, *radius*, and *metacarpus*, because in the fossils the phalanges are wanting; since, however, these latter are greatly affected in the reduction of the wing, their omission tends to make difference between the wings of the flightless and flying forms appear somewhat less than it really is. The length of the leg is, of course, taken as the sum of the lengths of the *femur*, *tibia*, and *metatarsus*.

From the foregoing description it will be seen that *Diaphorapteryx* is merely an Ocydromine rail, in which the reduction of the wings has advanced somewhat farther than in the living forms, and has been accompanied by a lengthening of the beak and a considerable increase in bulk. Milne-Edwards* has shown that *Aphanapteryx* is likewise an Ocydromine rail which has undergone a similar series of modifications, and its similarity to *Diaphorapteryx* is so remarkably great that Forbes was justified in his hesitation in according the Chatham Island bird generic rank; but the inferences he draws from the similarity of the two forms do not appear well founded. He considers† that their occurrence in Mauritius and the Chatham Islands is strong evidence that these were formerly connected with the great Antarctic Continent, for the existence of which a large body of evidence has been brought forward by various writers. It is true that the geological structure of the Chatham Islands tends to show that they form part of a continental area, since they are largely formed of sedimentary deposits consisting of clay-slates, limestones,‡ and various fossiliferous tertiary deposits, which, according to Hutton, § probably range from the

* "Sur les Affinités Zoologiques de l'Aphanapteryx," *Ann. Sci. Nat.* (5 series), Vol. X. (1868), p. 325.

† "The Chatham Islands: Their Relation to a former Southern Continent," *Supplementary Papers of the Royal Geographical Society*, Vol. III., Pt. 4 (1893), p. 607 (with map).

‡ Von Haast, "On the Rock-Specimens collected by H. H. Travers, Esq., in the Chatham Islands," *Trans. N. Z. Instit.* Vol. I. (1869), p. 180 (with map).

§ *Catal. Tert. Moll. and Ech. N. Z. in Coll. Colonial Museum*, Introduction, p. viii. Wellington, 1873.

Upper Eocene to the Upper Miocene; but, on the other hand, there is nothing in their present fauna to show that since their last emergence they have been connected with any land area whatever. On the contrary, it seems clear that since that period they have never been united even with New Zealand, for not a trace of any of the *Dinornithidae*, *Apteryx*, *Cnemiornis*, *Aptornis*, or any of the flightless birds characteristic of those islands have been found in them. Moreover, as Mr. Forbes himself has pointed out, no fragment of the skeleton of *Diaphorapteryx* is recorded from New Zealand. This complete difference in the flightless birds of the two areas does not seem to be outweighed by the occurrence of *Hatteria*, remains of which Mr. Forbes states he has found on Wharekauri, the main island; indeed, since in the whole of the immense collection of bones at the Tring Museum no reptilian remains occur, it seems possible that this determination may be due to a mistake. Dr. Gadow* has, I think, given the true explanation of the likeness of *Diaphorapteryx* and *Aphanapteryx* to one another, namely, that it is the result of parallelism of evolution, or, in other words, similar conditions acting on similar organisms have produced like results. The ancestors in the two cases, generalised rails capable of flight, were probably of different genera, or, at least, species. In the case of *Diaphorapteryx* this ancestor was most likely some widely spread form, such as *Hypotaenidia philippinensis* is at the present day, individuals of which from time to time reached New Zealand, Lord Howe Island, and the Chatham Islands, the channels between which may formerly have been narrower than at present. The modified descendants of these birds are now referred to the genera *Diaphorapteryx*, *Cabalus*, and *Ocydromus*, the most highly modified forms being the outcome of earlier, the less altered of later colonisations. In any case there can be little doubt that these rails became flightless in the islands they now inhabit, and cannot therefore be regarded as evidence of the former extension of land; in other words, they are of no value in determining former geographical conditions, since they are themselves the outcome of the present one.

* Bronn's *Thierreich*, *Aves*, Vol. IV. (Systematischer Theil.), p. 101.

NOVITATES ZOOLOGICAE.

Vol. III. JUNE, 1896. No. 2.

FURTHER NOTES ON GIGANTIC LAND TORTOISES.

By THE HON. WALTER ROTHSCHILD.

HAVING lately become possessed of the very fine collections made by Dr. Georg Baur on the Galapagos Islands, some interesting facts have come to light in connection with the tortoises collected on that expedition. The total number recorded by Dr. Baur consists of twenty-one specimens, of which three specimens from South Albemarle and four from Duncan Island have passed into my possession. In an article in the *American Naturalist* for December 1889 Dr. Baur publishes an elaborate and most valuable supplement to Dr. Günther's famous work on the Gigantic Land Tortoises, living and extinct, which was published in 1877. In this article, among other notes, Dr. Baur gives a synopsis of all the species then known to inhabit the Galapagos group. In this synopsis he, to my mind, proves that *elephantopus* Harl. is the *vicina* of Günther, that *elephantopus* Jackson (*nec* Harl.) was new, and that *elephantopus* Günth. (*nec* Harl.) was also without a name. To the two latter he gives the names of *Testudo galapagoensis* and *T. güntheri* respectively. He therefore recognises six species of tortoises from the Galapagos Islands. Dr. Baur, however, from certain records, tries to prove that Dr. Günther's *Testudo ephippium* is identical with *T. abingdonii* of the same author. This he goes to prove on circumstantial evidence only, for he entirely ignores the fact, partially stated in the description, that *T. ephippium* has the thickest carapace of all this group, while *Testudo abingdonii* has a carapace almost as thin as paper in most parts. Under these circumstances I think we are justified in accepting seven distinct species as being known to have inhabited the Galapagos Islands, as follows:—

Testudo abingdonii Günth., Abingdon Island.
T. ephippium Günth.
T. elephantopus Harl., South Albemarle.
T. microphyes Günth., North Albemarle.
T. nigrita D. & B.
T. galapagoensis Baur, Charles Island.
T. güntheri Baur, James Island.

As there are, however, many more islands on which, as we know from records as late as 1835, there were tortoises, we can, I think, fairly assume that the Galapagos Islands held at the time of their discovery at least fifteen species of tortoises.

Before proceeding to the discussion of Dr. Baur's specimens, I think it will be of interest to give a translation of that portion of the narrative of Dr. Baur's expedition, in the *Beilage der Münchener Allgemeinen Zeitung*, Nos. 26–29, 1892, which deals with the capture of the tortoises.

"Albemarle is the largest of the Galapagos Islands, and at the same time was the least well known; till my visit only *four* species of birds had been recorded. Therefore one of my principal tasks was to more closely explore this island, and we accordingly stayed on the island about three weeks.

"During this stay we succeeded in observing no less than *forty* species of birds. Here also we encountered the first Giant Land Tortoises, about which I will now proceed to speak. I only wish to remark that Albemarle Island reminds one in flora very closely of Indefatigable Island, and its fauna also strongly resembles that of the latter island. Already on the second day after our arrival I made a tour with Silva on to the mountainous highlands in order to become acquainted with the Land Tortoises. All along the shore they are no longer to be found, having long ago been exterminated by whalers and the gatherers of orchilla moss; but, according to the assertions of our men, they are still to be met with in the difficult and very inaccessible parts of the interior.

"On the morning of July 15th we set out shortly after sunrise. The road first passes along the shore across meadow-land, and then through mangrove thickets by the side of a lagune. Farther on we go up the mountain by a road which Silva had cleared a little the day before, but still through thick underwood which arches over above our heads, producing an agreeable shade and coolness. We wander along thus, perhaps for half an hour, uphill. The road consists of crumbled lava. We continually pass large manzanilla trees, which give delightful shade and always present nice green resting-places. More and more birds appear. But soon we come to wide lava fields, on which only thorny cacti and acacias grow, which greet an incautious approach most unkindly. Then followed a stretch of the thickest scrub, through which we had to cut our way with the hatchet. Now we came to a lava bed covered with loose slag, which had to be traversed, and it took an hour and a half to do so, each step having to be carefully weighed, for the slag is loose and shaky, and a fall among these jagged masses is far from pleasant. Even where there is more vegetation it is most unpleasant, for in addition to slipping on the loose slag, you are liable to catch your feet in the thorny creepers. It was already 9 o'clock, and yet we had not espied any tortoises. But now the grass gets thicker, and the ground better and pleasanter to walk on. Suddenly we come upon a footpath about 12 inches wide, and Silva halts with the words, 'A *galápago* has passed here.' We look closely around, and soon espy the first living Galapagos tortoise. The carapace measured about 16 inches in length. We tied it by the legs to a shady tree, and our journey proceeded, now fortunately through nice underwood well turfed with grass and with but few scattered blocks of lava. Up to 11 o'clock we had found eight specimens, the largest measuring 26 inches in length of carapace. This was all very fine, but now came the reverse of the medal, how to get them down to the shore. Of course it was out of the question to take more than two, one per man. We each bound a tortoise on to our backs with a rope, and the return began. At first all went well, but on the slag field there was a hard struggle. If walking before was difficult, it was ten times more so with the creature on one's back, because every minute it jammed its thick feet against one's back in its endeavours to escape. Several times I fell down bodily, tortoise and all, among the slag; but onwards we went over sticks and stones, though but slowly. We had taken no provisions with us, neither to eat nor to drink. The heat got greater, and our thirst more acute. At last it was past 3.30 p.m. when Silva said he knew of a place near by where there was some water. The nearness of the place seemed far to me, but at last we arrived, after much fighting of our way through

scrub and sharp-edged slag, at a shady group of manzanilla trees. Silva hunted about, and really at last found a small puddle, in which lay a lot of leaves and twigs. That was his water! We filled my panama hat, and the dirty water was drunk with gusto in spite of its foul taste. Yes, even after thirst was quenched, we drank again, for at all events it was cool and refreshing. Last year I drank in Kansas, and also in Wyoming, some water which, under ordinary circumstances, nobody would have touched, but that was the *purest* spring water compared to this. However, after our drink we were refreshed, and about 6 o'clock we reached our camp, after an absence of twelve hours.

"On the following day I again went with Silva and the captain, whom I begged to accompany us, to the place where we had tied up the rest of the tortoises. Two further specimens were carried off. The captain and I carried the bigger one between us on a pole, and it was the cause of a regular tumbling and stumbling match amongst the slag when we got back. The captain was half dead; he had smashed off some lava blocks with his knee, as he said, and when he seized hold of a tree to prevent himself tumbling he found, to his pain and horror, that he had hold of a prickly cactus stem. He swore that never in his life would he again go on such an expedition. He did indeed look badly smashed up; of clothes he only had rags hanging about him, and his boots were cut to pieces. This was on July 16th. On the following day Adams, Silva, our two sailors, and the black set out to bring in the tortoises we had tied up two days before; in the evening they returned, each with a tortoise on his back. Thus we certainly had a considerable number of tortoises in camp, but they were not the *giant tortoises*, which, according to Silva's account, existed in the interior.

"On July 18th, therefore, five of us set out to go farther inland, and, if possible, to get one of these giants. Our party consisted of Adams, Silva, a sailor, our blacky, and myself. We proceeded by the old route, as before. We halted under the manzanilla trees and took in water; then we proceeded on our march through the scrub, Silva cutting the track with his axe, while the rest followed in single file. Thus we forced our way onwards, and had, up to half-past four, encountered perhaps a dozen tortoises. Scattered about in the bushes there were the remains of many large tortoises. I took away two perfect skulls and a humerus of 29 centimetres = 11·5 inches. When darkness fell we halted, and one of the tortoises we had found was eaten; the liver roasted over the wood fire was delicious, but, alas! our meal was not moistened, for our small supply of water had to be reserved for the next day, when we wanted to push farther into the interior in search of the *giants*. We dragged together a quantity of grass, and lay down to sleep, but the mosquitos never left us in peace. As soon as day broke we started again. About 9 o'clock we passed out of the region of Opuntias and Palo-Santos, and reached the middle zone, the more wooded region. Here we noticed the same trees as on Chatham Island, but in addition a large tree with *ash-like* foliage and small white flowers in bunches, called *Savoncillo*. The ground is covered with high grass. On the trees, and in many places also on the ground, was a large orchid, but, as on Chatham, flowerless. Giant creepers climbed all over the trees, as well as a convolvulus with enormous white flowers. Up till 11 o'clock we had met again more than a dozen tortoises, but not one that reached our ideal point of size. We encamped now, and killed a tortoise to eat. Unfortunately our water was nearly used up. We only had enough for a cup of tea all round. If we had known if we could find water we would have proceeded, but it was probable that none existed in the immediate surroundings. Nothing remained

but to turn back, and meanwhile it was nearly 1 o'clock, and in the most wretched of spirits we began the return journey. Two days of suffering through thirst, bad roads, legs badly lacerated, all for nothing. We wandered on thus under the burning sun, no one uttering a sound, for about an hour, when suddenly Silva halted and shouted, 'Here is a large *galápago*!' and really there was a huge one wandering along. It must have weighed two hundredweight, and its carapace measured 39 inches in length. We could not dream of bringing this giant alive into camp, and so it was necessary to kill the beast. We suffered most awfully from thirst, and I at once started to try the water in the sack above the heart, about which I had read so much. It was most refreshing, and only tasted somewhat like white of egg; we found over five cups full, and each of us who wanted got his share. We ate the liver, which was bigger than that of a calf, and all the remaining meat which was eatable was put into a sack and carried with us. The cutting up took over an hour. It was half-past two, and if we walked smartly we could still reach the group of manzanilla trees, in order to camp there. Silva took the carapace on his back, and off we started.

"It was a long tramp, but about 6.30 p.m. we erected our camp under the trees, it having already got dark. Early next morning we struck camp, and arrived about 7 a.m. in the harbour.

"But Silva declared that farther west there were much bigger tortoises, so if such exist we must get them.

"Already the following morning, July 20th, I set out with Silva and a sailor towards the supposed locality. For four and a half hours we proceeded along the beach to the westward, at first across wide sandbanks which afford an excellent place for the study of the various birds' footprints, but farther on across steep rocks and sharp lava. On the projecting water-surrounded and rugged banks of lava numerous marine iguanas, often 4 feet long, were sunning themselves, but drew back into the clefts at our approach.

"Suddenly the road ceased, for the mangroves grew right down to and into the water; in consequence we had to cut our way through with axe and knife. About midday we arrived at a straw-built hut, which had formerly been built by Cobos' people when they caught tortoises to make oil. I strolled round the hut, and discovered about two dozen shells of small tortoises. In some of these I still found the skulls attached, and so I was able to make a good collection. At 2 o'clock we left the hut, and, after a hard struggle against the thick scrub and broken lava, encamped on top of the height. From time to time we came across large tortoise shells, under which I generally found a family of small geckos and big black ants.

"On the following day, shortly before 6 o'clock, we again set out, and after a long march, as usual cut step by step with the axe, we halted at 12 o'clock. On the way I caught a lot of land-shells, which sat on the long grass. Vegetation here was most verdant and prolific. We saw on the way several tortoises, among them one measuring quite 39 inches over the carapace, but we were after larger ones. Continually we encountered wide paths through the grass evidently made by large animals, but none were fresh-made. At last we came across a puddle, which was in a hollow in the lava. After a good meal of tortoise soup and roast tortoise liver, we laid aside all superfluous baggage, and set about the search in earnest. At the end of twenty minutes we found an old female whose shell just spanned 39 inches, and I was about cutting her up, when I heard the others, who had continued the hunt, calling. I hurried up to them, and beheld a gigantic monster, such as I had never before seen. The carapace measured in length 56 inches, 60 inches across, and about 25 inches

high. It was, of course, utterly impossible to carry off this creature, which weighed at least 400 lbs. [perhaps nearer 800 lbs.—W. R.] alive; it was even a question if we could take it when cleaned and prepared. The skull of this specimen measures in length 7·12 inches, while the largest in the British Museum, collected by Captain Cookson and said to have belonged to the largest remaining tortoise, is only 5·52 inches long. After a tiring job of three hours, the preparation of this huge specimen was finished, and, on darkness supervening, we returned to the puddle, where we pitched our camp.

"The following morning, while my fellows again started on a hunt, I finished the preparation of the first tortoise of the day before. The fellows came back about 11 o'clock. They had found and tied up another tortoise, about 39 inches long. We now had to think about starting on our return, for I had agreed with Adams to meet him the next day at the old hut. We felled a slender tree, whose stem was passed through the shell of the giant, and my two men proceeded to take this load on their backs. Our progress was extremely slow, and every fifteen minutes we had to halt and rest. The road also which we had cut was often too narrow, and had to be widened. At 6 o'clock we stayed our march, as it had begun to rain. The next day although it had rained all night, we set out afresh. I went ahead, in order to meet Adams at the prearranged time. At 12 o'clock I arrived at the old hut, wet to the skin. At 1 o'clock my men put in an appearance, but without the big tortoise; it had been too heavy for them, and they had left it behind on the roadside. Shortly after Adams, with the blacky, appeared, having come from the east. In the course of the afternoon the men went up the hill again, and brought down the giant shell. As the road along the beach to our headquarters was only available at low tide, I remained with the rest for the night in the hut. On the morning of July 25th I set out to our principal camp, while Adams and the three men again went up the hill to fetch in the remainder of the tortoises. I arrived at 2 o'clock at our anchorage. On the 27th I sent the two sailors to the hut with some fresh provisions, as I judged that by now Adams and his men must have got back. On the 28th Adams came back into camp with the two sailors. He had found two more larger-sized tortoises, and all were now being brought down to the hut by the three men he had left behind. Therefore, almost five hours' journey from our anchorage, there were lying five large tortoises, which had to be brought in. Landing at that place was out of the question, on account of the fierce surf and the rocks. Nothing remained, therefore, but to bring them along the troublesome road by the beach. On the evening of July 29th our men appeared with two of the tortoises, and on the 30th we sent all five men, for this time even the cook had to assist, to bring the three remaining ones, which were lying to the west of the hut, down to the ship. On the evening of July 31st they returned, after almost overpowering exertions. Full ten days had it cost us to collect five of the large tortoises.

"At daybreak on Sunday, August 2nd, we left Albemarle, where we had been since July 12th. We passed the Grossman Islands, sailing on to Duncan Island, which was our next place of destination. While south of Duncan Island we got a capital view of the large island of Albemarle. The whole island consists of five huge volcanoes, and Narborough is a similar sixth giant.

"We anchored at Duncan Island at 2 o'clock, and we stayed till the evening of August 4th. We were fortunate enough to discover on this island a new species of tortoise, of which, after hard work, we got down eight specimens. The tortoises of Duncan Island are totally different in shape to those of South Albemarle, and are

similar in shape to those of Abingdon Island. Besides having their carapace shaped like a Spanish saddle, they have a much longer neck than the Albemarle species."

Now as to the seven specimens in my collection :—

Of the South Albemarle tortoise, there are, as before mentioned, three. One is the large one described above; it is 56 inches in length over the carapace, and 49½ inches in a straight line, and is the largest Giant Land Tortoise in any museum, being half an inch longer than the large *Testudo elephantina* in the British Museum. The second is about 39 or 40 inches long, and the third one is quite small. All these three animals belong to the species *Testudo elephantopus* Harlan = *T. vicina* Günth., and thus prove that Dr. Günther was right when he said that the type of his *T. vicina*, though unlabelled, most likely came from South Albemarle.

Of the four Duncan Island specimens I cannot say much. Two of them are now in the British Museum, and two I have retained at Tring. I am not yet certain whether they are a new species or not, but they are undergoing a thorough comparison by Dr. Günther, and I hope to publish the result in the next number of this journal. They, however, certainly belong to the same section as *T. ephippium* Günth. and *T. abingdonii* Günth., which among the Aldabra tortoises is represented by *Testudo daudinii* Dum. & Bib. and among the Mascarene tortoises by *T. vosmoeri* Dum. & Bib.

I think it may also be of interest to give an account here of the recent capture of some wild tortoises on Aldabra, for all those received lately have been specimens from the Seychelles, where they have been acclimatised. The *Zoologische Garten*, which appears at Frankfort, publishes the following about Dr. Voeltzkow's journey :—

"Dr. A. Voeltzkow, who went to Madagascar for embryological studies, and has now, after almost seven years' absence, returned to Europe, always kept before him as a special task the procuring of some of those Giant Tortoises which are now only to be found in a wild state on the Aldabra Islands, about 250 miles north of Madagascar. Through him the Senkenberg Natural History Society received, two years ago, the two large specimens at present in the Frankfort Zoological Gardens. On a recent stay of a month on Aldabra, Dr. Voeltzkow succeeded, after almost daily excursions, in capturing seven more specimens. The capture of these creatures, however, is associated with many dangers. As there is no direct communication with Aldabra, a small schooner of fifty tons had to be hired, and during the stay had to be strongly fastened to the beach with cables. Aldabra is much larger than usually believed. It is an oval *atoll*, cut through in three places, whose greatest length is about twenty miles (English).

"But what forms the chief hindrance in the search for these tortoises is the impenetrability of the island. The soil consists entirely of razor-sharp waterworn corals with their points uppermost, while the whole is covered with such thick masses of low scrub that the way has first to be cut with an axe before each expedition, so that an extended search over a large area is quite out of the question. To land on the outside is most dangerous on account of the heavy surf, while landing from the inside of the *atoll* is much hindered by the dense thickets of mangrove-trees.

"As drinking water (and that very bad) is only found in one place, rain-water has to be collected from the natural hollows and carried along in tanks. Thousands of mosquitos prevent one remaining over-night in those places which the tortoises frequent. Then at last, when one has discovered one of these creatures—which, in

consideration of the thick scrub and the only slight movements of these animals, which pass the heat of the day hidden away in the bushes, is always a stroke of luck—the real hard work begins, viz. the conveyance of the beast. Because they are very obstinate and will not walk of their own accord, each has to be carried tied to a ladder-like structure, and upside-down, often for hours, by four men over the sharp corals and through the dense bush, and the bearers inevitably reach the lagune with their clothes torn to rags and their feet all bleeding. Of these seven tortoises six reached Europe alive. The two smallest are in Frankfort, and the four others are in Hamburg." The latter will shortly be deposited in the Zoological Gardens in London.

NEW LEPIDOPTERA.

By THE HON. WALTER ROTHSCHILD.

1. **Troides haliphron pistor** Rothsch. subsp. nov.

♂. Very similar to *T. haliphron pallens* (Oberth.), but differs in the abdomen being less edged with yellow beneath, and in the first discal yellow mark on the hindwing being usually smaller.

♀. Most specimens as pale as *pallens*, some darker; differs chiefly in the abdomen being less edged with yellow underneath, in the discal area of the hindwing being below more yellow, often as yellow as above, in the yellow spot in cell being less extended, reaching only as far as origin of subcostal nervule, in the first discal yellow mark being larger, and in the whitish mark behind the cell being less extended down towards base.

Hab. Kalao I. and Djampea I., between Celebes and Flores; a considerable series of both sexes (A. Everett, December 1895).

I shall give in one of the future numbers of this journal a more detailed account of the species of *Papilioninae* obtained by Mr. A. Everett on his recent expeditions.

2. **Papilio adamantius insulicola** Rothsch. subsp. nov.

♂. Differs from *P. adamantius* Feld. in the outer margin of the forewing being less concave, the wing shorter, the green scaling in the apical region much more restricted in the direction of the nervules, remaining 3 mm. short of the origin of the fourth subcostal vein, and in the blue basal area of both wings being more extended.

The outer edge of the blue region on the forewing crosses the median nervure close to the origin of the second median branch; at the submedian nervure the blue area is extended close to the inner edge of the large cottony scent-organ.

On the hindwing the blue scaling reaches as far as the tip of the cell, occupying also the base of the cellule between veins 3 and 4 for a length of about 6 mm.

There are three cottony stripes on the forewing, situate upon the two lower median branches and upon the submedian fold respectively; they are very large and merged together to one patch, which extends a little beyond the submedian vein.

On the underside the brownish black area is more extended, especially beyond the apex of the cell, than in *adamantius* Feld.

Hab. Saleyer, south of Celebes; 1 ♂ (A. Everett, November 1895).

This form is very interesting, as it comes in the extent of the blue area on the wings nearer to the forms of *P. peranthus* F. than it does to *adamantius*; it is most readily distinguished, however, from *P. peranthus* and *P. peranthus intermedius* Snell. by the absence of submarginal markings from the upperside of the hindwings.

3. **Papilio antiphates kalaoensis** Rothsch. subsp. nov.

♂. The black bands on upperside of forewing narrow, more so than in *P. antiphates alcibiades* F.; the marginal band 3½ to 4 mm. wide at the fourth subcostal vein, reaching a little beyond lower median nervule; subapical black band terminating midway between lower and middle median veins, not joined behind to the marginal band; the fourth cellular band reduced to a spot 2 or 3 mm. in length, the other cellular bands stopping at median vein.

On the hindwings the first marginal black spot (before subcostal vein) is absent or only represented by a few black scales; between veins 4 and 5 (before tail) there are, besides the black marginal lunule, no black scales or only a few, and there is in that cellule no submarginal black spot.

On the underside the first marginal black spot to the hindwings is present, but is minute; the anterior lunule of the discal macular band, situate between costal and subcostal nervure, is thinner than in *alcibiades* F., and all the geminate black spots of the submarginal row are minute.

Hab. Kalao I., between Celebes and Flores; 3 ♂ (A. Everett *leg.*, November 1895).

4. **Papilio eurypilus insularius** Rothsch. subsp. nov.

♂ ♀. Comes nearest to *P. eurypilus sallastius* Staud. from Sambawa; however is generally larger. The two posterior spots of the discal row are not separate from one another, and are longer, the last spot having a length of 6 to 8 mm., while the spot before it is usually 1 mm. shorter; the submarginal spots are somewhat smaller than in *sallastius*. The median band of the hindwings is considerably broader than in *sallastius*, being from 6 to 9 mm. wide within cell. Below, there is, as in *sallastius*, a white spot within apex of cell of hindwing, situate at the second and third discocellular veinlets, not separate from these veins, as in *eurypilus asion* Feld. and other subspecies of *eurypilus*. This cellular spot includes sometimes some red scales, but in most specimens it is all white. The submarginal spots of the hindwings scarcely smaller than in *sallastius*, and the two elongate marks near the second submarginal spot are as in that form.

Hab. Kalao I., between Celebes and Flores; a series of both-sexes (A. Everett *leg.*, November 1895).

5. **Morphotenaris nivescens** sp. nov.

This, the second species of the genus *Morphotenaris* Fruhst., is easily distinguished from *M. schönbergi* Fruhst. by the entire absence of the broad brown band on the forewing, and the much narrower brownish black border to the hindwing; in fact this border is so narrow that it is almost restricted to the fringe.

Hab. Eafa District, 5000 feet, British New Guinea; 2 ♀♀ (Anthony, October 1895).

In the two specimens before me the ocelli on the hindwing are four in number, small and partly obliterated, but, as in all the species of *Tenaris* and the allied genera the ocelli vary to an almost indefinite extent in both size and number individually, this cannot be taken as a specific character. I think that it is quite possible that, when the fauna of the high mountains of New Guinea has in future become better known, we shall find connecting links between *M. schönbergi* and *M. nivescens*, but at present I know of no such links, and I therefore am bound to treat *M. nivescens* as a distinct species. The two *females* I have are quite as large as the largest *female* of *M. schönbergi* I have seen.

6. **Canerkes natunensis** Rothsch. sp. nov.

♀. Differs from *C. euschemoides* Moore and *javanicus* Rothsch., Nov. Zool. III. p. 56 (1896), in the ground-colour of the forewing above being clove-brown, with a faint bluish green tint in side light and without metallic gloss, in the base of the wing having two separate yellow spots, in the dark violet area of the hindwings being more extended, and in the crown of the head being metallic green-blue without yellow colour.

The spots on the forewing are smaller than in *javanicus* Rothsch.; the median band does, as in that insect, reach from costal margin to vein 1^a, is well separated from the basal yellow spots, and is incised at the veins. The white spot between veins 2 and 3 is wanting, while it is present in the two allied species.

On the hindwing the violet area reaches 3 mm. down the apex of cell; the yellow spot at anterior angle of cell stands 2 mm. away from the yellow basal area; the yellow streak before vein 1^b is separated into a discal streak and a marginal spot; there is no yellow marginal spot before vein 3, and the spot before and that behind vein 2 are small.

The colour of the underside agrees with that of *euschemoides*, but the costal region of hindwings near apex of cell is bright metallic blue. There is no black basal patch in cell.

Hab. Bunguran, Natuna Islands; 1 ♀ (Hose *leg.*, July to October 1894).

7. **Spilobotys leonina lifuensis** Rothsch. subsp. nov.

Agape subsp. nov.? Rothschild, Nov. Zool. III. p. 60 (1896) (Lifu I.).

Of this insect I recently received another specimen, which agrees with that mentioned under *Agape* on p. 60 of this volume, and now no longer hesitate to describe it as a subspecies of *leonina* (Butl.).

As said on p. 60, this form differs from *leonina* especially in its smaller size, the total absence of thoracic spots, and in the two last abdominal segments* having a bluish black patch on the upperside; the patch on the preanal segment is twice as large as that on the anal one.

Hab. Lifu I., Loyalty Is.; 2 ♂♂.

The specimen of *Spilobotys* from the Solomon Islands (Alu) referred to on p. 60 belongs to *Spilobotys arctioides* Butler, *Ann. Mag. N. H.* (5). XX. p. 123 (1887)

* Seventh and eighth segments, not eighth and ninth, as is said on p. 60.

(Guadalcanar). *Spilobotys* Butl., *l.c.*, has the priority over *Agape* Snell. ; *Agape* Feld. is a *nomen nudum*, and can consequently not be employed.

Snellen, *Tijdschr. v. Ent.* XXXI. p. 117 (1888), records *Spilobotys chloropyga* (Wlk.) from Sumatra. I now have a ♀ from Nias and another from Mont Mulu, North Borneo (Hose *leg.*, August and September 1894), which do not seem to me to differ from typical *chloropyga*.

8. **Phalaenoides vitticollis** Rothsch. sp. nov.

♂. *Upperside:* both wings black. Forewing with some metallic blue scales in basal half before costal nervure, a lunate mark beyond middle of cell and some short indistinct rays upon veins 4 to 7 also metallic blue ; a creamy white band extends from the costal to the submedian vein, situate just outside the apex of cell; this band is broadest at vein 2, having here a breadth (measured along that vein) of 6 mm., while at the subcostal vein it measures a little more than 3 mm. ; upon the subcostal vein between base and band stands a small creamy white spot, and close to the band there are upon that vein some creamy white scales.

Hindwings with fringe and small marginal spots white; spot behind vein 2 largest, ill defined ; no marginal spots between costa and vein 6.

Underside as above, more brownish black; band to forewing somewhat wider; small subcostal whitish spot absent, and marginal spots to hindwing larger.

Antennae longer and stronger than in *P. glycinae*, almost as thick as in *Agarista*, but much less clubbed. First joint of palpi and ventral middle line of second white ; third joint about twice as long as broad.

Head creamy white, middle of front and occiput behind eyes black. Thorax above with three creamy white stripes ; below, with coxae and femora, orange. Abdomen black ; anal segment large (as in *Immetalia* Jord.) and orange. Tibiae without tufts of hairs.

Expanse : forewing AM 27 mm. ; EM 16 mm. ; PM 15 mm.
„ hindwing „ 15 „ ; „ 13 „ ; „ 16 „

Hab. Fergusson I., D'Entrecasteaux Is. ; 1 ♂ (A. S. Meek *leg.*, October 1895).

Vein 2 of the forewing stands closer to vein 3 than in *Phalaenoides glycinae* Lew. ; the antennae are thicker, the third joint of the palpi is shorter, and the tibiae are without tufts of hairs. In pattern *vitticollis* resembles somewhat *glycinae*, but is different in the colour of the palpi, thorax (above and below), coxae, and femora ; the band on the forewings is broader and shorter, and the white colour at the margin of the hindwing is much less extended and does not include black spots.

9. **Phalaenoides maculosus** Rothsch. sp. nov.

♂. *Upperside:* both wings olive mummy-brown. Forewing with a creamy buff band outside cell, extending from costal margin, which it nearly reaches, to beyond vein 2, broadest behind (3½ mm.), its outer edge indented between veins 5 and 6 and posteriorly rounded, its inner edge with sinus at the bases of veins 3 and 4. Outside the band there is a row of minute creamy white spots. A spot within apex of wing (diameter a little more than 1 mm.), fringe at apex, a spot in inner angle, a few scales before it near extremities of veins 2 and 3, a

rounded spot at the middle of inner margin (1½ mm. wide), a minute spot before and a somewhat larger one (1 mm. wide) beyond middle of inner margin also creamy white. No blue scales present.

Hindwing with a buff patch in basal half, neither reaching base nor costal and abdominal margins, about 5 mm. wide, rounded outside; a small subluniform spot (1½ mm. at its widest part) within anal angle, and fringe at extremities of nervules, especially in front, buff-colour.

Underside as above, all the spots buff-colour. Cell of forewing with a rounded spot in the middle and a transverse line near apex; spots in and near middle of inner margin merged together to one longitudinal mark. Apex of hindwing with a marginal spot, diameter about 1 mm.

Antennae as thin as in *P. goldiei* Druce. Palpi, head, thorax, and abdomen buff-yellow. Base of second and the whole third joint of the palpi, the frontal processus of the head and a transverse spot at the insertion of the antennae, thorax above (except edge of collar, tips of tegulae, and a lateral spot upon metathorax), apical half of the dorsal and basal half of the ventral portions of the abdominal segments (except last segment, which is all buff-yellow), a large spot upon the forebreast, all the femora, tibiae (except a spot upon the foretibiae), and tarsi black.

Third joint of palpi scarcely half as long again as broad; tibiae without tufts of hairs; frontal processus of head rather convex, circular ridge one-fifth the diameter of the front of the head. Second partition of the median nervure on the fore- and hindwings slightly shorter than the respective portion of the outer margin. Upper discocellular veinlet to hindwings shorter than the lower one.

Expanse: forewing AM 19 mm.; EM 11 mm.: PM 14 mm.
„ hindwing „ 14 „ ; „ 11 „ : „ 9 „

Hab. Cedar Bay, south of Cooktown, North Queensland; 1 ♂ (A. S. Meek *leg.*).

10. **Aegocera triplagiata** Rothsch. sp. nov.

♂. *Upperside:* forewing black, with three maize-yellow markings—namely, a spot in basal fourth 4 mm. long and 3 mm. broad, neither reaching costal margin nor submedian vein, broadest at median vein; a second spot within apex of cell, 1 mm. short of the discocellulars, faintly reniform; and a band situate 1 mm. outside apex of cell, and running from the costa towards inner angle, ending a little beyond vein 2, rounded behind, slightly tapering towards costa, 3½ mm. broad at vein 3. Besides these markings there are three white minute spots near the base, one before costal nervure, the two others at the submedian vein. Three short metallic blue lines, one in middle of cell, the second upon the discocellulars, and the third, outside the maize-yellow band; some blue scales behind costal margin and between median and submedian veins. Fringe plumbaginous at the extremities of the veins.

Hindwing orpiment orange; outer margin black; this border is 6 mm. broad at vein 7 and becomes slightly narrower behind, having at anal angle a breadth of 4 mm.; at costal margin it is extended down to the base, but this costal border is only ½ mm. broad. A minute black spot upon the discocellulars. Fringe irregularly white at the nervules.

Underside: forewing with the three markings deeper yellow; the subbasal patch enlarged, nearly occupying the basal fifth of the wing, and the subapical band broader at vein 3.

Hindwing with the costal black border broader than above, having a breadth of about 1 mm.

Antennae clubbed, as in *Aegocera fervida* Wlk.; tip pale ochraceous, upperside scaled white. Palpi black; first and second joint (except back and sides of the latter) and ventral portion of the base of the third joint tawny ochraceous; second joint with long hairs, as in *A. fervida* Wlk. Head black, with two white frontal lines. Thorax black, with four white spots on the collar, one on each tegula, and two in the middle line of the mesothorax; below, the thorax has a tawny orange mark near the base of the forewings. Abdomen black, sides of base tawny ochraceous. Legs black; anterior coxae and two spots on the middle tibiae tawny ochraceous.

Expanse: forewing AM 24 mm.; EM 13 mm.; PM 16 mm.
„ hindwing „ 16 „ ; „ 11 „ ; „ 13 „

Hab. Mpeta, Loangwa R., northern affluent of the Zambesi R.; 1 ♂ (C. T. Coryndon *leg.*, November and December 1895).

In pattern unlike every species hitherto described from Africa.

11. **Aegocera coryndoni** Rothsch. sp. nov.

♀. *Upperside:* forewing maroon, but this colour much covered by grey (base and outer margin) and maize-yellow (disc) scales; with two white patches, one of 5—6 mm. length in the middle of the wing between subcostal and submedian vein, not reaching this vein, nearly parallel and of about 2 mm. breadth in one specimen (*type*), widened behind in the other; the second patch stands about 1½ mm. beyond the apex of the cell, is 4 mm. broad and 5 mm. long, and expands between veins 3 and 10. Each patch is encircled by an olive band on a maroon ground, the edges of which are here and there marked by silvery scales, which form a conspicuous silvery line in the basal third of the wing; a spot in the middle of the cell, another between median white patch and costa, a third between this patch and vein 1, and an arch on the discocellulars also composed of silvery scales. Fringe grey.

Hindwing orange-ochraceous; outer border black, narrowing behind, 5 mm. wide at vein 7 and 1½ mm. at vein 2, running down at costal margin half-way to base. Fringe white, much shaded with black.

Underside: forewing black; basal sixth yellow; basal half of inner margin white: white patches as above, median one merged together with the white area of inner margin; fringe white; outer margin somewhat grey.

Hindwing as above, but black border extending farther down the costal margin; fringe more white.

Antennae scaled white above, scarcely thickened towards apex (♀). Palpi, head, and collar wax-yellow; first and second joint of palpi with a black spot, third joint black with a few wax-yellow scales; head with four black spots, one in the middle of the front, the second between the antennae, and the two others on the occiput behind the eyes; collar with seven black spots. Mesothorax grey; tegulae with long whitish and maroon hairs, and a black baso-lateral spot. Metathorax orange-yellow, like the abdomen. The latter with the extreme tip, part of the underside, especially the underside of the posterior segments, tips of the dorsal tufts of hairs, and faint basal spots in the median line above, black. Underside of thorax orange-yellow; anterior coxae grey behind. Legs orange-yellow, more or less

variegated with black; anterior tibiae with two black spots; all the tarsi more black than yellow.

Expanse: forewing AM 24 mm.; EM 8; PM 17 mm.
„ hindwing „ 16 „ ; „ 15; „ 13 „

Hab. Mpeta, Loangwa R., northern affluent of the Zambesi; 2 ♀♀ (C. T. Coryndon *leg.*, November and December 1895).

Is closely allied to *A. obryzos* Mab. from Madagascar, but at once distinguishable by the much more extended orange hindwings.

The *male* of *A. obryzos* Mab. has prolonged foretarsi; the second and third joint are much longer than in other *Agaristidae*.

12. **Metagarista (?) rendalli** Rothsch. sp. nov.

♂. *Upperside:* forewing black, with some metallic blue scales near the base, a small spot of the same colour beyond middle of cell, a second upon the discocellulars, a third in hinder angle, and a fourth near the apex of the wing. Two large buff patches: one in basal half, trapeziform, oblique, 2½ mm. from base, expanded between costal and submedian nervure, 3¾ mm. broad at subcostal and 5½ mm. at submedian vein, outer edge straight; the second patch stands 1½ mm. outside apex of cell, and expands between veins 2 and 10; it is 4½ mm. wide at vein 4, and narrows in front and behind; its inner edge almost straight, its outer edge convex. Besides, a minute buff spot in apex of cell close behind subcostal vein. Fringe black.

Hindwings orange; outer border black, of nearly even width (3 to 4 mm.), anteriorly extended down half-way to base, inner edge slightly convex at vein 2. Fringe black. Some black scales upon the discocellulars and at extreme base.

Underside: as above, without blue scales; basal patch of forewing extended down to base and inner margin, occupying basal fourth of wing, and, like the subapical patch, orange-buff instead of buff. Black border to hindwing not convex at vein 2.

Antennae, palpi, head, thorax, legs, last segments of abdomen and underside of abdomen except three median spots, black. A patch on each side of collar, and rest of abdomen (basal segment partly black above, all black below) orange-buff.

Expanse: forewing AM 20 mm.; EM 12 mm.; PM 13 mm.
„ hindwing „ 13 „ ; „ 11 „ ; „ 10 „

Hab. Zomba, British Central Africa, south of Lake Nyassa; 1 ♂ (Dr. Percy Rendall *leg.*, December 1895, wet season).

This species, which I name in honour of the collector, does not fit well in any of the genera of *Agaristidae*. The hairy third palpal joint it has in common with some other African Agaristids, namely *Hespagarista* Wlk., *Pais* Hb., and *Metagarista* Wlk.; but differs from these genera in the convex front of the head bearing a circular ridge of which the diameter is only about one-tenth the breadth of the front of the head, and is, moreover, distinguished from *Hespagarista* by the third joint of the palpi being three times as long as broad, and by the absence of the tail of long hairs from the tip of the abdomen in the ♂; from *Pais* by vein 2 of the hindwings originating nearer to three; from *Metagarista* by the narrower forewings and the longer third palpal joint.

As I have only one sex before me, and of this only one specimen, I prefer to put the species provisionally into *Metagarista* instead of erecting a new genus for it. The front of the head is faintly narrowed behind.

13. **Pycnodontis ovata** Rothsch. sp. nov.

♂. Resembles *P. spadicea* Feld., but the band on the forewing is reduced to an ellipsoid spot of 4 mm. length; the greater portion of the costal margin, median and submedian fold of the hindwing below, and the fringe to the hindwing, are white.

Head and thorax sprinkled with creamy white scales; coxae with long creamy white hairs; tarsal joints with white scales at apex. Tip of the abdomen orange.

Hab. Bahia, Brazil; 1 ♂.

There are two *females* in the Tring Museum, one from Petropolis, near Rio de Janeiro, the other without exact locality, which belong most probably to this species. They differ from the above-described ♂ in the hindwing having a creamy white patch on the disc between veins 4 and 6 which is rounded exteriorly and tapers off towards base, and in the hairs on the coxae being black intermingled with white scales.

14. **Pycnodontis pulverosa** Rothsch. sp. nov. (Felder in coll.).

♀. There are two *females* under this name in the Felder collection which are to my knowledge still undescribed. They resemble *P. leuconoë* Feld. very much, but are distinguished by the absence of the indistinct white patch from the cell of the forewing above, by the discal band not being split up into spots by the nervules, by the costal margin of the hindwings having on either side a black border of 1½ to 2 mm. width, and by the abdomen being devoid of the ventral and lateral longitudinal white bands, and having the penultimate segment above orange, like the anal segment.

Hab. Venezuela; 2 ♀♀ in coll. Felder.

15. **Milionia everetti** Rothsch. sp. nov.

♀. *Upperside:* black, deep blue in side light. Forewing crossed by a slightly arched metallic blue band, varying to pale bluish green in different lights. This band is 4 mm. wide at the subcosta and tapers off behind, having at the inner margin, where it ends 2 mm. short of tip of vein 1ª, a breadth of scarcely 2 mm.; the discocellulars are situate inside the band very near its outer edge. In the anterior portion of the band there is a pinkish buff line of 5 mm. length, extending from vein 2 to near middle of apex of cell, crossing vein 3 close to its origin. Base of wing metallic blue at median and submedian nervures.

Hindwing across the disc with a band which is of the same colour as that on the forewing, and reaches from the costal nervure to the abdominal margin, where it ends 3 mm. short of tip of submedian vein; the band is almost straight, has a breadth of 2 mm. in the middle, and is somewhat narrower at either end; discocellulars in middle of band.

Underside: as above, base of both wings metallic blue at the veins. Band on forewing broader than above, widest between veins 2 and 3, ending before reaching submedian vein. Band of hindwing separated into two spots, one at anterior, one

(larger) at posterior angle of cell ; blue scales along subcostal and median nervures and base of vein 2 ; the two spots connected by a few blue scales along discocellular veinlets. Body metallic blue, metallic especially on collar and at edges of abdominal segments.

Neuration the same as in *Milionia rauakensis* (Quoy & Gaim.).

Expanse : forewing AM 29 mm. ; EM 18 mm. ; PM 20 mm.
„ hindwing „ 21 „ ; „ 16 „ ; „ 16 „

Hab. Bonthain Peak, S. Celebes, 5000.—6000 feet ; 1 ♀ (A. Everett, October 1895).

Differs from all species of *Milionia* in the band across the wings being metallic blue.

NEW *GEOMETRIDAE* IN THE TRING MUSEUM.

By W. WARREN, M.A., F.E.S.

Subfamily OENOCHROMINAE.

Physetostege gen. nov.

Forewings : with costa hardly curved, except at the base and before apex ; apex rounded ; hindmargin obliquely curved.

Hindwings: broad, with hindmargin bluntly elbowed in middle ; the inner margin rather dilated.

Forewings of ♂ with an exaggerated fovea, which is covered on the upperside by a raised wave of curved hairlike scales, extending from the median to the submedian vein.

Antennae of ♂ with very fine oblique pubescent pectinations, which decrease gradually to the apex ; tongue present ; palpi porrect, rostrate, the terminal joint drooping ; legs slender ; hind tibiae with two pairs of unequal spurs.

Neuration : as in *Alex* Wlk., but the median vein of forewings is curved upwards near the base.

Type : *Physetostege miranda* sp. nov.

1. **Physetostege miranda** sp. nov.

Forewings : dull cinereous with a reddish tinge, covered with numerous small irregular fuscous strigae ; the basal two-thirds deeper in tint than the marginal area ; the two lines darker, the first very indistinct, bluntly angled on the subcostal and median veins ; exterior line consisting of three curves, concave outwards from the costa to below the fifth subcostal nervule, thence to above the third median, and thence to the inner margin at two-thirds ; discal mark linear, vertical ; costa more reddish.

Hindwings : the same, but the second line is irregularly dentate and curved.

Underside paler and redder, with less fuscous dusting.

Head and thorax dark cinereous ; face and palpi black-brown ; abdomen and legs paler, the latter with darker patches at the joints.

Expanse of wings : 36 mm.

One ♂ from Humboldt Bay, New Guinea.

Subfamily ORTHOSTIXINAE.

Sebastosema gen. nov.

Forewings: narrow at base, widening outwards; costa straight, slightly indented at three-fourths, then shortly convex; apex rounded; hindmargin bluntly elbowed opposite the cell, then oblique to anal angle, which is nearly rectangular.

Hindwings: with both angles rounded; hindmargin curved, faintly indented opposite the cell.

Thorax and abdomen stout. Antennae of ♂ short, curled round, strongly pectinated to the apex, the pectinations ciliated. Forehead very flat; palpi short, hairy, decumbent; tongue not visible. Pectus and femora hairy; hind tibiae with a pair of short terminal spines. All the tarsi hooked at extremity.

Neuration: forewings, cell rather more than half as long as wing; discocellular slightly angled; first median at three-fourths, second before angle of cell, third from the angle; radials normal; last three subcostals stalked from end of cell; second a little before; first from close to base, running close to and parallel with the subcostal as far as the origin of the second, where it appears to vanish; point of origin of the second thickened. Hindwings, costal united to subcostal by a bar near base; first subcostal before upper angle of cell; second median before the lower angle.

Type: *Sebastosema bubonaria* sp. nov.

Akin to *Epirrhanthis* Hüb.

2. **Sebastosema bubonaria** sp. nov.

Forewings: lilac-grey, dusted with fuscous atoms and suffused in parts with tawny; a curved dark-brown basal line at one-fifth, the area included slightly suffused with tawny; second line at three-fourths, dark brown, sinuous, nearly parallel to hindmargin; marginal area beyond, tawny, except a minute pale grey spot on costa beyond second line, a larger triangular apical spot edged outwardly with brown, and a paler space above the anal angle; discal blotch large, round, tawny; above it towards the base is a dark oblique costal streak.

Hindwings: dull orange dusted with coarse blackish atoms, with two fine blackish lines, the inner thickening towards costa, the outer towards inner margin; hindmargin diffusely brownish, with a multitude of short fuscous and dark striae.

Thorax, face, and antennae grey, mixed with darker; abdomen tawny. Underside pale straw-colour and yellow, with the lines ferruginous, and suffused in parts with tawny, the markings of the upperside being more or less represented.

Expanse of wings: 42 mm.

One ♂ from Japan.

Schistophyle gen. nov.

Forewings: with costa sinuous, convex in basal half, inflexed beyond; apex produced, acute, falcate; hindmargin concave below apex, then vertical, and abruptly rounded above anal angle, before which it is also slightly indented; inner margin slightly sinuous, convex near base, inflexed beyond middle.

Hindwings: triangular; both angles distinct, the anal angle rectangular, the apical rounded; hindmargin nearly straight.

Palpi upcurved, squamose, the joints indistinct; tongue present; antennae of ♀ filiform.

Neuration: forewings, cell fully half as long as wing; the discocellular rather oblique; first median at five-sixths, second well before end of cell, third from the end; radials normal; last four subcostals stalked together. Hindwings with costal free, united to subcostal by a bar at one-half the cell; first subcostal from before end of cell; medians as in forewings.

Type: *Schistophyle falcifera* sp. nov.

3. **Schistophyle falcifera** sp. nov.

Forewings: ochreous, thickly freckled with orange; the costa from before the middle to apex broadly brown, tinged slightly with brown towards the base; first line near base, brown, acutely angled outwards in the cell, with a darker spot at the angle in the cell, and another on the submedian fold; a brown oblique discal mark; a broad red-brown oblique median line from middle of inner margin towards apex, becoming obsolete in the costal shade; a sinuous outwardly dentate submarginal line; a brown spot at anal angle; fringe red-brown, with red-brown hindmarginal line.

Hindwings: like forewings; a broad red-brown antemedian line, followed by a brown cell-spot; submarginal line and fringe as on forewings; a brown spot at apex.

Head, thorax, and abdomen concolorous with wings. Underside like upper.

Expanse of wings: 38 mm.

One ♀ from the Khasias.

4. **Rambara costata** sp. nov.

Forewings: pearly white, dusted with grey scales; the costa irregularly ochreous grey; first line grey, very indistinct; cell-spot round, black; second line curved and sinuous, grey; hindmargin thickly dusted with grey scales; fringe white, with black dots at the end of the veins.

Hindwings: the same, but the discal mark grey and linear. Underside pure white, with the fringe-dots small.

Expanse of wings: 24 mm.

Many examples from the Khasias. Appears to be quite distinct from any described species.

Subfamily PSEUDOTERPNINAE.

5. **Hypochroma subrubescens** sp. nov.

♀. *Forewings:* white, almost wholly suffused with pale greyish green, and dusted with darker green and blackish atoms; the lines black, denticulate, neatly edged externally with the white ground-colour; costa white, dotted with black; an indistinct dark line close to base; first line at one-third, distinct, black, forming two sharp angles outwardly in the cell and on the submedian fold, and one inwardly on the median nervure; discal ocellus oblique, white, edged with black and connected above with a small black subcostal spot; second line from two-thirds of costa to middle of inner margin, outwardly curved in disc, forming two more prominent angles outwardly on upper radial and third median nervure; subterminal line curved, consisting of black wedge-shaped marks; fringe concolorous, preceded by a black marginal festoon; the marginal area is dusted with blackish scales between the lines, and the whole wing shows an undertone of pink.

Hindwings: like forewings, but the pink tinge is more conspicuous, and the *basal* area is quite densely dusted with blackish scales.

Thorax and abdomen concolorous; head wanting. Underside pale straw-colour, tinged with yellowish towards the base, with the lines and costal markings black; the inner line angulated as above, the exterior simply curved, and the subterminal represented by a thick diffuse blackish fascia; discal ocellus large, black; on the hindwings the discal ocellus is represented by a small dark spot; in both wings the marginal area broadly vinous red, which colour extends in the forewings also along the lower part of the disc to the base.

Expanse of wings: 36 mm.

One ♀ from Queensland.

Subfamily GEOMETRINAE.

6. **Agathia subdeleta** sp. nov.

Forewings: bright apple-green; a small round-edged black-brown basal spot; costa fuscous or greyish; first line at one-third, irregularly zigzag, passing over the dark discal spot; outer line at five-sixths, consisting of contiguous denticulated lunules, indented opposite the cell, then running parallel and nearer to the hindmargin, with some darkening by numerous fuscous transverse streaks above the anal angle; a small black-brown apical spot and black fringe-line, swollen into a small spot at end of third median nervule; fringe whitish, chequered with fuscous at end of each vein, especially at the apical spot and that at end of third median.

Hindwings: the same, but without the first line; the second strongly marked; inner margin narrowly grey, more broadly grey at anal angle; fringe-line swollen before the short tail at end of third median.

Thorax green, marked with brown; abdomen wanting; antennae, face, and outside of palpi reddish; inside of palpi ochreous. Underside paler, silvery green, exterior line alone marked by broad contiguous blotches; apical spot of forewings brown.

Expanse of wings: 38 mm.

One specimen, not in very good condition, from Sikkim.

Camptolophia gen. nov.

Forewings: with costa slightly curved; apex rectangular; hindmargin elbowed at vein 4, and with a slight tooth at vein 6; oblique and straight from elbow to anal angle.

Hindwings: with crenulate hindmargin and a sharp tooth at end of veins 4 and 6; the anal angle bluntly rectangular; abdomen with three stiff tufts of hair, erect at first, then bent backwards; palpi short, hardly reaching beyond front; antennae of ♂ thick, strongly serrate; hind tibiae with two pairs of short spurs.

Neuration: as in *Agathia*.

Type: *Camptolophia marmorata* sp. nov.

7. **Camptolophia marmorata** sp. nov.

Forewings: pale sea-green; a minute black dot at base; first line pale, close to base, curved and outwardly dentate on the subcostal, median, and submedian veins

and on the two folds; second line white, slender, oblique, and irregularly wavy, from three-fourths of costa to two-thirds of inner margin, the green ground-colour being slightly deeper before it; marginal area ochreous white, with two cloudy greenish patches; some contiguous green blotches touching outer line below costa and above inner margin; four greenish spots along hindmargin from apex to elbow, and a green line from elbow to anal angle; the space above anal angle and towards apex is also marked with a few very slender vertical dark green streaks; on inner margin touching outer line is a small yellowish ochreous spot, followed by some deep red scales; fringe white, with the apices dark grey from apex to elbow; a small black cell-spot.

Hindwings: with basal half green, edged by a curved whitish line, before which the green is deeper; marginal area varied with yellowish ochreous, grey, green, and red scales; the white line is followed by a corona of acute teeth, of which the upper three near costa are grey, tinged with red, and the lower three dark green, the central one being much prolonged and reaching nearly to the margin; a dark purplish grey cloud runs from costa to anal angle, and the whole area is covered with fine dark green streaks which become confluent and form blotches along the margin below the apex; the marginal space in the middle is bright pale ochreous; towards the anal angle are several small patches of red scales, and the pale ochreous ground runs up along the inner margin mixed with red scales; a white curved line on discocellular, and two small white dashes on the inner-marginal edge of the green basal area; fringe ochreous at base and apex, with a broad grey-green central line.

Abdomen and crests ochreous; face and palpi orange-red; vertex pale green; collar green, with its front pure white; patagia green; thorax blackish, with the front reddish. Underside of wings white; forewings with two large black blotches corresponding to the two dull clouds in the marginal area above; hindwings with a broad submarginal black band Pectus orange-red; abdomen beneath blackish.

Expanse of wings: 48 mm.

1 ♂ from the Khasias. A very beautiful insect.

Chlorochromodes gen. nov.

Forewings: with costa faintly curved, rather more strongly towards apex, which is blunt; hindmargin nearly straight, oblique; anal angle distinct.

Hindwings: triangular; hindmargin slightly curved; both angles well defined, but blunt.

Palpi porrect, long; second joint hairy beneath; terminal joint naked. Antennae pectinated in ♂, minutely serrate in ♀. Frenulum absent; costa of forewings hairy near base.

Neuration: forewings, cell barely half as long as wing; discocellular very oblique; first median at two-thirds, second before the end of cell, third from end; lower radial from above centre of discocellular; upper radial stalked with the five subcostals. Hindwings, medians as in forewings; the two subcostals on a long stalk.

Type: *Chlorochromodes tenera* sp. nov.

8. **Chlorochromodes tenera** sp. nov.

Forewings: pale green; costa white; fringe white, with a rust-red line at base; discal spot red-brown; usually without any lines or markings; sometimes there is just visible an oblique white inner line, and a sinuous exterior line denoted only by white dots on the veins.

Hindwings: the same.

Abdomen whitish, or very pale green with rust-red dorsal spots; vertex and thorax green; collar and front of thorax whitish; face green; palpi whitish, dusted externally with reddish fuscous, and with the terminal joint either with a broad dark ring at base or wholly reddish fuscous. Antennae white. Underside pale, glossy; the base of the costa with reddish fuscous hairs. The scaling is very fine, and the wings semi-transparent.

Expanse of wings: ♂, 26 mm.; ♀, 34 mm.

Several examples of both sexes from the Khasia Hills.

Chloromianta gen. nov.

Forewings: with costa straight till shortly before apex; apex rectangular; hindmargin with very slight bend in middle, more oblique below the bend.

Hindwings: with slight prominence at end of second subcostal and third median, incurved between the veins; anal angle squared.

Abdomen with flat crests; antennae of ♂ pectinated to beyond middle; palpi porrect beyond face; tongue present; hind tibiae thickened, with terminal pair of spurs.

Neuration: forewings, cell not half the length of wing; discocellular angulated; first median at two-thirds, second and third from the lower angle of cell; lower radial from above centre of discocellular; upper radial from the common stalk of the last four subcostals; of these the second does not separate till long after the fifth, the third and fourth parting shortly before apex; first subcostal free, and ending only a little way before apex. Hindwings with discocellular oblique; the two subcostals on a longish stalk; the last two medians on a very short one.

Type: *Chloromianta ferruginata* sp. nov.

9. **Chloromianta ferruginata** sp. nov.

Forewings: green, the costa white for three-fourths; markings rust-colour; first line thick, wavy, at one-fourth; second at three-fourths, irregularly wavy, and parallel to hindmargin; submarginal line wavy, interrupted above, the whole of the space between the two last lines filled up with dark cinereous and pinky scales, as far as the radial, leaving only the edges formed by the lines dull ferruginous; a ferruginous spot at end of each vein, connected below with the submarginal line; fringe ferruginous; the green basal half of wing is spotted in places with ferruginous.

Hindwings: with a large dark greyish black and pinky patch at apex; a ferruginous darker-centred patch on inner margin near base, extending along margin to another smaller patch; an irregular submarginal band of ferruginous and yellow spots; the veins also yellowish; marginal spots ferruginous, with the fringe.

Abdomen reddish, with the tufts darker; thorax and collar green; vertex and shaft of antennae white; face, palpi, and antennal pectinations ferruginous. Underside pearly whitish green; a purplish grey blotch from anal angle of forewings and at apex of hindwings.

Expanse of wings: 44 mm.

Three ♂♂ from the Khasias.

Chloromma gen. nov.

Forewings: with costa gradually curved throughout; apex produced, bluntly subfalcate; hindmargin oblique, hardly curved; anal angle well marked.

Hindwings: with a prominent tail at end of third median. Frenulum absent; antennae of ♂ strongly pectinated; palpi porrect, hairy, reaching a little in front of face; hind tibiae dilated, with a tuft of hairs and four spurs.

Neuration: first subcostal of forewings anastomosing with costal; the other four stalked from upper angle of cell; in the hindwings the two subcostals and last two medians are stalked.

Type: *Chloromma mimica* sp. nov.

10. **Chloromma mimica** sp. nov.

♂. Wings olive-green; the lines olive fuscous, irregularly denticulate; the first at one-third, distinct only on inner margin; the second at three-fourths, parallel to hindmargin, but incurved before inner margin; a black cell-spot; fringe paler green.

Hindwings: with second line only, and with a large black blotch on the discocellular.

Thorax and abdomen green; face and palpi dull red; fillet white. Underside duller, with the cell-spots denoted, and a dull dark central fascia on each wing.

Expanse of wings: 28—32 mm.

Two ♂♂ from the Khasias.

Superficially this species recalls *Idiochlora ophthalmicata* Moore.

11. **Comostola albifimbria** sp. nov.

Forewings: apple-green, with a paler wavy basal line and a wavy denticulated slightly sinuous exterior line at two-thirds; costa evenly fawn-coloured throughout; cell-spot purple-brown on lower half of discocellular; fringe broad, white, with a broadish purple basal line, formed of shallow lunules between the veins, interrupted by a white vein-spot.

Hindwings: the same, with the cell-spot longer, covering the whole of the discocellular.

Thorax and abdomen concolorous green; vertex and shaft of antennae whitish; palpi and antennal pectinations rufous; face brown. Underside pearly whitish green.

Expanse of wings: 22 mm.

1 ♂ from the Khasias.

12. **Comostola mundata** sp. nov.

Forewings: apple-green; the costa grey, with a few brown scales towards apex; first line indicated by white dots on inner margin and median vein; cell-spot round, dark red-brown, with paler, slightly metallic centre and whitish orbit; outer line represented by six whitish dots on the veins, the upper four lying in a curve, the lower three in a straight line; fringe white with basal half lustrous, containing a line of shallow dark red-brown lunules from vein to vein.

Hindwings: the same, without any basal dots.

Face red-brown; frontlet narrowly white; vertex, thorax, and abdomen green. Underside uniform whitish green, glossy.

Expanse of wings: 24 mm.

A few of both sexes from the Khasias.

Distinguished from *C. meriturio* Wlk., with which it agrees in size, by the different shade of green, and the pure white or yellowish white dots and grey costa.

Helicopage gen. nov.

Forewings: ample; costa strongly rounded at base, then straight and faintly convex before apex; apex blunt, rectangular; hindmargin crenulate throughout, the upper half vertical, the lower oblique.

Hindwings: with hindmargin deeply crenulate; a longer tooth at end of third median and a slightly deeper indentation above it opposite the cell; anal angle squared; abdomen long, without tufts; antennae of ♂ bipectinated, the pectinations thickened towards apex and pubescent.

Palpi long, porrect, the second joint reaching well in front of face, third more slender, half as long as second; tongue present; hind tibiae slender, with four spurs, and a thin pencil of hairs on the inner side; frenulum very fine, working in a spiral hair-covered retinaculum, which springs from the extreme base of forewing and is not attached to the wing beyond.

Neuration: forewings, cell nearly half as long as wing; discocellular with short upper arm oblique inwards, the longer lower arm oblique outwards; first median at three-fifths, second close before end, third from end of cell; lower radial from angle of discocellular, upper from below upper angle; last four subcostals stalked from the angle, first anastomosing with costal. Hindwings with the medians as in forewings; the two subcostals from upper angle of cell; radial from just below it and above the angulation of discocellulars.

Type: *Helicopage hirundinalis* sp. nov.

Distinguished from all other genera, as far as I know, by the unusual character of the retinaculum.

13. **Helicopage hirundinalis** sp. nov.

Forewings: pale green, with darker greyish green mottlings and markings, the mottlings confined to the basal area and first half of costa; basal patch edged with a thick grey-green blotch, angulated outwardly, with some blackish scales in the middle; a grey-green discal blotch; a double irregular series of grey-green lunules, oblique outwards above the median, inwards below it; the three lunules above the median each contain a black sagittate mark, much resembling a swallow on the wing; marginal area with a broad grey-green fascia from apex to middle, broken into lunules below the middle; extreme hindmargin pale green; fringe pinkish white; costa yellowish, with innumerable small brown mottlings.

Hindwings: with grey-green basal blotch and discal spot, followed by three irregular sinuous bands of lunular spots, the submarginal above the anal angle being the most conspicuous; fringe as in forewings.

Head, thorax, and abdomen concolorous green; palpi externally and antennae fuscous; lower part of face whitish. Underside pale faded green, with the bands of lunules dull gilded; the costa of forewings with many irregular blackish blotches, of which the apical is the largest.

Expanse of wings: 50 mm.

A few examples from the Khasias.

14. **Hemithea (?) anomala** sp. nov.

♂ ♀. Wings apple-green.

Forewings: with costa narrowly ochreous yellow; a curved slightly wavy first

line, and a straight oblique minutely wavy second line, white; fringe concolorous: no discal dot; both lines are more distinct towards inner margin.

Hindwings: with a central straight white line, slightly curved towards the inner margin.

Head and thorax green; abdomen white, greenish towards base; face fawn-colour; palpi and forelegs tinged with fawn. Underside of wings uniform pale green.

Expanse of wings: 34—36 mm.

Kulu; Masuri.

Agrees in neuration and shape of wings and palpi with *Hemithea*; but the ♂ antennae are merely pubescent, not ciliated; and the abdomen is entirely without tufts, or the reddish segments that characterise *Hemithea* proper.

15. **Idiochlora contracta** sp. nov.

Forewings: dull apple-green, with two pale olive indistinct cross lines; the first at one-third, outwardly curved and slightly wavy; the second from costa at two-thirds, irregularly waved and approaching the first line on inner margin, paler-edged externally; fringe paler green.

Hindwings: the same; both wings with dark olive-green cell-spot.

Head, face, thorax, and abdomen green; vertex and antennae white. Underside dull whitish green, with a dark grey submarginal shade, strongest towards inner margin of forewings and costal margin of hindwings.

Expanse of wings: 20 mm.

One ♂ from the Khasias.

16. **Iodis annulifera** sp. nov.

Like *argutaria* Wlk., but smaller; the costa narrowly yellowish; the exterior pale line running strongly inwards opposite the cell; the discal spots in both wings larger and with pale outlines; the upper half of the discocellular not marked with dark green; the whole ground-colour more shagreened with whitish; the hindwings narrower, with the tail more produced.

Expanse of wings: 21 mm.

Only ♂♂ from the Khasias.

17. **Iodis coeruleata** sp. nov.

Forewings: pale bluish green; the costa deep green, with its extreme edge yellow; central fascia edged, as in the allied species, by a paler line of curves preceded by a deeper green shade, a similar shade also following the first line; discal spot round, dark green; fringe concolorous; hindmargin deeper green, without line or vein-spots.

Hindwings: the same.

Head, thorax, abdomen, and face deep green; basal joint of antennae and vertex narrowly white; antennae pale fuscous. Underside pearly whitish green.

Expanse of wings: 40 mm.

A few from the Khasias.

18. **Iodis inumbrata** sp. nov.

Forewings: pale glaucous green, with the usual two denticulated white transverse lines, but these are much more distinct than usual, and towards the inner margin

consist of broad white lunules; the inner line is edged externally and the outer internally by blotches of deep green, and the opposite sides are edged with a thin line of the same colour; ocellus edged with the same green.

Expanse of wings: 28 mm.

♂ ♀ from the Khasias.

19. **Iodis iridescens** sp. nov.

Forewings: semi-diaphanous opalescent green, dusted with pearly scales; costa dark grey-green; the two lines, as usual, consisting of a series of lunules, the inner line followed and the outer line preceded by a slightly deeper green shade, unsuffused with the pearly scales; the lunules forming the outer line are more uniform in direction than in the allied species, the last two beneath the costa not being reflexed basewards, but rather approaching the apex, so that the width of the central area between the two lines is much greater on the costa; hindmargin preceded by a narrow band of unsuffused darker green; fringes paler, with a concise green basal line.

Hindwings: the same.

Head, thorax, and abdomen pale green; vertex white. Underside white.

Expanse of wings: 26 mm.

One ♂ from the Khasias.

20. **Megalochlora convallata** sp. nov.

Very near *vallata* Butler, from Japan, which also occurs in the Khasia Hills, but certainly distinct. The costa is concolorous with the forewings, without any traces of dark or light speckles, and there is no dark spot at the origin of the transverse lines, nor the slightest trace of any submarginal line. The hindwings are not so distinctly elbowed in the middle, and the dark spot at the angle is entirely wanting. The specimens I have seen have all faded in the same way that *vallata* is wont to fade; the markings, viz. the two transverse lines on the forewing and the central line on the hindwing, with the ocelloid spot on both wings, are, as in *vallata*, rusty olive.

Both ♂♂ and ♀♀ from the Khasias.

21. **Tanaorhinus discolor** sp. nov.

Forewings: liver-colour, the basal area strewn with hoary lustrous scales; traces of a darker line from three-fourths of costa to second median, where it touches a bean-shaped ochreous white blotch, the outer side of which it traverses and renders diffuse; basal line visible only on inner margin near base; fringe from apex to middle pale, thence to anal angle liver-colour; costa paler than ground-colour, but probably through discoloration.

Hindwings: with basal and marginal thirds liver-colour, darker towards anal angle, where there are some paler spots; median area dull fulvous yellow, with darker suffusion and curved lines; fringe dark, paler opposite the cell.

Head, face, and palpi pale ochreous; collar and abdomen fulvous; thorax and patagia liver-colour. Underside duller, more reddish grey, with the pale spaces distinct, pale hyaline yellow.

Expanse of wings: 60 mm.

Two ♂♂ from the Khasias.

Subfamily STERRHINAE.

22. Arhostia (?) persimilis sp. nov.

Forewings: dirty ochreous, dusted coarsely with grey, especially from the base outwards and along the hindmargin; the three lines dark grey, slightly curved, and parallel to hindmargin; first at one-fourth; second at one-half, passing close to the small blackish cell-spot; third at three-fourths, the last the clearest; fringe concolorous, with dusky basal line.

Hindwings: the same, without the first line.

Thorax and abdomen concolorous; face reddish. Underside duller.

Expanse of wings: 20 mm.

A few from the Khasias.

23. Craspediopsis inaequata sp. nov.

Forewings stone-colour, slightly darker in tone than *bimaculata* Warr. and more tinged with ochreous, the costa paler. The markings are similar to those of *pallivittata* and *bimaculata*, but the exterior line, instead of consisting of a series of lunules with denticulations between them, is a continuous fine thread, which forms a distinct curve opposite the cell, and is immediately followed by a somewhat indistinct reddish line, not parallel to it, which bears a spot beyond the curve and another between the first and second median nervules, from which an oblique line runs to the top of the two blotches in the exterior line; the fringe, which in *bimaculata* is quite pure, has, like that of *pallivittata*, a small spot opposite the end of each vein. The lower spot of the exterior line is smaller and blacker than in *bimaculata*, while the upper one is more faintly expressed. The pectinations of the ♂ antennae are much shorter and of more uniform length throughout, whereas in *bimaculata* they are plumose in the middle. Face and palpi black, as in the other species.

Expanse of wings: 36 mm.

Several from the Khasias.

Of the four species which I refer to this genus, *pallivittata* Moore is the largest, and also the most mottled with ochreous and reddish; *bipunctata* comes next in point of size, and is the palest in colour; then *persimilis* Moore, which is the greyest; and last *inaequata*, which is decidedly smaller and slightly darker than *bimaculata*, but less mottled than *pallivittata*.

24. Chrysocraspeda perpicta sp. nov.

Forewings: yellow, irregularly blotched and dusted with blood-red; the costa, hindmargin, and inner margin dull pinkish drab; discal spot white, surrounded with reddish.

Hindwings: yellower; basal area thickly dusted with blood-red, the apical region more sparsely so; hindmargin dull violet-grey, becoming dull red at base of fringes, which are yellow; on inner margin above anal angle is a curved dark red blotch concisely cut by the second median nervule; discal spot white, set in red.

Thorax and vertex pinkish drab; abdomen yellow, dusted with blood-red, the penultimate segment with a blotch of the same colour as that on inner margin of hindwings; face and antennae yellow, spotted with red. Underside yellow, suffused

in the forewings with bright rosy; the hindwings with the red-brown blotch of inner margin only.

Expanse of wings: 26 mm.

A good series from the Khasias.

25. **Chrysocraspeda sanguinea** sp. nov.

Forewings: brilliant red, with a few darker red strigulations; costa broadly fawn-colour; hindmargin blood-red, thinning out towards the anal angle, the extreme hindmargin being left narrowly yellow; discal spot blackish, surrounded by deep red; fringe pale yellow.

Hindwings: like forewings, but with a pearly white discal spot.

Head, thorax, abdomen, and antennae all red. Underside bright rosy, with the fringes yellow.

Expanse of wings: 26 mm.

Several from the Khasias.

26. **Chrysocraspeda subangulata** sp. nov.

Forewings: pale pinkish ochreous, suffused with purplish grey except along the inner margin, and dusted throughout with fine rust-coloured atoms; cell-spot distinct, blackish, lying in a short streak of unsuffused ground-colour; the lines purplish brown; first from costa near base is acutely angled just before the cell-spot, running thence obliquely inwards to inner margin at one-fourth; second line at two-thirds but not quite touching costa forms a right angle on the upper radial, and runs vertically, but slightly bent, to anal angle; extreme hindmargin bright yellow, preceded by a deep purple shade, with the veins also purple, their extremities sharply jutting out into the yellow; fringe bright yellow.

Hindwings: with the disc only unsuffused; the first line continued across them near the base; the second line irregularly bent from before apex to before anal angle; discal spot white, oval, followed by a slight dark shade; hindmargin and fringe as in forewings.

Head, face, antennae, thorax, and abdomen all dull rosy. Underside bright rosy, with fringes and extreme margin bright yellow.

Expanse of wings: 22 mm.

One ♂ from the Khasias.

Subangulata differs from *abhadraca* and its allies in being slightly but visibly angled at the third median of each wing; but it agrees with that species in having the first subcostal stalked with the remaining four, in the bright rosy underside with its yellow fringe, and in the white discal spot of hindwings. The acute angulation of the first line separates it from all others.

Discoglypha gen. nov.

Akin to *Lipomelia* Warr., but the antennae of ♂ are not ciliated, but minutely serrate and fasciculate; palpi short; hind tibiae of ♂ with a terminal pair of spurs, and their extremity fringed with hairs, first joint of tarsi also being dilated and fringed with hairs.

Neuration: as in *Erythrolophus*; veins 7, 8, 9, 10 of forewings stalked; 10 anastomosing with 11, and afterwards with 8, 9, forming a double areole. The

three transverse lines generally distinct and denticulate, darker than the uniform ground-colour.

Type: *Discoglypha aureifloris* sp. nov.

Idaea hampsoni Swinh., *Tr. E. S.* 1892. p. 14, and *Erythrolophus punctimargo* Hmpsn., *F. B. I.* III. p. 453, should be referred to this genus.

27. **Discoglypha aureifloris** sp. nov.

Forewings: dull dark red, a little paler towards hindmargin; the costa broadly smoky black; the lines blackish; first from costa at one-fifth, wavy, to inner margin at one-third; second from just beyond the middle, denticulate, incurved below the cell; submarginal denticulate, about midway between second and hindmargin; fringe concolorous, with a concise darker red line at base, interrupted at ends of veins by a paler dot; a small black cell-spot.

Hindwings: like forewings, with two outer denticulate lines; in the middle of the cell, extending from the subcostal to the second median nervule, is a large golden blotch resembling a flower with its stalk.

Thorax and abdomen concolorous; face and palpi bright red; vertex and base of antennae white. Underside dull rosy, with the two outer lines of each wing darker.

Expanse of wings: 30 mm.

Two ♂♂ from the Khasias.

28. **Discoglypha inflammata** sp. nov.

Forewings: bright fulvous red, overlaid in parts with fuscous grey, with two broad streaks of unsuffused fulvous along the cell and the submedian fold; submarginal line indicated also by fulvous blotches; costa dark fuscous, as are the lines: the first at one-fourth, slightly oblique outwardly and hardly wavy; the second central, slightly denticulated, and with a projection outwards between the second and third medians; the third exterior, decidedly denticulated; cell-spot small, fuscous; fringe fulvous and fuscous.

Hindwings: the same, but with the cell-spot large, triangular in shape, silvery white, edged with fuscous.

Vertex white; face dark red. Underside dull fulvous, unsuffused, with all the lines indicated.

Expanse of wings: 32 mm.

Both sexes from the Khasias.

29. **Eois flavisinuata** sp. nov.

Wings dull rosy, with a leaden tinge; the lines obscure, blackish; first line at one-third, straight; second, just beyond centre, wavy; third, a little beyond second, straight; all the lines are thicker towards the costa, which they do not reach; fringe and hindmargin broadly clear yellow; the dividing line between the yellow marginal area and the red is sinuous, starting obliquely and diffusely from the costa just before apex, strongly indented opposite the cell, and still more strongly and rectangularly above inner margin, forming a single rounded projection above the first indentation, and a bilobed one between the two; the costa and this dividing line are blood-red.

Hindwings: like forewings, but the yellow marginal space narrower, the dividing line less sinuous and distinct.

Head, face, thorax, and abdomen deep leaden red; vertex and antennae white. Underside the same, but darker, less reddish.

Expanse of wings: 18 mm.

Several from the Khasias.

The yellow fringe and margin on forewings does not extend beyond the apex along the costa, as in *E. rubridentata*.

30. **Eois rubridentata** sp. nov.

Wings dull rosy; forewings with costa and three transverse sinuous lines deeper rosy; first line at one-third, curved; second in middle, passing just outside the discal spot, and slightly wavy; third at two-thirds, running to near anal angle, more sinuous; fringe clear yellow, with the extreme hindmargin of the same tint, starting on costa before apex; this yellow margin is preceded by a deep red line, which emits minute red teeth at the end of each vein.

Hindwings: the same, with the lines curved, and the first line wanting.

Thorax and abdomen dull rosy; face deep red; vertex and antennae white. Underside the same, but rather duller.

Expanse of wings: 16 mm.

Several from the Khasias.

The forewings are narrow, elongate, with the apex produced, blunt, and hindmargin very oblique; anal angle well marked: hindwings bluntly elbowed in middle.

31. **Janarda ruptifascia** sp. nov.

Forewings: pale ochreous, dusted with greyish; costa throughout pale; basal half greyish, bounded by an oblique pale fascia, the inner edge of which starts from the middle of inner margin and runs parallel to hindmargin; the outer edge also runs parallel till opposite the cell, where it goes obliquely to apex; marginal space beyond this greyish, divided by a narrow submarginal line; fringe pale, with small dark dots opposite the ends of the veins, and brownish at extreme apex of wing; a small blackish cell-spot near the outside of the greyish basal area.

Hindwings: the same.

Thorax and abdomen concolorous; face and vertex dark red-brown. Underside duller.

Expanse of wings: 21 mm.

Several from the Khasias.

32. **Nobilia strigata** sp. nov.

Forewings: dull red-brown, with numerous undulating silvery grey strigae; the costa broadly olive, with scattered silvery grey scales; discal spot red-brown; an indistinct red-brown curved line beyond the middle and another before apex from costa to middle of hindmargin, followed by a broad silvery streak; fringe red-brown, with a darker line at base.

Hindwings: uniformly striated and alternated with red-brown and silvery grey; discal spot oblong, whitish, with a black dot at its lower end.

Head, thorax, and abdomen mixed red-brown and grey; face and palpi deep

red-brown. Underside deep gilded yellow, dull reddish along costa and towards hindmargin of forewings.

Expanse of wings: 50 mm.

Several ♂♂ from Borneo.

33. **Organopoda sanguinata** sp. nov.

Forewings: deep yellow, much suffused with deep dull red; costa of forewing smoky; antemedian, median, postmedian, and submarginal lines deep red, thick, and indistinctly denticulate; with some blackish scales on the teeth, especially towards inner margin; submarginal line with a darker blotch opposite the cell; a row of black spots along hindmargin; fringe reddish; a large round dull black discal blotch.

Hindwings: the same.

Thorax and abdomen concolorous; face and collar smoky, like the costa of forewings. Underside dull reddish, with the discal spots blurred, blackish.

Expanse of wings: 30 mm.

One ♂ from the Khasias.

Orthoserica gen. nov.

Forewings: with costa gradually curved throughout; apex rounded; hindmargin strongly curved; anal angle obtuse.

Hindwings: broad; hindmargin well rounded, subcrenulate; anal angle produced; ♂ antennae pectinated, the pectinations shortly ciliated; palpi horizontally porrect, thick; third joint indistinct; tongue present; hind legs shortened; tibia with very long tuft of hair from base covering tarsus, which is quite short.

Neuration: forewings, cell half the length of wing: first median at four-fifths, second close before end, third from the end of cell; lower radial from rather above centre of discocellular, upper from upper angle; second subcostal shortly stalked with the last three, anastomosing with the first and then again with the common stem of the others, forming a double areole. Hindwings with the two subcostals short-stalked; medians as in forewings. Wings of weak structure, and thinly scaled.

Type: *Orthoserica rufigrisea* sp. nov.

34. **Orthoserica rufigrisea** sp. nov.

Forewings: dull brick-red with pale greyish markings; the costa is broadly dull grey; the space between basal patch and central fascia, a large apical blotch, a narrow blotch along lower half of hindmargin, and the submarginal line are pale grey, rather glossy; discal spot dark red-brown; beyond and slightly above it is a subquadrate pale grey spot, coalescing with the costal streak; the exterior line at four-fifths is darker red, denticulate, and wavy, but not distinct; submarginal line narrow, zigzag; fringe grey mixed with rufous.

Hindwings: with basal area pale grey, with a few reddish scales close to base; a blackish discal spot surrounded with grey; central and submarginal lines wavy; denticulate, pale with dark red edging internally; marginal space more or less mixed with grey scales.

Head, thorax, and abdomen dull reddish; face and palpi and edge of costa dark brown-red. Underside pale dull grey, with the discal spots and exterior lines alone marked darker.

Expanse of wings: 44 mm.

Two ♂♂ from the Khasias.

35. **Perixera mediusta** sp. nov.

Forewings: ochreous, very finely dusted with purple scales; first line represented by scarcely visible purplish dots on veins; exterior line with the dots plain but small; fringe concolorous, with a row of small purple dots at base; cell-spot indicated by a few slightly darker scales; a broadish diffuse dull purplish central band from two-thirds of costa to middle of inner margin, slightly wavy and angled outwardly.

Hindwings: the same, but the cell-dot white, surrounded by purplish scales; the central purplish band widened along costa.

Head, thorax, and abdomen ochreous; face whitish; palpi and forelegs externally and top of forehead dull rosy. Underside duller, with the central band in both wings broader and dull rosy; the forewing also suffused with rosy patches along the disc.

Expanse of wings: 34 mm.

One ♂ from the Khasias.

Phrissosceles gen. nov.

One of the varied developments of *Anisodes*. The hind legs are fully developed, as in *Platisodes* Warr., and the median pair of spurs absent; the tibiae are slightly thickened and indented at the place where the spurs would be, and the *femora* are thickly clothed with woolly hair, which at the end forms a curl; the third segment of the abdomen bears on each side a rounded tuft of scales.

Type: *Phrissosceles argyromma* sp. nov.

36. **Phrissosceles argyromma** sp. nov.

Forewings: straw-colour, dusted with reddish atoms; costa dark fuscous; first line dull grey, forming two or three curves, and marked by a distinct black dot on subcostal, and a minute dark dot on the median vein; cell-spot obscure, dull fuscous; median line greyish fuscous, strongly denticulate, and distinct; exterior line reddish grey, strongly denticulate, marked by black points on the veins, that on the radial most distinct and surrounded by a grey shade; submarginal line indistinct, preceded by fuscous blotches opposite the cell and above anal angle; fringe straw-colour, with a black spot at the end of each vein, and a minute dot between the veins.

Hindwings: like forewings, but the cell-mark round and bright silvery, edged finely with black.

Head, thorax, and abdomen straw-colour, dusted with reddish, the abdomen with a reddish patch on the sides above the lateral tuft; palpi above deep red. Underside duller straw-colour, in the forewings much suffused with rosy; curl at end of hind femora red.

Expanse of wings: 48 mm.

One ♂ from the Khasias.

37. **Platisodes (?) jocosa** sp. nov.

Forewings: yellow, thickly dusted with bright ferruginous speckles; the lines all denoted by black grey-edged spots, and all angled on the subcostal; the spots on costa and subcostal coalesce to form black blotches at the rise of the basal, central, and exterior lines; a black spot on the subcostal close to base; three black spots in a straight oblique line, on the subcostal, median, and submedian veins, represent the basal line; five spots represent the median line, and seven, more linear, the exterior;

cell-spot large, round; submarginal line represented by four larger blackish spots — one below the costa, two almost contiguous, opposite the cell, and the fourth between the first and second median nervules; three small black dots on costa before apex, and a row of distinct black spots along base of fringes, which are concolorous.

Hindwings: the same, but the cell-spot larger, with a pale grey centre.

Head and thorax with abdomen yellowish speckled with red, the abdomen with some black dots; face pale, unspotted; palpi reddish. Underside pale straw-colour, with the markings and frecklings more diffuse. Disc of forewings suffused with rosy, and the spots towards the hindmargin purple-grey.

Expanse of wings: 34 mm.

One ♂ from the Khasias.

A very distinct and gaily marked species. In this case, as the legs are all broken off, the genus of the species must remain uncertain.

38. **Ptychopoda luteata** sp. nov.

Forewings: pale yellowish ochreous, with three diffuse paler whitish ochreous fasciae, without any darker lines or dusting; the pale fasciae come between the basal area and the central fascia, between the latter and the submarginal fascia, and along the hindmargin; fringes of the paler colour.

Hindwings: exactly similar.

Head, thorax, and abdomen concolorous with the yellower ground-colour. Underside the same, but the yellower tints are greyer, and the first pale fascia is absent.

Expanse of wings: 16 mm.

A good series from the Khasias.

39. **Ptychopoda obliquilinea** sp. nov.

Forewings: rufous ochreous; first line at one-fourth, slender, obliquely sinuous inwards; outer line at five-sixths, irregularly wavy and faintly denticulate, followed by a rufous wavy submarginal and marginal shade; fringe pale ochreous, with dark basal line, which is more strongly marked towards anal angle, and with very faint dark dots opposite the veins; a thick oblique rufous grey line from two-thirds of costa to middle of inner margin, preceded by a small blackish cell-dot.

Hindwings: the same, with the thick oblique line antemedian, followed by the cell-dot.

Head, thorax, and abdomen rufous ochreous; face dark brown. Underside paler, less rufous.

Expanse of wings: 22 mm.

A few from the Khasias.

40. **Ptychopoda rubellata** sp. nov.

Wings pale ochreous, suffused with pinkish brown scales.

Forewings: with a curved basal, sinuous central, and wavy darker pink exterior line; a pale wavy submarginal line of the ground-colour; discal dot distinct, blackish; fringe of the ochreous ground-colour, with a minute round dark dot at the end of each vein.

Hindwings: the same, with two curved pale submarginal lines, and a dark distinct discal dot.

Abdomen and thorax ochreous; vertex whitish ochreous; face dark brown.

Underside paler, with less suffusion; all the wings showing three wavy pinkish lines, one central and two submarginal.

Expanse of wings: 24 mm.

Several of both sexes from the Khasias.

Symmacra gen. nov.

Closely related to *Discoglypha* Warr., but the neuration of forewings is different: the first subcostal anastomosing with the common stem of the other four for a considerable distance; the hind tibiae have a pencil of hair and the terminal spurs unequal; the ♂ antennae are subserrate and ciliated. The character of the markings is the same as in *Discoglypha*.

Type: *Symmacra regularis* sp. nov.

41. **Symmacra regularis** sp. nov.

Forewings: dull reddish, thickly dusted with darker; costa broadly brown; first line dark grey, at one-fourth, outwardly oblique; second just beyond middle, nearly vertical, wavy, dark grey; submarginal line distinct, blackish, dentate, the teeth marked by black dots on the veins, followed by an obscure reddish dentate shade; a thin black marginal line, concisely interrupted at each vein by a whitish dot; fringe concolorous; cell-spot round, black.

Hindwings: like forewings, but the cell-spot oblong, silvery white edged with dark.

Thorax and abdomen dark red-brown; vertex and shaft of antennae white; face and palpi red-brown. Underside of forewings rosy, of hindwings pinky white.

Expanse of wings: 28 mm.

A few ♂♂ only from the Khasias.

In a second example the first line is not visible at all, the second very obscure, and the submarginal distinct, but not marked by black dots.

42. **Timandra strigulata** sp. nov.

Forewings: ochreous, suffused with rufous, and covered with short fuscous transverse strigulae; a diffuse rufous streak from apex to inner margin beyond middle; submarginal line grey, sinuous; fringe rufous, with a darker line at base; cell-dot rufous, indistinct.

Hindwings: with the rufous line antemedian; the submarginal line with a blunt angle in middle.

Head, thorax, and abdomen ochreous dusted with fuscous; face and collar rufous. Underside like upper, but rather paler and duller.

Expanse of wings: 30 mm.

Several from the Khasias.

Distinguished from *responsaria* Moore by the dense strigulations.

Subfamily ASTHENINAE.

43. **Autallacta livida** sp. nov.

Wings dull slate-colour, with liver-coloured wavy transverse lines, six on the forewings, four on the hindwings: of the former two are basal; the third and fifth form the edges of the central area, having the fourth midway between them; the

sixth is submarginal; each of the last three is followed by another much fainter wavy line. In the hindwings the first line is basal, the next central; the other two, close together, submarginal; fringes concolorous. Forewings with costa between the lines ochreous, and wholly ochreous just before apex.

Head, thorax, and abdomen concolorous; tip of abdomen ochreous; face dark chocolate-brown; extreme apex of forehead and antennae ochreous. Underside duller, with the chief markings reproduced.

Expanse of wings: 26 mm.

Several from the Khasias.

Subfamily TRICHOPTERYGINAE.

Aphantoloba gen. nov.

Forewings: with costa well curved throughout; apex produced, but blunt; hindmargin with bluntly rounded projection in middle, incurved above, oblique and straight below; anal angle well marked.

Hindwings: in ♂ quite narrow, in ♀ more developed; the hindmargin nearly straight, and both angles squared; no trace of a lobe in the ♂, the inner margin being limited by vein 2.

Palpi porrect, rostriform, reaching well in front of forehead; antennae of ♂ pectinated, but not strongly; of ♀ simple, filiform; hind tibiae of ♂ with four spurs.

Neuration: forewings, cell not half as long as wing; first median at one-half, second and third from lower angle of cell; lower radial from centre of discocellular, upper from upper angle of cell; the five subcostals stalked from before end. Hindwings, cell short; costal connected with subcostal by a bar at middle of cell; the two subcostal nervules stalked, as are the last two medians; first median close before end of cell.

♂ only half, or not half, as large as ♀.

Type: *Aphantoloba nigrinotata* sp. nov.

44. **Aphantoloba nigrinotata** sp. nov.

Forewings: glossy pale olive ochreous, with a few sparsely scattered black atoms; two triangular dark olive fuscous costal blotches at one-third and two-thirds, from which the two transverse lines start, the first very indistinct, the second curved and sinuous, olive-brown; a small black blotch on costa before apex, and a still smaller one at apex; a small curved blackish blotch on margin of the subapical concavity; fringe concolorous, with a black blotch in the lower half of the concavity and along the middle of the lower arm.

Hindwings: paler, more whitish, with an irregular dark greyish black submarginal streak and some scattered fuscous scaling; fringe pale, with black marginal line.

Head, face, thorax, and abdomen ochreous, the latter with some dark markings towards apex. Underside pale ochreous, with coarse fuscous mottlings; the exterior line broadly dark on both wings.

Expanse of wings: ♂, 14 mm.; ♀, 30 mm.

Several from the Khasias.

45. **Dysethia pallescens** sp. nov.

Forewings: pale bluish grey, thickly dusted with fine blackish atoms; three brown-black spots on costa, first at one-third, second at two-thirds, the third at five-sixths; the first oblique outwards, the second inwards, the third quite small; from the end of the first a tawny line runs obliquely inwards to inner margin at one-third, marked by a brown dot on median and submedian veins; from the end of the second a tawny line runs in a large curve outwards to the first median nervule, then straight to inner margin, also marked by brown dots on the veins; from the third a very indistinct submarginal shade can be traced; fringe concolorous, with a very fine dark basal line.

Hindwings: with no markings except an outer dark line, which is irregularly bent, and only distinct towards the inner margin.

Head, thorax, and abdomen all concolorous. Underside dull ochreous yellowish, dusted with darker; costal area of forewings yellow, undusted; inner margin whitish; a faint discal dot.

Expanse of wings: ♂, 32 mm.; ♀, 36 mm.

A pair from Japan.

Emmesomia gen. nov.

♀. *Forewings:* very broad; costa slightly curved at base, then straight till shortly before apex; apex produced, curved, falcate; hindmargin strongly incurved below apex, then running out so as to form a broad blunt elbow in the middle at end of third median, thence very obliquely curved in to anal angle, which is strongly marked and almost rectangular.

Hindwings: small; apex rounded; hindmargin forming a short projection at end of first subcostal, thence slightly curved to anal angle, which is square.

Antennae short, thick, curled at apex, lamellate; tongue present; palpi exceedingly short, not reaching front of face.

Neuration: forewings, cell not quite half the length of wing; discocellular straight; first median a little beyond one-half, second close before angle, third from angle of cell; lower radial from middle of discocellular, upper from near the base of last subcostal; third, fourth, and fifth subcostals stalked; first and second stalked; second anastomosing with third and fourth for some distance. Hindwings, costal connected with subcostal in middle of cell by a bar; two subcostals stalked; last two medians short-stalked.

Type: *Emmesomia bilineata* sp. nov.

46. **Emmesomia bilineata** sp. nov.

Forewings: stone-colour, dusted with very fine and dense fuscous atoms, which are darkest towards hindmargin and apex; costa finely brick-red; two transverse bands olive-yellowish, edged, the first externally, the second internally, with dark grey; first band from costa just before middle is sharply angled on subcostal, then curved inwards to inner margin at one-third; above the angulation at the costa the olive-yellow becomes brick-red and the dark grey edging black; second line from costa at about three-fourths to inner margin shortly before anal angle, quite straight; the small costal portion is coloured brick-red, as in the first band; a curved black spot on hindmargin in the subapical excision opposite the cell; fringe dark red, with pale drab outer half and a faint dark grey line in the middle.

Hindwings: paler, without dark dusting except along inner margin, with the second band of forewings represented very faintly; fringes red.

Head, antennae, thorax, and abdomen concolorous with wings; face dull olive-red. Underside mainly dull brick-red or orange-red; the base and inner margin of forewings cinereous; the second band in both wings black, as well as the marginal blotch on forewings; fringe of forewings blackish at base, of hindwings with a fine black basal line.

Expanse of wings: 56 mm.

One ♀ from the Khasias.

47. **Lobogonia olivata** sp. nov.

Forewings: pale silvery green, suffused in parts with olive-green, and dusted with very fine dark atoms; costa whitish, with numerous irregular blackish frecklings: lines thick, olive-fuscous; first at one-third of costa to one-third of inner margin: second from two-thirds of costa to inner margin just before anal angle, parallel to first line; both lines nearly straight, and edged internally with pale whitish green, which gradually deepens into olive towards base; hindmargin likewise whitish green, deepening into olive outside the second line; a small round black spot near hindmargin opposite the cell; a small dark cell-speck on discocellular; fringe pale green, but dark olive-fuscous in the curve between apex and central prominence, and again between it and anal angle.

Hindwings: pale shining whitish, speckled with faint green, with a bent fuscous olive line at two-thirds and a faint darker cell-spot; fringe pale ochreous.

Head and thorax olive-green; abdomen silvery grey. Underside dull yellowish ochreous, mottled with fuscous; the forewing mostly suffused with cinereous.

Expanse of wings: 30 mm.

A few from the Khasias.

Hypocometa gen. nov.

Allied to *Phthonoloba* Warr.; like that genus, with neither wing distorted or excised; agreeing also in the antennae and palpi, and in the neuration of forewings; vein 10 anastomoses with 11, and then with 8, 9, to form a double areole. The points of *difference* from *Phthonoloba* are twofold: the hind tibiae of ♂ are without spurs, and instead of the femorotibial tuft have a thick short brush of dark scales at the junction of the tibia and tarsus; secondly, in the ♂ hindwing one of the median nervules is wanting, presumably the second.

Type: *Hypocometa clauda* sp. nov.

48. **Hypocometa clauda** sp. nov.

Forewings: bright green or whitish green, with black waved and dentated lines; fifteen can be counted; of these the first is basal; 2 and 3 are confused together by black scaling, forming a fascia; 4 is thick, 5 very slender; 6 and 7 form a fasciaform edge internally to the central fascia; 8, 9, 10, 11 are fine and subdentate, close together, and form the outer edge of central fascia; 12 is slender and wavy, and forms the centre of a whitish fascia; 13 and 14 form a submarginal fascia; 15 is submarginal, and consists of triangular or lunulate contiguous blotches, preceded by a whitish line; a series of double black spots along hindmargin at end of veins; the upper half of central fascia is widened and pale, and contains a large oval black discal spot, with pale edges.

Hindwings: dark silky fuscous.

Face, palpi, and thorax green; abdomen ochreous, with black segmental markings; antennae ochreous, annulated with black. Underside dull ochreous cinereous; tibial tufts black.

Expanse of wings: 50 mm.

Numerous examples from the Khasias.

49. **Pseudoschista bicolor** sp. nov.

Forewings: broader and shorter than usual, pale green, with darker green and fuscous wavy and denticulated transverse lines; basal space consisting of diffuse dark green curved bands with paler interspaces, bounded by a paler green narrow space with a dark green thread in its centre: central space or fascia formed of six dark green lines, the second and fifth faintest, all becoming denticulate below the middle; the first, third, and sixth ending in outwardly directed blackish spots on inner margin; lower half of discocellular marked by a dark linear spot, to which from the costa stretches a narrow tooth-shaped pale whitish green blotch; the central fascia is followed by, first, a paler green fascia, then a dark green one, then the whitish green subterminal line, all three denticulated; beyond this the marginal space is deep olive-green, paling again towards the margin itself, which is marked by blackish spots at the ends of the veins; fringe pinkish green; the space below the median vein and beyond the cell as far as the dark green exterior fascia is suffused with dull lilac.

Hindwings: small, dull whitish, with the apical region fuscous and the fringe ochreous.

Thorax green, mottled with darker; abdomen ochreous (? faded); face and vertex pale green; palpi dark green; antennae reddish at base, becoming blackish towards their apex. Underside pinkish cinereous.

Expanse of wings: 40 mm.

A few from the Khasias.

The species may be recognised by the ample forewings, with lilac discal suffusion, and the whitish green tooth-shaped mark from the middle of the costa.

50. **Pseudoschista nigrifusalis** sp. nov.

Forewings: green, with darker green and blackish cross lines; a black outwardly curved line close to base, with a shorter black line inside it; a black wavy line at one-third, broad on costa and angled on the subcostal vein, runs to the inner margin at middle; two or three indistinct dark green wavy lines in the interval between it and the basal line; beyond the middle a broad blackish fascia of three or four lines, the outer edge sharply angulated, and then incurved and dentate to inner margin before anal angle, leaving a pale green space on costa between its inner edge and the second line; apical space pale green, with three wavy denticulate lines, which become darker and approximate towards inner margin; a wavy denticulate submarginal line parallel to hindmargin, the marginal space beyond its lower half clouded with blackish; a blackish longitudinal shade from the angle of central fascia to hindmargin; fringe whitish green, with darker mottlings.

Hindwings: pale grey.

Head and thorax greenish; abdomen ochreous (? green when fresh); antennae black; palpi greenish. Underside dull cinereous.

Expanse of wings: 40 mm.

A pair from the Khasias.

51. **Trichopterygia ustimargo** sp. nov.

Forewings: pale grey, tinged in parts with ochreous and suffused with dark fuscous or blackish; basal patch and broad central fascia smoky grey, darker towards the edges, along the inner margin smoky black, forming a streak from base to anal angle; outer edge of central fascia followed by three or four alternate pale and dark grey wavy and denticulated lines, mixed with ochreous scales and crossed by longitudinal black streaks on the veins, which on the costa form a dark ochreous and black velvety spot; marginal area grey; fringe lighter, with indistinct pairs of dark dots at base. There appears to be a dark ochreous-edged curved line down the centre of the central fascia, and the discal spot is oblique, linear, dark, edged with ochreous; veins generally streaked with black.

Hindwings: white.

Underside of forewings dingy grey, of hindwings white. Thorax dark grey; abdomen paler; face pale ochreous; palpi blackish.

Expanse of wings: 34 mm.

One ♂ from the Khasias.

Subfamily HYDRIOMENINAE.

52. **Cidaria subcanescens** sp. nov.

Forewings: with the ground-colour silvery grey; basal patch dull chestnut-brown, bounded by a silvery grey line, which is bluntly angled below costa; the central fascia is likewise bounded internally by a silvery grey line, which forms a beaklike projection beneath the first median nervule; the space between the two lines is mottled with fuscous and grey, and contains a darker triangular blotch; central fascia dull chestnut-brown above the median, dark grey below, containing four lunular lines, concave inwards, the two middle ones uniting and forming a series of flattened ovals, of which the four below the median are complete and separate, while those above are irregular and coalescent; it is edged by a curved white line, which emits a sharp tooth inwards along the fifth subcostal and second median; marginal area silvery grey mottled with dark grey; an indistinct series of irregular dark lunules; a rounded brown-black subapical patch along the upper part of hind-margin, and a bright chestnut patch along the lower, edged beneath at anal angle with white; an interrupted black line before the fringes, which are brown.

Hindwings: silky grey, tinged with fuscous, with traces of three or four wavy lines in the outer half, which are visible only towards inner margin; fringe and basal line as in forewings; both wings with blackish cell-spot.

Face, palpi, head, and collar bright ochreous; thorax and abdomen brownish ochreous, tinged with grey; patagia grey. Underside silvery grey, dusted with brown, with the discal spots large and distinct, and traces of lines.

Expanse of wings: 38 mm.

Two ♀♀ from the Khasias.

53. **Epirrhoe (?) contortilinea** sp. nov.

Forewings: whitish, suffused with dull grey, and crossed by thick blackish lines; basal area dark grey, its outer edge curved; followed by two irregularly

sinuous thick black lines, the outer nearly touching the large black cell-spot; a broad bulging black sinuous fascia at two-thirds is preceded by a thick black sinuous line, and followed by a white fascia, broadening at costa and traversed by a fine slightly wavy black line; marginal area dull smoky grey, with a paler submarginal line immediately before the hindmargin; fringe dark grey.

Hindwings: exactly the same.

Head, thorax, and abdomen dark smoky grey. Underside dirty white, with all the dark markings of upperside expressed, except the basal, where there is only one line before the cell-spot.

Expanse of wings: 28 mm.

1 ♂ from the Khasias.

Unlike any other species with which I am acquainted.

54. **Ochyria inconspicua** sp. nov.

Forewings: pale grey, with a slight olive tinge; lines rather darker; basal line curved, edged with whitish externally; inner line at one-third, curved obliquely inwards, edged internally with whitish; outer line at two-thirds, at first oblique outwards, then vertical, and again oblique inwards, faintly wavy and denticulate, edged externally with whitish; submarginal line indistinct, close to margin, preceded by a darker olive-grey cloud; fringe grey, preceded by a series of dark double dots; discal spot distinct, dark grey.

Hindwings: with the lines and shading distinct only on inner margin; a dark grey whitish-edged shade in the middle.

Head, thorax, and abdomen grey, with darker dusting. Underside dull grey, with a darker central shade on both wings.

Expanse of wings: 24 mm.

A few only from the Khasias.

55. **Perizoma quadrinotata** sp. nov.

Forewings: bright straw-colour, with the basal patch, an angulated central fascia, a truncated subapical fascia, and an apical triangular spot, all blackish; the basal patch is filled up with black only in its costal half, and is limited by a concise black line; in the pale space of ground-colour between it and the central fascia are two diffuse wavy dull orange lines, and some blackish smudges beneath the costa; central fascia concisely edged with a fine white and black sinuous line on either side; the truncated fascia is followed by a white interrupted submarginal line, and is itself continued to the inner margin as an orange fascia; the triangular apical spot is produced as a dark fine shade edging the submarginal line externally; fringe straw-colour, wide, with very distinct black dashes at the ends of all the veins.

Hindwings: glossy pale grey, with a dull darker cell-spot, and two pale curved fasciae towards hindmargin, both obscure, and the outer interrupted; fringe ochreous grey.

Head, face, palpi, antennae, thorax, and abdomen all straw-colour. Underside of forewings glossy dark cinereous, with distinct blackish discal spot and whitish interrupted submarginal line; hindwings straw-colour mottled with grey, with three more or less distinct darkish curved fasciae; fringes as on upperside.

Expanse of wings: 14 mm.

In abundance from the Khasia Hills.

56. **Perizoma semifusca** sp. nov.

Forewings: ochreous grey, tinged in parts with rufous; a narrow central blackish fascia edged with black lines, and with a black line down its centre; the inner edge evenly curved, the outer indented opposite the cell, and with a slight bilobed projection between the first and third medians; basal space within this fascia traversed by several curved lines, and suffused with dull reddish grey; basal patch itself fuscous or blackish; a reddish band in the space between it and the central fascia; the outer edge of central fascia is itself edged by a white line, followed by two wavy dark lines; submarginal shade cuneiform, a double blackish wedge-shaped mark opposite the cell; extreme hindmargin fuscous and reddish, with a paler patch in middle, as in *taeniata*; fringes reddish grey mottled with darker.

Hindwings: dull ochreous grey, with broad curved dark grey marginal band and traces of curved lines in the central portion of the wing.

Thorax and abdomen blackish; anal segment in ♂ pale; vertex, palpi, and face pale grey. Underside dull greyish, with a broad pale submarginal fascia beyond exterior edge of central fascia; base of hindwings paler.

Expanse of wings: ♀, 20 mm.; ♂, 18 mm.

Several from the Khasias.

Generally, owing to the dark suffusion of the space between the basal patch and central fascia, the whole basal three-fifths appears dark, while the outer two-fifths remains in the main of the pale ground-colour, and by this the insect may be easily recognised.

57. **Perizoma tenuifascia** sp. nov.

Forewings: greyish white, with a narrow basal patch and slender central fascia brown; the fascia is broader on costa, and has a small projection on its outer edge below the median; a small brown costal spot before apex; a blackish discal spot in central fascia; marginal line dark grey; fringe whitish, with dark grey triangular mottlings.

Hindwings: greyer, with a faint central curved line.

Head and thorax dark grey-brown, the metathorax black; abdomen greyish white, with black band on first segment and black spots on back of the rest. Underside of forewings dark grey; of hindwings paler, with a blackish cell-spot and traces of two curved lines.

Expanse of wings: ♂, 24 mm.; ♀, 26 mm.

Both sexes from the Khasias.

It is possible that this and *triplagiata* may be forms of the same species: *triplagiata* has an ochreous suffusion which is wanting in *tenuifascia*; and the specimens were taken a month later than those of the latter—in October, instead of September.

58. **Perizoma triplagiata** sp. nov.

Forewings: white, with faint traces of waved ochreous lines; a dark brown basal patch, with outer edge vertical and faintly waved; a triangular brown patch on middle of costa, the apex blunt and reaching the median vein; a small brown costal patch before apex; fringe white.

Hindwings: white, with a minute dark discal spot.

Head and thorax dark brown; abdomen greyish white. Underside of forewings dull grey, of hindwings paler; both wings with a dark cell-dot.

Expanse of wings: ♂, 24 mm.; ♀, 28 mm.

Both sexes from the Khasias.

In one ♀ the submarginal line of forewings is distinct, wavy throughout, with the marginal area beyond it clouded with grey and the marginal line grey; and the hindwing is greyish, with a darker spot at anal angle.

Subfamily TEPHROCLYSTINAE.

Aetheolepis gen. nov.

♂. *Forewings:* exaggerated, very broad; costa curved throughout; apex rounded; hindmargin obliquely curved, inner margin straight; both equal in length.

Hindwings: very small, triangular; costa arched; apex strongly rounded; anal angle rounded, but somewhat produced.

Forewings clothed with ordinary scales; hindwings with their base covered with dense papillae; the central area iridescent and very finely scaled; the marginal area clothed with a mealy efflorescence; no fringe except at anal angle on inner margin. Underside of forewings iridescent on inner half; in the hindwings the whole area except just above the costal vein is clothed with dense overlapping broad square-tipped scales. Palpi fairly long, porrect, rostriform. Antennae simple.

Neuration of forewings like *Chloroclystis*, and probably of the hindwings also. Hind tibiae with four spurs, the median pair very short and near to the end pair.

Type: *Aëtheolepis papillosa* sp. nov.

59. **Aëtheolepis papillosa** sp. nov.

Forewings: pale green, crossed by numerous irregularly wavy fuscous lines; several near base form a darker basal area; two from about the middle of costa are curved outward round the discal line and form the edge of the usual central fascia, while two or three more close together form a confused subterminal line; a darker shade at anal angle; all the lines thicker and darker on inner margin; fringe greenish.

Hindwings: with the papillae at base grey-green, the efflorescence along the hindmargin dull reddish brown.

Head, thorax, and abdomen greenish. Underside of forewings pinkish cinereous, the inner half pearly; scales of hindwings dull brownish.

Expanse of wings: 30 mm.

A few from the Khasias.

60. **Chloroclystis nigroviridata** sp. nov.

Forewings: bright green; basal patch black; central fascia with the inner edge broadly curved from costa to middle, thence straight, its outer edge with a conical projection below the upper radial, a blunt elbow on third median, thence running oblique inwards and waved; the whole of the middle of the fascia is overrun by the green ground-colour, so that it appears to consist of two irregular black fasciae, of which the outer is obsolete in its lower half except for the black waved outline; both inner and outer margins are finely edged with white; submarginal line represented by a black costal blotch and two small black spots below it, the rest of the line being faintly white; fringe rufous grey, chequered with dark grey, and with traces of a dark basal line.

Hindwings: glossy grey, with traces of a submarginal and marginal curved band; fringes as in forewings.

Head, thorax, and abdomen green. Underside whitish grey, mottled with darker; the fringes yellowish, with dark grey mottlings.

Expanse of wings: 22 mm.

Several from the Khasias.

61. **Tephroclystia biviridata** sp. nov.

Forewings: with basal and marginal areas delicate pale green; median area purple-brown; a curved fine black line close to base, with a blackish costal spot a little beyond; inner edge of central fascia slightly curved above, straight below; outer edge bulged in middle, and there with neat denticulations; oblique inwards below the costa and sinuous above inner margin; both edges are finely black; within the fascia can be traced a median thick wavy dark band, and two more towards the outer edge; cell-spot distinct, black; submarginal line darker green, denticulate; fringe green, with a line of fine black dashes at base.

Hindwings: glossy pale grey at base, then smoky grey with a purplish tinge, and finely green along the hindmargin; fringe and fringe-line as in forewings.

Head, thorax, and abdomen green. Underside duller green, with the markings and suffusion dark grey.

Expanse of wings: 18 mm.

One ♂ from the Khasias.

Onagrodes gen. nov.

Forewings: short and broad; costa straight, convex at apex, which is broadly rounded; hindmargin strongly curved; inner margin short.

Hindwings: with both angles and hindmargin strongly rounded.

Antennae of ♂ simple, annulated; palpi porrect, reaching beyond face; second joint hairy; third pointed, drooping.

Neuration: cells very short. Forewings with first median from two-thirds, curved at origin towards inner margin; second from close before lower angle of cell; third from angle; lower radial from centre, upper from upper angle of cell; all five subcostals stalked, the fifth leaving first, the first, second, and third at equal intervals running shortly into costal margin, the fourth into the rounded apex, third and fourth widely separate and concave to each other. Hindwings with costal anastomosing for two-thirds of cell; the two subcostals stalked; discocellular angulated, the radial from the shoulder of the angulation; second median well before the lower angle of cell; first at two-thirds, straight at its origin. The forewings have a roundish patch of smooth ochreous scales above and below the origin of the second median on the underside; the hindwings have a similar patch on the upperside, visible also beneath, between the two subcostals shortly after their point of separation. Scaling rough and lax.

Type: *Onagrodes obscurata* sp. nov.

62. **Onagrodes obscurata** sp. nov.

Forewings: dull smoky brown, with no distinct markings; a paler spot on costa at one-third and two-thirds seems to denote the origin of the first and second line respectively.

Hindwings: the same, with the ochreous patch of scales strongly marked.

Underside the same, but duller: on the forewings the pale origin of the two lines is more distinct towards the costa, the second showing a dark line down the centre of the pale fascia; the ochreous patch plain. Head, thorax, and abdomen, as well as fringes, all smoky brown.

Expanse of wings: 26 mm.

Three ♂♂ from the Khasias.

In a fresher example lately received the course of the usual pale lines across the forewings is more visible, and the whole ground-colour of both wings is decidedly paler.

Sesquiptera gen. nov.

♂. A development of *Chloroclystis*, with which it agrees in the forewings, but the hindwings are reduced in size and shape; the costa is rounded, and curves into the hindmargin, and this again into the inner margin, so that the wing, which is not more than one-half the width of the forewings, has no angles; the inner margin is bounded by vein 2. The whole outer half of the wing is clothed with a thick mealy efflorescence in place of scales, as in the genus *Aëtheolepis* Warr.

Neuration of hindwings: costal anastomosing with subcostal for three-fourths of cell; the two subcostals from upper end of cell; the discocellular oblique; radial from the centre; third median from lower end of cell; second and first at equal distances before the end.

Type: *Sesquiptera inaequata* sp. nov.

63. **Sesquiptera inaequata** sp. nov.

Forewings: dull green, with the central fascia blackish, its inner edge curved and wavy, its outer edge acutely angled outwards below the costa; traces of a basal dark line, and of wavy lines in the marginal area; fringe greenish, with black basal line.

Hindwings: pale green at base; the efflorescence reddish olive-green.

Underside dirty greenish, with indistinct markings. Head, thorax, and abdomen green, with an olive tinge; two thin black lines at base of abdomen.

Expanse of wings: 20 mm.

One ♂ from the Khasias.

Gymnopera gen. nov.

Another development of *Chloroclystis*, allied to *Sesquiptera* and *Aëtheolepis*. The ♂ hindwings are rounded, and appear puffy, being clothed above with coarse mealy scales, which towards the hindmargin are developed into a fine suberect efflorescence; the hindmargin itself is thickened, and there are no vestiges of fringe; the inner margin, and also vein 2, are clothed with long pale curved hairs. On the underside of the forewings of the ♂ the area below the median vein is clothed with thick green hairlike scales. The underside of hindwings is clothed with the ordinary fine scaling.

Neuration of hindwings: costal anastomosing with subcostal for half the cell, then curving away vertically and reaching the costal margin just beyond the middle; the two subcostals shortly stalked; discocellular twice angulated, the radial from the lower angulation; first median at one-half, second at five-sixths, third from angle of cell.

Type: *Gymnopera rubrovirdis* sp. nov.

64. **Gymnopera rubroviridis** sp. nov.

♀. *Forewings:* pale green, almost whitish, with darker green transverse lines and fasciae; the edge of basal area denoted by a green line; central fascia with a broad green fascia on its inner edge, with three other green stripes only plain along the costa, becoming thinner towards inner margin, where the whitish green ground-colour predominates; submarginal line double, fine green, starting from a large green subapical blotch; marginal line green, interrupted, consisting of subcontiguous blotches; throughout the cell the green lines become *rosy*; fringe whitish green, with darker green chequering.

Hindwings: whitish ochreous, becoming pale green towards hindmargin, with a paler submarginal band.

Head, thorax, and abdomen ochreous (? green when fresh). Underside dull whitish green, with the markings hardly indicated.

♂ like ♀ in the forewings; the hindwings without markings, pale dirty green, thickly clothed with deep green mealy scales in the centre, which towards hindmargin become more olive, finer, and suberect; costal area whiter, without scales; no fringes, but the hindmargin thickened; inner margin and the marginal area clothed with long pale greenish hairs. Underside of hindwings scaleless, smooth; underside of forewings below the median vein clothed with a bed of dull green rough scales.

Expanse of wings: 22 mm.

A pair from the Khasias.

Subfamily OURAPTERYGINAE.

65. **Ourapteryx modesta** sp. nov.

Forewings: whitish, semi-transparent, the whole surface rendered somewhat sordid owing to the numerous short transverse strigae and freckles; costa yellowish, with very short blackish dots and strigae; lines and fringes reddish fuscous; first line fine, straight, from one-third of costa to middle of inner margin; a fine vertical discal line at end of cell; exterior line slightly concave outwards from three-fourths of costa to inner margin at five-sixths.

Hindwings: with a thin brown straight line from top end of discocellular towards anal angle; fringes becoming redder on either side of the acute tail, before which, on the upperside, are some diffuse black scales, containing a small triangular brick-red spot. The inner vein is pale brown, and the region of the anal angle is filled with dull grey speckling.

Head, thorax, and abdomen, with underside and legs, pure white; antennae, palpi, and face drab brown. Underside of wings simple, white; the costa of fore-wings dusted with dark dots; the fringes dark brownish red.

Expanse of wings: 56 mm.

One ♂ from S. Java.

Subfamily SCARDAMIINAE.

66. **Scardamia rectilinea** sp. nov.

Forewings: deep orange, with darker transverse strigae; costa broadly brown-black; transverse lines brown-black; the first oblique outwards, slightly bent on the median, and running in basewards along the costal streak; the second at three-

fourths, quite straight from costa to inner margin; the second is edged outwardly and the first inwardly by a fine line of metallic scales; discal spot linear, brown; a series of metallic dashes close to hindmargin between the veins; fringes concolorous.

Hindwings: with a round cell-spot, and a nearly straight exterior line at two-thirds.

Thorax and abdomen orange-red, the latter with a black spot above first segment; face and vertex red; palpi dull orange; antennae black. Underside dull greyish yellow, with the markings dull red-brown.

Expanse of wings: 32 mm.

This form appears restricted to the Khasia Hills, and exhibits no variation whatever in the direction of the typical *metallaria* and its different forms.

SUBFAMILY DELIXHNAE.

67. **Heterostegania denticulosa** sp. nov.

Forewings: yellowish ochreous, washed with deeper yellow and tawny fuscous, and thickly sprinkled with coarse fuscous atoms; the costa blotched and spotted with fuscous grey; first line dark fuscous at one-third, curved and forming angles outwards on the subcostal, median, and submedian veins, the angle on the median containing a distinct white spot, that on the submedian a white dot; cell-spot black; exterior line at five-sixths, curved parallel to hindmargin, and consisting of a very regular series of curves between the veins, preceded by a broad grey-brown fascia, which runs in along the median vein as far as the cell-spot, thence to inner margin at middle, the inner edge concave between the veins; marginal area mostly grey-brown, and connected with the fascia, except towards costa; a darker brown oblique shade from apex to outer line; fringe grey-brown, with darker patches opposite the veins; the space immediately beyond the discal spot is paler yellow, with very few brown atoms.

Hindwings: with whole outer half grey-brown, the basal half yellowish much dusted and varied with fuscous; cell-spot black; the outer line like that on forewings; fringe rufous, with pale apices.

Head, thorax, and abdomen grey-brown; vertex, base of antennae, and upper part of face yellow; lower part of face blackish. Underside like upper, but greyer and duller.

Expanse of wings: 40—44 mm.

Both sexes from the Khasias.

68. **Orthobrachia latifasciata** Moore, ab. **flavidior** nov.

Both wings with the usual straw-coloured ground orange-tinted, with deeper orange striae and without any grey suffusion; the median area of forewing no darker than the rest of the wing; the exterior line generally straighter; line at base of fringe orange.

I have only seen ♀♀ of this form; but the ♂♂ probably vary in the same ways.

69. **Orthobrachia particolor** sp. nov.

Forewings: dull pale chestnut, with a few darker specks and a minute black cell-dot; first line dark brown, bluntly angled below costa, then straight and oblique to inner margin at one-fifth; basal area within this line cream-colour, with some brown

atoms; an irregularly rounded costal subapical blotch of the same cream-colour, with some dark brown atoms, densest in the middle; the blotch outlined with dark brown; fringe concolorous with ground-colour, with fine dark brown line at base; no trace of any exterior line.

Hindwings: with extreme base cream-colour, bounded by a brown line; second line sinuous, crenulated; cell-spot dark brown; central area and outer area from apex to the second subcostal dull chestnut-brown, like the forewing; rest of marginal area cream-colour, with dark brown specks and the outer veins darker, especially near the second line; basal line of fringe dark brown; fringe cream-colour, with chestnut-brown marks at ends of veins, and wholly chestnut below apex.

Head, thorax, and anal segments of abdomen cream-colour; rest of abdomen chestnut. Underside of forewings ochreous, dusted with dark brown and tinged towards hindmargin with reddish; apical blotch cream-colour as above; the first line dark brown. Hindwings ochreous hardly tinged with reddish, with cell-spot and outer line indicated.

Expanse of wings: 34 mm.

♀ ♀ only from the Khasia Hills.

70. **Parasynegia atomaria** sp. nov.

Forewings: sandy yellow, mottled and suffused with deeper yellow, and dusted in parts with fuscous; costa thickly dusted with fuscous; first line not visible; second indicated only by dark vein-spots and dark fuscous dusting within them, followed by a slightly paler fascia of ground-colour; subterminal line equally obscure, indicated mainly by the darker tint and fuscous dusting on either side of it; a row of small black dots along hindmargin between the veins; fringe concolorous; a distinct black cell-dot.

Hindwings: the same.

Head, thorax, and abdomen concolorous with wings. Face, palpi, and antennae reddish brown. Underside paler, dull straw-colour, with more confused mottlings and indications of two irregular blotched curved fasciae on both wings.

Expanse of wings: 38 mm.

Two ♂ ♂ from the Khasias.

71. **Syntaracta maculosata** sp. nov.

Forewings: yellow, dusted with coarse orange atoms; the three lines as usual in the genus; the first below the median irregularly clouded with leaden grey; the second below the median followed by a broad leaden grey fascia reaching to the submarginal line; this latter indistinct, followed opposite the cell by a small leaden grey blotch, and below the median by a larger one; costa and marginal spots leaden grey; fringe yellow, faintly chequered with grey opposite the spots.

Hindwings: like forewings.

Head, thorax, and abdomen yellow, spotted with orange; collar leaden grey; underside dull straw-colour, with all the markings dull.

In the ♂ all traces of the first two lines are absent, and the leaden grey blotches and fascia are edged throughout with orange; the costa is dark only at the extreme edge, and the marginal spots are wholly absent.

Expanse of wings : ♂, 34 mm. ; ♀, 38 mm.

A pair from the Khasias.

The insect has a superficial resemblance to *Parasynegia lidderdalii*.

72. **Borbacha pardaria parviscripta** subsp. nov.

Smaller than *pardaria* Guen., with all the markings thinner and finer ; not consisting of broad grey lunules edged with reddish, but of reddish grey or orange lines formed of narrow contiguous lunules ; forewings with a large grey spot towards costa, obliquely beyond the cell-spot ; cell-spots of both wings blackish, small.

Expanse of wings : 32 mm.

One ♂ from S. Java.

Subfamily BRACCINAE.

73. **Bordeta tricolor** sp. nov.

Forewings : black, with three white blotches edged with grey ; one oblique, oval, elongated, just before middle of wing, from subcostal to submedian fold, directed towards anal angle ; the second and third smaller, with irregular edges, lying one above the other in a line parallel to the first, the third, which is the smallest, being near the centre of the hindmargin ; fringe black.

Hindwings : yellow, with the base, the costa narrowly, and a broad marginal band black ; in this marginal band is a large yellow straggling blotch from near the costa to two-thirds of hindmargin, separated from the yellow basal portion of the wing by a narrow margin of black.

Head and thorax black ; collar whitish ; abdomen yellow, with black segmental rings ; underside like upper, the black not so deep ; legs and antennae dark fuscous.

Expanse of wings : 60 mm.

♂ ♀ from Humboldt Bay, New Guinea.

Subfamily ABRAXINAE.

74. **Abraxas unisinuata** sp. nov.

♀. Wings silky white.

Forewings : with basal one-sixth yellow, edged and spotted with blackish ; costa slenderly black towards base, then irregularly spotted with black ; two exterior rows of elongated blackish spots, slightly sinuous, the inner of the two rows forming a blotch on costa ; a blackish spot beyond discocellular, another in the cell, and a few scattered irregularly below it ; hindmargin with fringe narrowly blackish, with some small round spots contiguous, and two or three smaller, before the apex, unconnected.

Hindwings : with fringe blackish and a single curved row of round spots. Opposite the cell, the hindmargin is very perceptibly indented.

Head, face, and thorax yellow ; abdomen yellow, spotted with black ; antennae black. Underside like upper.

As is frequently the case with *Abraxas*, the markings of the two wings are not symmetrical.

Expanse of wings : 50 mm.

One ♀ from Java.

SUBFAMILY ASCOTINAE.

75. **Alcis (?) fuscibrunnea** sp. nov.

Forewings: dull brownish wood-colour, suffused with dingy fuscous and blackish; the markings indistinct; first line at one-third, outwardly curved and wavy to inner margin at one-fourth, where it is more distinct and geminated; second line from two-thirds of costa, wavy and slightly dentate to inner margin in the middle, here appearing geminated like the first; submarginal line very faint, but edged internally by a brown dentate shade; traces of a dusky fuscous suffusion beyond second line opposite the cell, and a dark brown triangular blotch on the hindmargin below the apex.

Hindwings: the same, but the first line not visible, and the second only on the inner half of the wing.

Head, thorax, and abdomen dark fuscous; anal segment of abdomen pale. Underside dingy grey, with dull fuscous markings; the cell-spots black and distinct, but small.

Expanse of wings: 36 mm.

A good series from Newcastle, Jamaica.

Fovea absent; 10 and 11 stalked, 11 anastomosing with 12, and 10 connected by bar with stem of 8 and 9, just after the origin of 7.

76. **Alcis orbifer** sp. nov.

Forewings: pale reddish fuscous, with dark fuscous atoms and suffusion; costa irregularly black marked; the origin of the lines indicated by spots at one-third, one-half, and two-thirds; subterminal line pale, denticulated, with darker scaling on either side; exterior line indicated only by black vein-dashes; base of wing dusted with blackish; no distinct cell-spot; fringe concolorous, with elongated black spots along the base.

Hindwings: with a broad straight diffuse line near base; a large round discal spot, followed by a broad curved blackish second line, which approximates to first line on inner margin; a large irregular black patch at apex, and another smaller at anal angle, leaving the middle of the marginal space paler, like the disc; submarginal line pale, denticulated, indistinct; fringe as in forewings.

Head and thorax concolorous; abdomen much marked with fuscous; face blackish. Underside dull cinereous, with fuscous markings; outer line clearly denticulate on both wings.

Expanse of wings: 28 mm.

Several from the Khasias.

77. **Alcis squamosa** sp. nov.

♂. *Forewings:* dull fuscous, speckled with lighter and darker scales, which give the insect a rough appearance; fovea large and prominent; costa speckled with black, and the lines blackish, but ill-defined; first at one-third, curved, and marked more on the veins; exterior at two-thirds, from a dark costal spot, denticulate, but marked chiefly on the veins; a curved central line between them, passing over the largish but ill-defined blackish discal spot; submarginal pale, indistinct, preceded on costa and opposite cell by blacker patches, and again at anal angle, where the line itself

forms a whitish spot ; fringe concolorous, with rather large blackish spots at the end of the veins.

Hindwings: with a scaleless semihyaline patch at base ; indistinct antemedian, denticulate postmedian, and interrupted submarginal lines ; discal spot blackish, diffuse.

Head, thorax, and abdomen concolorous. Underside dull cinereous ; the costa ochreous, spotted with darker ; all the markings dull blackish.

Expanse of wings : ♂, 32 mm. ; ♀, 40 mm.

A few from the Khasias.

Closely allied to, but quite distinct from, the preceding species.

78. **Calicha (?) minima** sp. nov.

Forewings: fuscous ochreous, slightly pink-tinged, and suffused and striated with dark cinereous fuscous ; first line at one-fourth, curved on subcostal, and running in to the inner margin at one-sixth, just beyond the prominent fovea ; exterior line at three-fourths, wavy, sinuous outwards in midwing, then incurved, and finally vertical to inner margin just beyond middle ; the included space dark cinereous, except along costa, which is striated with darker ; an obscure central dark shade is just visible in the centre, curved outwards round the blackish cell-spot ; the exterior line is edged outwardly and the basal line inwardly with paler, most distinctly on the two margins ; marginal area mottled with cinereous, with an interrupted obscure submarginal line, which is enlarged towards costa and forms an elongate pinkish blotch with two dark blotches above it ; fringe mottled pale and dark, with darker basal line.

Hindwings: the same, but darker cinereous ; an obscure pinky ochreous blotch at anal angle.

Head, abdomen, and thorax dull fuscous, darker mottled. Underside dingy cinereous, with the markings all indicated.

Expanse of wings : 26 mm.

One ♂ from the Khasias.

This species is hardly congeneric with *Calicha retrahens*, but the first two subcostals are, as in it, coincident.

Diplurodes gen. nov.

Akin to *Paralcis* Warr. and *Prorhinia* Warr. ; agreeing with the former in the short button-shaped third joint of the palpi ; but characterised especially by a pair of thick lateral tufts of scales from the middle of the abdomen, which project so as nearly to meet above ; anal segment also tufted ; fovea of hindwing of ♂ partially protected by a flat sheath of shining scales ; in other respects like *Prorhinia*.

Type : *Diplurodes vestita* sp. nov.

79. **Diplurodes vestita** sp. nov.

Forewings: greyish ochreous, suffused with fuscous and dark grey throughout the basal and marginal areas, and striated with blackish ; first line blackish, twice bent, and nearer base on inner margin than on costa, where it starts from a blackish spot ; the line is preceded by a dark tawny fuscous shade ; discal spot black, followed immediately by a somewhat obscure central line, also rising from a dark costal spot,

and becoming irregularly wavy towards inner margin; exterior line at two-thirds, from a costal spot, forms a small but very distinct sinus outwards opposite the cell, enclosing a round white spot, then runs inwards and forms a shallower sinus below the median, thence vertically wavy to the inner margin close to the central shade; this line is followed, as the first line is preceded, by a tawny fuscous shade; submarginal line pale, denticulate, preceded by a blackish costal blotch and more or less margined with blackish throughout; a darker shading on each side opposite the cell, and a blackish blotch below the sinus of the exterior line; fringe wholly fuscous, with black dots at base between the veins.

Hindwings: with base whitish; a thick blackish oblique basal line to middle of inner margin; a curved subdentate line beyond the dark cell-spot, followed immediately, as in forewing, by a tawny fuscous shade; a subdentate submarginal line.

Head, thorax, and abdomen fuscous, mottled with darker; vertex paler, without mottlings. Underside smooth, glossy, dull ochreous grey; with the basal and marginal areas fuscous, and the lines darker.

Expanse of wings: 36 mm.

One ♂ from the Khasias.

Superficially much like a large *Psilalcis inceptaria*.

Enantiodes gen. nov.

Like *Alcis*, but with the ♂ antennae not pectinated, but with fascicles of cilia, the joints strongly angled; the patagia roughly scaled, and the metathorax with a strong tuft of coarse scales; forewings of ♂ with fovea; hind tibiae thickened and with a tuft of hair. In the forewings the first and second subcostals are free, and the other three stalked.

Type: *Enantiodes stellifera* sp. nov.

80. **Enantiodes stellifera** sp. nov.

Forewings: reddish brown, suffused and dusted with fuscous along costa and hindmargin; the lines blackish, starting from black costal spots; first at one-fourth, angulated on subcostal, then oblique and straight to inner margin near base; a black curved discal spot; median line vertical to middle of cell, then oblique and straight to middle of inner margin; outer line at three-fourths, strongly dentate, excurved in middle, incurved below and reaching inner margin quite close to median line; submarginal line formed by a curved row of black somewhat irregular lunular spots, edged outwardly with white; that between the second and third medians replaced by a round white spot; a row of shallow black triangles along margin; fringe concolorous.

Hindwings: less red; a central curved dark line passing over the black discal spot; postmedian line regularly curved and strongly dentate; submarginal line and fringe as in forewings; the veins of both wings are rather bright ochreous, spotted with black.

Head, thorax, and abdomen dark fuscous, the abdomen mixed with reddish scales. Underside dull cinereous, with all the lines obscurely darker; costa of forewings pale ochreous, spotted and marked with black; the pale spot in the submarginal line indistinct.

Expanse of wings: 44 mm.

One ♂ from the Khasias.

81. **Ephemerophila costistrigata** sp. nov.

Forewings: pale ochreous, varied towards hindmargin with olive and fulvous shades; the lines pale fulvous; the costa fuscous, marked with blackish; first line pale fulvous, double, biangulated as usual, the upper angle beneath costa becoming dark fuscous; exterior line thin, fulvous, preceded by a thicker more diffuse fulvous central line; the end of the exterior line forms a long dark fuscous subcostal streak, running basewards so as nearly to touch the upper dark tooth of the first line; it is followed by a broad greyish olive fascia, which is more distinct above, where it extends from the apex along the hindmargin to the elbow; from the elbow to the anal angle is a fulvous suffusion, separated from the olive band by a pale ochreous space; fringe pale ochreous, varied with fulvous, altogether fulvous towards apex.

Hindwings: ochreous, crossed by numerous fuscous olive streaks; a dark fascia close to base, and a diffuse one beyond middle; a broad submarginal olive fuscous band, limited internally by a dark line; the hindmargin fulvous and ochreous; fringe as in forewings.

Thorax and abdomen ochreous, mottled with fulvous; collar and head darker, mixed with fuscous. Underside pale ochreous grey, much mottled with coarse blackish atoms; both wings with a black cell-spot, and a broad olive-grey submarginal fascia, the inner edge of which is marked by a row of black spots on the veins; marginal area of both wings below the middle ochreous.

Expanse of wings: 48 mm.

Two or three ♂♂ from the Khasias.

Distinguished by the pale ochreous ground-colour and almost obsolete lines.

82. **Ephemerophila serpentinaria** sp. nov.

Forewings: ochreous fawn-colour, suffused in parts with pinkish and greenish, and towards the hindmargin with dull red-brown; first line exactly as in *humeraria* Moore, but very distinct and velvety black, the inner arm being vinous; space included between this line and the base hoary glaucous with a few black atoms, the costal region pinkish ochreous; the second line, instead of being, as in *humeraria*, a continuous line, is marked only by black vein-spots, with here and there a thin black thread between; area between the lines, as far as the median from the inner margin pinkish fawn-colour, above the median much mixed with dull green; marginal area clouded with dull reddish brown; above the anal angle is an irregular blotch of olive-green and blackish scales; fringe concolorous, with no dark basal line; cell-spot round, black.

Hindwings: with the basal two-thirds pale pinkish ochreous, varied with a number of longish transverse grey or fuscous striae, which in places become laterally confluent, and about the middle form an irregular straight fascia; exterior line, instead of being simple, as in *humeraria*, consists of a series of distinct lunules from vein to vein, the line being denticulate outwards on the veins; marginal area dark wood-brown, with a paler pinkish ochreous space from anal angle along hindmargin to the tooth at end of third median.

Abdomen ochreous, with brown segmental rings; patagia and thorax glaucous, like the basal space of forewings; collar and face vinous brown; vertex and base of collar pinkish ochreous. Underside pale stone-colour, with scattered fuscous mottlings, and a more or less distinct wood-brown marginal fascia on each wing, strongest towards

the apex, and becoming paler along the margin towards the anal angle; cell-spots distinct in both wings, but small.

Distinguished from *humeraria* by the coloured tints, *humeraria* being entirely fuscous; by the absence of the transverse striae with which that species is covered; by the difference in the outer line of both wings; and in particular by the different outline of the forewings, which have a marked elbow at the end of the third median and less regularly crenulate hindmargin.

Expanse of wings: 66 mm.

Many ♂♂ from the Khasias.

Taken apparently as commonly as *humeraria* Moore, and at the same time of year, in February and March; but a comparison of two series seems quite to preclude any idea of their being forms of one and the same species.

83. **Hemerophila trilineata** sp. nov.

Forewings: pale wood-colour, the costa broadly suffused with fuscous olive and finely dusted with black atoms; first line, as usual, double and acutely angulated on either side of the black cell-spot, brown-black filled in with reddish; exterior line the same, double only as far as the angulation before the apex, where the inner line is acutely retracted, and again bluntly angulated before the costa; marginal space dusted like the costa, blackish from third median to fifth subcostal; fringes like the margin; in the pale central space between the two lines a third less distinct red-brown line runs parallel to the others, fading out before the costa.

Hindwings: darker, suffused with fuscous and covered with fuscous strigae; a black line close to base; a straight red-brown central shade and another submarginal; marginal space from anal angle to third median of the pale ground-colour, with a few darker clouds; a small black cell-spot.

Head, thorax, and abdomen greyish ochreous, mottled with darker; metathorax brown; palpi and face mixed with brown. Underside pale straw-colour, with indistinct markings.

Expanse of wings: 40 mm.

A considerable number from the Khasias.

84. **Lassaba tephrosiaria** sp. nov.

Forewings: dull pale ochreous, tinged with greenish, this hue being caused by a sprinkling of diffuse coarse olive freckles; the lines darker, olive or fuscous olive; each appearing geminated, the second arm being paler than the first, and sinuous outwards above and below the median vein; first line before one-third, oblique from the costa to inner margin at one-fourth; the outer arm indistinct, but forming a dark dot on median and submedian; second line central; the sinuses of the outer arm distinct; third line at three-fourths, subdentate and darker, slightly curved, forming dark spots on veins, those on second and third median nervules coalescent; the outer arm similar but paler, and forming a dark fuscous grey blotch from second to third median; submarginal line pale, denticulate, margined on both sides with darker, and with a small dark blotch opposite the cell; hindmargin and fringes wavy; a series of dark blotches between the veins, extending into the paler fringes.

Hindwings: the same, without the basal line; a small dark cell-spot in both wings.

Head, thorax, and abdomen concolorous. Underside dingy straw-colour, with

the mottlings and lines more distinct, dark fuscous; an irregular thick exterior fascia is more distinct on forewings.

Expanse of wings: 40 mm.

One ♂ from the Khasias.

Superficially resembling an *Ectropis*.

85. **Paralcis rufaria** sp. nov.

Forewings: pale ochreous suffused with fulvous, and with very fine transverse black striae; the central area dark grey, becoming blackish below the median vein; the antemedian and postmedian lines whitish, the former curved at one-fourth, the latter wavy and denticulate from two-thirds of costa to just beyond middle of inner margin; the dark central area forming black dashes on the veins along its edges, and with an oblique black line along the median nervure and first median nervule; cell-spot black; submarginal line indistinct, wavy, pale, preceded and followed by dark fuscous and fulvous patches; fringe fulvous, with a darker line at base.

Hindwings: with the base whitish, the rest of the wings fulvous, the central area slightly greyer, with the lines only indicated by black dashes; cell-spot large, blackish; fringe fulvous, with shallow black lunules along the base.

Head, thorax, and abdomen fulvous dusted with fuscous; basal segment of abdomen with a white ring. Underside pale ochreous, with fuscous strigae and black cell-spots; both wings with a broad dark marginal band.

Expanse of wings: 36 mm.

One ♂ from the Khasias.

Superficially like *Poecilalcis latifasciata* Warr. and *Gasterocome euryzona* Hmpsn.

86. **Paralcis subochrea** sp. nov.

Forewings: greyish white, much suffused and dusted with fuscous and black atoms; the lines starting from dark costal spots; first at one-fourth, curved, marked by three linear black dashes, on subcostal, median, and submedian veins, preceded by a rusty shade; second line at one-half, curved outwards beyond the dark cloudy discal spot, then straight to inner margin; followed by a rusty shade; exterior line at three-fourths, denticulate, the teeth black on the veins, followed immediately by a fine pale space, and then by a denticulate rusty line; submarginal line pale, wavy, denticulate, preceded by three geminate dark blotches, one costal, the second opposite the cell, the third above anal angle; space beyond ferruginous fuscous; fringes chequered dark and light fuscous, with a row of black spots along base.

Hindwings: the same, but with no central line.

Thorax and abdomen whitish grey, mottled with darker; metathorax dark grey; vertex and front of collar dull rusty. Underside dull ochreous yellowish, with cinereous suffusion towards base, and a broad blackish fascia, which partially fades towards anal angle of hindwings.

Expanse of wings: 40 mm.

One ♂ from the Khasias.

87. **Phthonandria (?) conjunctiva** sp. nov.

Forewings: reddish fuscous, with dark fuscous suffusion and mottlings; the lines blackish; first at one-third, twice angled and towards inner margin geminated; second from costa at two-thirds, inwardly oblique parallel to hindmargin, denticulate

and wavy, reaching inner margin in middle, after forming an angulation outwards on the submedian vein, and connected by a black dash with the first line along the submedian fold; between the two is a curved black central line; the second line is followed by a dark shade; submarginal line blackish, interrupted, with some white dashes externally below costa; an ill-defined dark shade on hindmargin below apex, connected below with the second line; fringe concolorous, with black dots at end of veins.

Hindwings: with a straight antemedian and rather curved postmedian line, with black cell-spot between them; submarginal line indicated by black white-tipped spots.

Head, thorax, and abdomen concolorous. Underside dull brown, with darker markings.

Expanse of wings: 48 mm.

A single ♀ from the Khasias.

The example described is a ♀ with slightly pectinated antennae: whether it is really congeneric with *atrilineata* Butler, the type of *Phthonandria*, is, I think, doubtful.

88. **Racotis boarmiaria** Guen. ab. **sordida** nov.

Wings dull dirty olive, with the ordinary markings a shade darker and very indistinct; cell-spot and basal area of forewings with some scattered red-brown scales; fringe concolorous.

Head, thorax, and abdomen all dull olive. Underside as in typical species.

The example, a ♂, is in perfect condition, and the dull blurred appearance is quite natural, and not, as at first sight might be suspected, the result of exposure or bleaching.

89. **Sinameda intricata** sp. nov.

Forewings: pale straw-colour, with dark fuscous atoms; the lines and all the markings dark fuscous; basal line at one-fourth, curved, double, diffuse, the two branches irregularly connected; costa from base to first line fuscous; central spot oblong, dark fuscous; a fuscous blotch on costa above it, touching it, and curved round it externally, meeting a fuscous streak above the median vein from first line to outer line, and continued in a straight line with the discal mark to touch the exterior line; exterior line from costa at two-thirds, running nearly parallel to hindmargin, and bent in below costa; marginal space beyond filled in with fuscous, leaving patches of pale ground-colour at apex, below middle of hindmargin, and at anal angle: a thick fuscous basal fringe-line; fringe straw-colour, chequered with dark fuscous.

Hindwings: with a thick basal line at one-third, dark cell-spot, double dentate postmedian line, and irregular marginal shade, all fuscous.

Head, face, thorax, and abdomen straw-colour, the abdomen with some fuscous mottlings. Underside the same.

Expanse of wings: 36 mm.

Both sexes from the Khasias.

SUBFAMILY FIDONIINAE.

90. **Chiasmia maculata** sp. nov.

Forewings: straw-colour, sparsely dusted with blackish atoms; costa blackish near base; lines pale yellow, starting from blackish costal blotches, and more or less

dusted with blackish atoms; first near base, very indistinct, the costal blotch being quite small; a larger costal blotch near middle above the blackish discal spot, and a smaller one beyond; from each of these can be traced a curved yellowish line; the two lines approximating below the discal spot are lost in a large curved blackish blotch in middle of inner margin; a fourth blackish costal spot stands shortly before apex; a marginal blotch below apex, and a collection of blackish atoms at anal angle; fringe pale straw-colour, with some dark mottlings towards apex and at anal angle.

Hindwings: with a minute cell-spot; two pale yellow curved central lines, and the three marginal dark blotches as on forewings; fringes wholly straw-colour.

Head, face, thorax, and abdomen concolorous. Underside yellower, with dark fuscous strigae, and the dark markings indicated, but not plainly.

Expanse of wings: 22 mm.

In some numbers from the Khasias.

Allied to *C. strigata* Warr.

Chiasmiodes gen. nov.

Forewings: more elongate than in *Chiasmia* Hüb.; costa gradually curved from base to apex, which is nearly rectangular; hindmargin almost vertical to middle, then oblique and incurved to anal angle, which is rectangular.

Hindwings: kite-shaped, both angles well marked, the hindmargin with a broad blunt prominence in the middle.

Forewings with fovea; ♂ antennae thick, subdentate, with stout fascicles of cilia; forehead with sharp tuft of scales; palpi porrect, rostriform, laxly scaled; tongue present.

Neuration: forewings, cell half as long as wing; discocellular straight, oblique; first median nervule at two-thirds; second and third from lower end of cell; radials normal; last three subcostals stalked from end of cell; second wanting; first anastomosing with costal. Hindwings with the medians as in forewings; the two subcostals from upper end of cell.

Type: *Chiasmiodes variolinea* sp. nov.

91. **Chiasmiodes variolinea** sp. nov.

Forewings: whitish, tinged with yellow along costa and inner margin, and with all the veins yellow; numerous irregular transverse brown strigae; lines brown, distinct; first from one-fourth of costa to one-fourth of inner margin, strongly angulated outwards on subcostal nervure; second from costa just beyond middle runs at first towards middle of hindmargin, then bluntly rounded back to inner margin in the middle; third, half-way between second and apex, also runs outwards for a short distance, then, forming nearly a right angle, goes perfectly straight and concise to inner margin before anal angle; a fourth line, more diffuse, starts from apex, running alongside the third from its angle to near the margin, where it diverges into the anal angle; a dark brown marginal line, interrupted by the yellow veins; fringe straw-colour, mottled with brown; a large round blackish cell-spot.

Hindwings: with the transverse strigae denser, the costal region whitish, without markings; only two lines, one central, thick, straight; the other half-way to hindmargin, slightly curved.

Head and patagia white; collar yellowish; abdomen yellow, much mottled with brown; antennae and palpi brown. Underside like upper, with traces of an

additional cross line on forewings just beyond the discal spot, which can also be faintly seen on the upperside.

Expanse of wings: 26 mm.

Several from the Khasias.

Subfamily SEMIOTHISINAE.

92. **Azata subcinerea** sp. nov.

Forewings: fuscous, darker at base and in the marginal area; first line from costa at one-fourth, blackish, angled on subcostal, and obsolete towards inner margin; central line from a thick dark oblique costal streak, vertical, and slightly sinuous; exterior line at three-fourths, slightly sinuous outwards, denticulate, pale ochreous, with black scales on its inner edge; a pale dentate submarginal line through the dark marginal area; a large oval black discal spot.

Hindwings: the same, with cell-spot indistinct.

Head, thorax, and abdomen concolorous with wings, the thorax darker like the base. Underside dull cinereous, striated and suffused with darker.

Expanse of wings: 34 mm.

A series from the Khasias.

93. **Calletaera angulata** sp. nov.

Forewings: whitish, dusted with fuscous atoms, more thickly along the costa; first line near base, angled below costa, then oblique inwards and indistinct; median line oblique, thick, and slightly irregular from middle of costa to middle of inner margin; preceded by the dark fuscous cell-spot; exterior line at three-fourths, oblique and interrupted opposite the cell, followed by a broad rusty grey fascia, which grows fainter towards the costa; fringe white, preceded by a row of black spots between the veins; the lines are rusty grey.

Hindwings: darker, more suffused with rusty grey, the submarginal fascia broader and nearly reaching the margin.

Head, thorax, and abdomen whitish, dusted with grey. Underside whiter, with the markings darker and much more distinct; the fascia black-brown, narrowed on forewings, and there edged with ochreous yellow.

Expanse of wings: ♂, 26 mm.; ♀, 32 mm.

A few from the Khasias.

Differs from other species of the genus in having the hindmargin of forewings distinctly angled in middle; that of hindwings produced below apex, with a tooth at veins 4 and 6, thence straight to anal angle, which is rectangular.

94. **Gonodela ruptifascia** sp. nov.

Forewings: greyish white, with a slight ochreous suffusion in parts, and dusted sparsely with dark atoms; an indistinct curved subbasal line, followed by the inner line, which is angled below subcostal; an indistinct wavy central line, with an oblique brownish costal blotch beyond it; a brown-black outer fascia, much interrupted opposite the cell and below the middle, and intersected by the pale veins, its inner edge traversed by the pale outer line, which starts from a brown-black costal spot before the fascia; a shallow dark costal spot before the apex, and a brownish cloud

on hindmargin opposite the cell; cell-spot indistinct; fringe concolorous, with interrupted dark spots along base.

Hindwings: like forewings, with a large black cell-spot, and the fascia reduced to irregular blotches in the middle; basal line of fringe continuous.

Head, thorax, and abdomen concolorous with ground-colour of wings. Underside paler, with the fascia broad and very distinct, continued in the forewings opposite the cell to the hindmargin.

Expanse of wings: 40 mm.

One ♀ from the Khasias.

95. **Hyperythra rufifimbria** sp. nov.

Forewings: deep olive, overlaid with rufous and fuscous scales, with no markings, but traces of a darker, wavy-edged submarginal fascia; fringe bright red.

Hindwings: the same, the fascia still more indistinct.

Head, face, and thorax dull ochreous olive; abdomen concolorous with wings, with the sides and anal segments reddish; palpi and antennae red. Underside deep dull red; costal region of forewing fuscous; marginal area broadly suffused with blackish between the veins, and especially at anal angle; hindwings more or less dusted with blackish; a blackish blotch at anal angle; the inner margin broadly yellowish ochreous. Pectus yellowish; legs red. There are no signs of any lines or discal spots, and the hindmargin of the wings is scarcely crenulate.

Expanse of wings: 48 mm.

One ♂ from the Khasias.

A true *Hyperythra*, with the usual characteristics of the ♂; it *may* be an extraordinary aberration of *H. lutea* Cram.

96. **Semiothisa brunneata** sp. nov.

Forewings: dull white, covered on their basal half with olive-grey, on their outer half with olive-brown suffusion, except below the median, where the white ground shows through in places between the strigae; first line at one-third, second at one-half, third at two-thirds, all starting from oblique red-brown costal streaks, angled on subcostal, then parallel to hindmargin; the first and second brownish throughout, the third becoming paler in the middle and bisecting an oblique black blotch; submarginal line undulating, from before apex to anal angle, preceded by a red-brown costal blotch and a deeper shade throughout, and marked by pure white linear spots between the veins; some irregular white apical spots; fringe olive fuscous, with middle and apical lines darker, and a fine pale basal line, without any black dots at the base.

Hindwings: with a nearly straight central line, an obscurely dentate and slightly wavy exterior line, and nearly straight submarginal line from apex to anal angle, brownish; the last is preceded by a brown shade, and marked by a white dash on either side of the second median. The exterior line is followed in the middle by an indistinct blackish blotch; the pale basal line of fringes is preceded by irregular black scaling.

Collar, face, palpi, and antennae brownish; thorax and abdomen greyish white, the latter with two rows of dorsal black spots. Underside white, with the mottling, and all lines and markings, as well as the veins, rich brown; submarginal line consisting of pure white lunules.

Expanse of wings: 38 mm.

♂♂ from the Khasias.

Distinguished, over and above the difference in outline of forewings, from *S. maculosata* by the brown costal blotches, the more angulated exterior line, and the non-transparency of the white ground-colour.

97. **Semiothisa maculosata** sp. nov.

Forewings: opalescent white, semi-transparent, containing a profusion of drab, and ochreous olive, more or less coalescent, roundish spots; the veins ochreous yellow; basal line at one-fifth, dull fuscous olive, angled on subcostal and submedian veins, with some blackish scales above the submedian; an irregular, bent, oblique, thick central shade, dull fuscous, with black scales on the submedian and geminated below the median; some black scales on the discocellular at its extremities; exterior line yellowish ochreous, starting from a dark costal spot at two-thirds, curved opposite the cell, and then running nearly parallel to hindmargin, and preceded by a narrow, yellowish ochreous shade; this line bisects a roundish black blotch on the upper radial, and a larger, more quadrate, blotch extending from the lower radial to the second median; marginal area beyond the exterior line fuscous olive, varied with a congeries of black and yellowish scales along lower half of hindmargin; submarginal line undulating from before apex to anal angle, whitish yellow, but forming irregular *white* spots at apex, and one larger white spot obliquely below it; fringe fuscous olive, with a row of black spots at base between the veins.

Hindwings: with central and outer line as in forewings, the outer line passing through only one black blotch, extending over the second and third medians; submarginal line pale, nearly straight from apex to anal angle, preceded by a thick fuscous olive shade; marginal area fuscous, mottled in the middle before the slight tail with white and black scales.

Palpi, face, antennae, and collar ferruginous; thorax and abdomen dull whitish; basal segments of abdomen with double black spots; underside of wings white, with the spots and all the lines and shades dark brown.

Expanse of wings: 38 mm.

Distinguished from *S. brunneata*, to which it bears great superficial resemblance, by the more oblique hindmargin of forewings, scarcely perceptibly elbowed at the end of the third median, and the more produced and acute apex.

♂♂ from the Khasias.

98. **Semiothisa penumbrata** sp. nov.

Forewings: shining pale grey, thickly dusted with olive fuscous atoms; first line slender, brown, vertical, at one-fourth, slightly curved below costa and above inner margin; an oblique brown streak from middle of costa just touches the slender brown discal linear mark; a small brown spot on the median nervure and first median nervule just beyond their point of separation, and another on the submedian exactly below them; exterior line whitish, strongly curved below costa and slightly curved above inner margin, running in the main parallel to the hindmargin; on the costa it is preceded by a broadish oblique brown-black streak, which does not pass beyond the upper radial, and curves up to the costa shortly before apex, so forming a rounded triangular costal mark with a paler centre; a brown-black spot in midwing is divided into four parts by the exterior line and the third median nervule; marginal space

beyond exterior line dark grey; submarginal line slightly bent, consisting of white intraneural spots in the upper half of wing, and preceded in the lower half by a still darker fuscous grey shade; fringe dark grey, with a paler line at base; veins in outer half of wing paler than ground-colour.

Hindwings: like forewings, but the second line is brown, denticulate, and the submarginal line is straight, continuous, whitish in front of the angle of the wing, and preceded by a broad diffuse dark violet-grey shade; the pale fringe-line is preceded by a dark grey or brownish marginal line; inside the dark linear discal line is seen an indistinct irregular brownish central line.

Thorax and abdomen concolorous with pale ground-colour of wings; face, palpi, and antennae brownish. Underside paler, with all the markings dark brown and very distinct; especially the dark marginal shade, which in the forewing contains the submarginal line, and in the hindwing half the angular area, distinctly white.

Expanse of wings: 40 mm.

Both sexes from the Khasias.

The hindmargin of forewings is not emarginate, only bluntly elbowed at end of third median; the hindwing distinctly angled at the same place, with the margin on either side of it slightly wavy.

Antibadistes gen. nov.

Forewings: with costa straight, only faintly arched at the extreme base, and convex before apex, which is blunt; hindmargin oblique and faintly curved; anal angle well marked.

Hindwings: with hindmargin rounded and faintly crenulate; anal angle squared.

Antennae (♀) simple; palpi with second joint raised, rough-scaled and tufted beneath; third joint almost as long as second, but smooth, with appressed scales, spatulate; tongue well developed.

Neuration: forewings, cell two-fifths of wing; discocellular nearly straight; first median at three-fourths, second and third from the lower end of cell; radials normal; last three subcostals on common stem from before end of cell; second subcostal anastomosing with their stem and apparently with the first as well. Hindwings, cell one-third of wing; discocellular as in forewings; first median at three-fourths, second and third short-stalked from lower angle of cell; first subcostal just before the upper angle of cell, second from the angle. Scaling smooth and glossy.

Type: *Antibadistes subcinerea* sp. nov.

99. **Antibadistes subcinerea** sp. nov.

♂♀. Wings uniform glossy grey, with a metallic lustre; costa rather darker, marked with paler dots; the two lines slightly darker than the ground, very obscure, at one-third and two-thirds, straight, oblique outwardly, parallel to each other, the second reaching inner margin at four-fifths, the first at one-third; an obscure dark discal mark; fringe shining white, with a concise dark basal line, which at the extreme apex runs to the top of the fringe.

Hindwings: with no basal line, and the second line curved concave to hindmargin, which is slightly indented between the veins; fringe as in forewings.

Thorax and abdomen concolorous with wings; face and palpi (apparently) ferruginous. Underside paler, with hindmargin deeper; this, however, is very faint in

forewings; but in hindwings the margin is broadly blackish, preceded by a wide whitish line.

Expanse of wings: 38 mm.

Amboina; Java.

100. **Nadagara diversilineata** sp. nov.

Wings mouse-coloured, with many indistinctly marked fuscous transverse striae; costa narrowly bright ferruginous, speckled with black; hindmargin narrowly dull ferruginous; fringe lustrous yellowish with dark base, except at extreme apex, which is wholly pale; an indistinctly darker line from costa shortly before apex to inner margin at two-thirds, running nearly parallel to hindmargin.

Hindwings: the same, the ferruginous tint along the hindmargin broader and clearer.

Thorax and abdomen concolorous; collar, face, palpi, and antennae ferruginous. Underside duller, cinereous; the forewings towards the costa strongly ferruginous, speckled with fuscous.

Expanse of wings: 28 mm.

One ♂ from the Khasia Hills.

Distinguished from the other species by the different direction of the exterior line.

101. **Nadagarodes subfasciata** sp. nov.

Forewings: brownish ochreous, thickly sprinkled with fuscous strigae, especially along the costa and in the space beyond the outer line; first line at one-third, hardly perceptible above; second line dark brownish grey, from inner margin at two-thirds towards apex, before which it is angulated, and reflexed towards costa, and becomes obsolete.

Hindwings: like forewings, with the second line continued straight and somewhat diffuse across the wings; fringes of both wings concolorous.

Abdomen rather paler; thorax grey; face and vertex rufous brown. Underside dull ochreous yellow; forewings with numerous blackish strigae; an incomplete blackish line at one-third, and a broad blackish oblique line at two-thirds, neither reaching costa; a blackish mark at anal angle. Hindwings with a central curved line and a blotch at apex blackish, with a few blackish strigae along costa only; base of fringes at apex and throughout on forewings blackish.

Expanse of wings: 36 mm.

One ♂ from the Khasias.

Subfamily ENNOMINAE.

Azelinopsis gen. nov.

Forewings: with costa straight, slightly curved at base, and strongly convex before apex; apex produced, slightly falcate; hindmargin bidentate, a small tooth at the end of the upper radial, and a larger one at end of the second median nervule; anal angle distinct.

Hindwings: with the margin from the rounded apex to the second median nearly straight, a tooth at end of each of the first and second medians, and a deep circular excision between them.

Forehead protuberant, with slight cone of scales; antennae (♀) simple; palpi porrect, reaching just in front of face, the third joint short, drooping; tongue present.

Neuration: cell of forewings quite half as long as wing; discocellular bilunate; first median at four-fifths, second close to end of cell, third from the end; lower radial from two-thirds of discocellular, upper from top end of cell; stem of last three subcostals long before the end of cell; first and second free, close together. Hindwings with first subcostal rising long before the end of cell; medians as in forewings; discal spots in both wings hyaline.

Type: *Azelinopsis externa* sp. nov.

102. **Azelinopsis externa** sp. nov.

Forewings: dull fawn-colour, tinged with fulvous and lilac-grey, and powdered with numerous dark atoms and striae; the costa more prominently marked with striae; first line very indistinct, from one-third of costa to one-third of inner margin, running at first outwards from costa, where it is marked by an iron-grey streak, forming a blunt prominence in cell before the discocellular, then running basewards and forming a second prominence between the median and submedian nervules; second line from two-thirds of costa to two-thirds of inner margin, parallel to hindmargin and minutely crenulate at the veins; the basal and central areas are tinged with fulvous; the marginal one-third is varied with lilac-grey; a small black white-tipped submarginal spot in each of the three uppermost cells, and another between the first and second median nervules.

Hindwings: the same, but with no first line, and the subapical spots indistinct; discal marks in both wings hyaline, that of the forewings being crescentic, with a shorter upright prolongation above, that in the hindwings forming an irregular lunule.

Head and abdomen (probably the thorax also, which is worn) concolorous with wings. Underside of forewings pale greyish fawn, dusted and striated with brown; the hindmargin irregularly dark purplish grey, preceded by a tawny shade; the second line indicated by a row of black dashes on the veins. Hindwings with some tawny submarginal blotches, but no dark marginal shade.

Expanse of wings: 48 mm.

One ♀ from Mackay, N. Queensland.

The example from which this description is taken is rather worn, and the hindwings frayed in their margins, so that their exact contour is not quite certain.

103. **Corymica arnearia** Wlk. ab. **brunnea** nov. ? spec. dist.

Both wings entirely dull pale chestnut, with all the markings slightly darker, and the costa finely speckled with darker; fringes concolorous. Underside slightly paler.

1 ♂ from the Khasias.

Drepanopsis gen. nov.

Forewings: with costa convex in basal half, then incurved, becoming convex before apex; apex produced upwards and curved, blunt; hindmargin strongly bulging in middle, oblique below; anal angle well marked.

Hindwings: with both angles well marked; the hindmargin slightly curved.

Forehead with short tuft of hair; antennae of ♂ regularly pectinated almost

to apex; palpi thick, porrect; second joint densely haired beneath; third short, drooping, obscure; tongue present; hind tibiae not dilated, with four spurs. Pectus and base of wings woolly.

Neuration: forewings, cell considerably longer than half the wing; discocellular concave outwardly; first median at two-thirds, second shortly before, third from the lower angle of cell; radials normal; last three subcostals stalked, first and second free; the second close to stalk of the other three, the first remote. Hindwings with first subcostal rising before upper angle; medians as in forewings.

Type: *Drepanopsis ferrugata* sp. nov.

104. **Drepanopsis ferrugata** sp. nov.

Forewings: brown-grey, tinged with pink and ferruginous, and thickly covered with dark transverse strigae; costal area and space beyond second line ferruginous, the extreme edge of costa yellowish; first line very obscure, dark, at one-third, curved below costa, then vertical and wavy; second line from apex of forewing to below middle of inner margin of hindwing pale pinky grey, the space immediately beyond ferruginous; a black cell-spot in each wing; fringes ferruginous; the basal area of hindwings paler.

Abdomen concolorous with this basal area; thorax redder; collar, face, and tip of palpi dark ferruginous; rest of palpi pinkish grey; front of vertex rosy, edged with white. Underside greyish ochreous, with coarse dark striae; the outer line and cell-spots as above; marginal area of both wings and costa of forewings darker.

Expanse of wings: 40 mm.

One ♂ from the Khasias.

105. **Hygrochroa albipuncta** sp. nov.

♂. Dull fawn-grey, dusted with dark atoms, the central area tinged with ferruginous; first line at one-fifth, curved, dark fuscous; second line very diffuse, in fact only indicated by the difference in shade, from costa just before apex to inner margin at two-thirds, sinuous; this broad central area is tinged with ferruginous, especially towards the outside beneath the costa; discal spot dark with a pale centre, preceded by one or two very obscure small dark blotches; on the costa before the limit of the central area is a small pure white tooth-shaped spot; fringe fawn-grey, like ground-colour.

Hindwings: like forewings, but whitish in basal half; towards inner margin suffused with reddish and fuscous.

Underside like upper, but the reddish tints stronger. Head, thorax, abdomen, and antennae pale fawn-grey; face and palpi red-brown; legs grey, mottled with reddish.

♀ larger, greyer, and browner; central area limited externally by a denticulate lilac-grey line, followed by an obscure green shade; marginal area beyond it a mixture of greenish and pale lilac; the redder tinge of the ♂ seems to be altogether absent in the ♀.

Expanse of wings: ♂, 42 mm.; ♀, 48 mm.

Sikkim; Khasias.

This species comes very close to *Hygrochroa colorata* Warr., *P. Z. S.* 1893, p. 401, Pl. XXXII. fig. 26 (described as an *Ischalis*), but that insect is much redder and paler, and has no toothlike white costal spot. The exterior line really rises from

this spot, and is sharply angled towards apex, as may be seen by an inspection of the underside; but the brown suffusion of the central area runs up to the apex and hides the angulation of the line, making it appear itself to run to the apex. The antennae of the ♀ are pectinated, as usually in *Hygrochroa*, and the eyes, as far as I can see, are not hairy.

106. **Hygrochroa amethystina** sp. nov.

Forewings: ochreous, almost wholly suffused with dull pinkish grey, and with green and fulvous transverse striae; first and second lines thick, diffuse, dull olive; first at one-fourth, second just before middle, both angulated below costa, the first curved inwards near to base, the second curved and sinuous outwards to inner margin at two-thirds; the basal area and the costa, as far as and beyond this central line, is ochreous with green mottlings; the area between the lines is more mottled with fuscous, and overspread with the pinkish grey suffusion; exterior line forms an acute angle outwards, then curves in and approximates to the central band; subterminal line indicated by a curved irregular pale space of ochreous mottled with green, the patches forming it being larger and more conspicuous towards costa, where one of them is white, semihyaline, and scaleless, and altogether interrupted in the middle of wing; a small dark cell-dot beyond the angulation of the second line; fringe pinkish grey.

Hindwings: with base and inner margin ochreous, mottled with dark fuscous or blackish atoms; first line at one-third, straight, thick, blackish; second central, distinct, and blackish on inner margin, forming interrupted denticulations beyond; subterminal space most distinct at inner margin.

Head, thorax, and abdomen ochreous, shaded with green and pinkish; face dark brown. Underside whitish ochreous, thickly mottled with coarse fuscous, with the first lines dark olive fuscous, the marginal area washed with green.

Expanse of wings: 46 mm.

Several from the Khasias.

Comes near to *H. versicolor* Warr. from Padang.

107. **Ocoelophora maculifera** sp. nov.

♂. *Forewings:* testaceous ochreous, tinged with rufous, and covered with fine transverse dark brown strigae, most thickly towards inner margin; costa with short dark strigae; first line indicated only by two or three red-brown markings; exterior line very faint, rufous, denticulate, nearer hindmargin than in *basipuncta*, passing through a squarish red-brown blotch opposite the cell, and another of irregular form at anal angle; a red-brown shade before hindmargin, thicker above the elbow; fringe red-brown, slightly paler along base.

Hindwings: slightly darker, more suffused with red-brown, and with the veins paler and marked by lines of blackish dots; traces of a submarginal denticulate line; hindmargin dull brown-red; fringes reddish brown; both wings with dark cell-spot.

Head, thorax, and abdomen concolorous with wings. Underside pale testaceous, with the blotches and strigae blackish, and without any rufous tinge.

Expanse of wings: 34 mm.

A ♂ from the Khasias.

Differs from the type of the genus in that the hindmargin is not crenulate, and the cell is half as long as the wing.

Phanauta gen. nov.

Forewings: with costa gradually curved throughout; apex minutely produced; hindmargin obliquely curved.

Hindwings: with apex rather truncate, anal angle prominent; hindmargin crenulate, with slight teeth at end of veins from apex to third median, thence nearly straight to anal angle.

Antennae of ♂ simple; forehead with slight tuft of scales; palpi with second joint obliquely upraised, hairy above and beneath; third joint smooth, porrected, distinct; tongue present.

Neuration: as in *Dissoplaga* Warr., but differing in one particular: the last four subcostals are stalked together, but the fifth rises at one-third and the second at two-thirds—in other words the second, third, and fourth are stalked from the fifth; whereas in *Dissoplaga* it is the second that rises at one-third and the fifth at two-thirds, the third, fourth, and fifth being stalked from the second.

Type: *Phanauta eburnivena* sp. nov.

108. **Phanauta eburnivena** sp. nov.

Forewings: bone-colour, more or less suffused with fawn, and covered with fawn and fuscous transverse strigae; all the veins and the two cross lines bone-colour, and sometimes the costa; first line from costa at one-fourth, angled on the subcostal, thence oblique to inner margin, outwardly dark-margined; second line from apex to inner margin at two-thirds, edged internally with dark brown, and produced as a central line across hindwing; a distinct black cell-spot in both wings; fringes concolorous; a small dark apical spot, and oblique subapical brown streak in forewings.

Head, thorax, and abdomen concolorous. Underside like upper, but paler and more indistinct.

Expanse of wings: 42 mm.

♂ ♀. Khasia Hills.

The fawn-coloured suffusion predominates in the ♂; in the ♀ the bone-white costa, cross lines, and veins are very conspicuous.

Polyscia gen. nov.

Forewings: with costa gently curved throughout; apex produced, subacute; hindmargin obliquely curved.

Hindwings: with hindmargin slightly rounded; both angles rounded.

Antennae of ♂ simple, lamellate; forehead slightly produced; palpi with second joint oblique, closely applied to face, and smoothly scaled; terminal joint small, sharp, porrected; tongue present; hind tibiae of ♂ not dilated.

Neuration: forewings, cell half as long as wing; discocellular slightly curved; first median at two-thirds, second a little before the end, third from lower angle of cell; radials normal; first subcostal free, upcurved towards costal, but not anastomosing with it; the other four subcostals stalked, the second rising at one-third, the fifth at two-thirds. Hindwings with first subcostal from before upper angle of cell; medians as in forewings.

Type: *Polyscia ochrilinea* sp. nov.

109. **Polyscia ochrilinea** sp. nov.

Forewings: pale ochreous, with a tinge of olive, dusted with minute black specks; an indistinct oblique olive line from inner margin at one-fourth, retracted to costa; a small dark cell-dot; exterior line olive, straight from apex of forewing, where it is tinged with pink, to middle of inner margin of hindwing, followed by an olive band, which broadens from apex of forewing to inner margin, and on hindwing is equally broad throughout; a submarginal pale space, followed by another band of olive, with fine dark specks; fringe concolorous.

Hindwings: without basal line; the wings are palest immediately before the oblique line, the base and costa of forewing being suffused with olive.

Head, face, and thorax like base of wings; abdomen paler. Underside straw-colour, with numerous dark transverse fuscous strigae, coarser than those of upperside.

Expanse of wings: 38 mm.

One ♂ from the Khasias.

ON ORNITHOLOGICAL COLLECTIONS MADE BY MR. ALFRED EVERETT

IN CELEBES AND ON THE ISLANDS SOUTH OF IT.

By ERNST HARTERT.

BEFORE Mr. Everett's first collections from the Eastern Islands arrived at this Museum, it was planned that Mr. Rothschild, who is so keenly interested in the zoology of the Eastern Archipelago, and I should work out the birds together, but unfortunately Mr. Rothschild found himself too much engaged at present with entomology and other work. He therefore entrusted me alone with the work of the collections under consideration, which we had promised Mr. Everett should be studied without much delay. I must here express my thanks to Mr. Rothschild for giving this most interesting work into my hands, for I have hardly ever studied a collection with more interest than these well-prepared skins, collected with so much skill and love. Besides, although all the responsibility rests with me alone, Mr. Rothschild has compared many of the skins together with me, and given me several useful hints, but his co-operation did not seem important enough to him to attach his name to these articles as a co-author.

I am also obliged to Hofrath Dr. A. B. Meyer, whose knowledge of Celebes birds is at present unrivalled, for giving me notes on a few species I sent to him for comparison. I gained much important information, besides others, from the recent writings on the birds of Celebes of Messrs. A. B. Meyer & L. W. Wiglesworth, and of Dr. Büttikofer, who too most kindly compared some of my specimens with his types for me. Again, as so often before, am I further obliged to Messrs. Sharpe and Grant in the British Museum, who enabled me to compare with great ease the species I wanted to see in cases where the Tring Museum had not yet sufficient material for comparison. The mixed ornis of the small southern islands necessitated special care, and the comparison of comparatively many descriptions and skins from several regions. Any notes given on the labels have been faithfully inserted in these papers.

I.

ON THE BIRDS FROM SOUTH CELEBES.

Our friend Mr. Everett, of whose unlucky journey to the Philippines I reported in this journal, Vol. II., pp. 64, 486 ff., left Labuan again on August 21st for Celebes, and arrived at Makassar on September 16th. After some short stay in that town, he determined to work the *Bonthain Peak*, an enormous mountain of nearly 10,000 feet in the south of the Southern Peninsula of Celebes. He proceeded to *Bulekomba*, on the south coast; but the mountain being evidently inaccessible from the west and south, he went round to Balang Nipa, and travelled thence to Bikeroe, and on as far as *Indrulaman*, a place which is situated at about 2300 feet on the foot-hills of the Peak, about a short day's walk from the mountain itself. He arrived there on September 28th, and then despatched his assistant in various directions in order to ascertain the best route for ascending the mountain, with the result that he sent him to *Tasoso*, the highest village in the district, with three of his Borneo men and full instructions as to what and where they were to collect. Mr. Everett remained himself at *Indrulaman*, where he collected every species of bird that was observed, with the exception of one Caprimulgus. His assistant returned on November 1st, having succeeded in reaching the most elevated portion of the summit on October 13th. A few days before his return, the Messrs. Sarasin came to Tasoso from Makassar, and they also ascended to the highest point of the Peak. It is known from Messrs. Meyer & Wiglesworth's article in the *Abh. und Ber. Mus. Dresden* how successfully they collected there. As their specimens reached Europe long before those of Mr. Everett, and as they fell into the able hands of our colleagues in Dresden, it was natural that they were described first, and that in this way Messrs. Sarasin's birds anticipated several of the most interesting discoveries, such as *Zosterops anomala*, *Cryptolopha sarasinorum*, *Pachycephala bonthaina*, and others. Nevertheless there remained much to reward Mr. Everett's efforts, as can be seen from the discoveries of the *Androphilus everetti*, *Chlorocharis squamiceps*, and *Cataponera*, as well as from many other valuable things, dilated on in the following pages.

The following extracts from Mr. Everett's letters will be of interest :—

"My men worked altogether for twenty-three days on the Peak, collecting for the most part between 6000 and 7000 feet, and not at all below 5600 feet. No doubt a collector remaining several months on the mountain, and changing his station several times, would make large additions to its fauna, especially if working immediately after the wet season. The Peak seems to represent an ancient volcanic vent, being composed of a number of summits and ridges forming the walls of a crater, the eastern of which would seem to have been blown away. The country between Balang Nipa and the mountain is wholly composed of old volcanic rocks and disjectamenta, and neither on the eastern side nor in travelling to Bulekomba did I see any sedimentary rock whatever. Of the remaining walls the highest is a ridge called locally Lampo Batang, the next in altitude being the peak known as Buah Kraïing. The former is a little below 10,000 feet, and the latter, according to Messrs. Sarasin, about 9000 feet. The Buah Kraïing was found by my assistant covered with arboreal vegetation to its very top, but the trees were very stunted and thickly clothed with mosses. He found the temperature 'at midday' on Buah Kraïing to be only 49° F. At Indrulaman 60° was the *lowest* temperature noticed.

Messrs. Sarasin informed Mr. Dumas that 42° F. was registered at night on the top of Lampo Batang. Nobody has as yet passed a night on the summit of Buah Kraïing."

"The entire country surrounding Bonthain Peak is old cultivated land—rice-fields next the shore, coffee, tobacco, rice, maize, scrubby secondary jungle, fields of coarse grasses, etc., inland—and it is quite denuded of primitive forest up to an elevation of some 5000 feet, or even more, on the eastern aspect of the mountain. Hence the mammalian fauna below that elevation is very poor, even for Celebes. Wild pig, deer, and a rat which is, I think, *M. neglectus* Jent., abound, and in the villages a shrew; and *Cuscus celebensis* is fairly common in the coffee-plantations. I also obtained a single individual of the Celebes Tarsier. But not a single monkey or squirrel was seen or heard by any of us, the peculiar jungle-rats of the island were not to be found, there was no *Anoa* and no *Babirusa*, and even bats were seldom seen. Even in the old forest above Tasoso only one species of squirrel was observed, and of that few were met with. Some black monkeys were seen once—probably *Macacus maurus*—and the quill of a porcupine was found beside one of the traps set at 6500 feet, from which it had escaped. A jungle-rat with bi-coloured tail was obtained, and the *Anoa* was said by the natives to be plentiful, but the *Babirusa* neither they nor the Buginese in the lower country had heard of as inhabiting this part of Celebes. The *Cuscus* was not met with by my party on the mountain, although both *C. ursinus* and *C. celebensis* seem to exist in the lower country, nor did they encounter any *Viverra* or *Paradoxurus*, but the natives say that *V. tangalunga* is common in the coffee-plantations."

1. **Merula celebensis** Büttik.

♂. Upperside dark olive (Ridgw., *Nomencl. Colours* III. 9), wings and tail more blackish. Under wing-coverts, chin, throat, and upper breast pale olive; palest on chin, which is pale hair-brown (Ridgw., *l.c.* III. 12), darkening towards the breast. Whole abdomen pale cinnamon-rufous, paler in the middle and whitish on the vent, dark olive-brown with whitish tips and lines along the shafts. Bill and feet yellowish (in skin). Wing 125—129 mm. The *female* is browner on the breast.

Bonthain Peak, from about 6000 to 7000 feet upwards to the highest regions.

2. **Pratincola caprata** (L.).

♂ ♀. Indrulaman. A nest with three eggs found at Indrulaman, October 3rd, 1895. They agree with Indian specimens, and measure 17 to 18 by 14 to 14·4 mm.

3. **Phylloscopus borealis** (Blas.).

Bonthain Peak, 5500 feet.

4. **Phyllergates riedeli** Mey. & Wigl.

Three *males* and a *female* from Indrulaman. Hofrath Meyer has compared one of the *males* with the type and declared them to be the same. The shade of colour on the crown varies. The *female* has the head uniform with the back.

5. **Cisticola exilis** (Vig. & Horsf.).

Indrulaman. ♂. "Iris yellow-brown; bill sepia; mandible pale horn-brown; legs flesh-colour."

6. **Cisticola cisticola** (Temm.).

Makassar.

7. **Trichostoma finschi** Wald.

Several specimens shot in October from Makassar. Dr. A. B. Meyer compared one of our skins with his five specimens of June and July in the Dresden Museum. He found them to be alike, though our skin was slightly browner, specially on the tail and tail-coverts. This is probably because our birds are in very fresh plumage.

8. **Cataponera turdoides** Hartert (*anteà*, p. 70).

In the somewhat rounded wing the first primary is of about half the length of the second, the fifth or the sixth is longest, the fourth, fifth, and sixth generally not differing much in length. The outer web of some of the middle primaries are slightly emarginated from about the middle. The tarsus is covered with an unbroken lamina in adult birds, only at the lower part a scale or two can be distinguished. In an immature bird before me, however, the ridges of the margins of scales can still be distinguished in the middle part of the tarsus! This young bird also has pale shaft-lines on the head, and on the breast and abdomen some feathers with pale centres and dark brown margins, like those of some young thrushes, have remained. Behind the eye is a small but conspicuous bare space. The nostrils are longish; the feathers extend towards the nostrils. There are bristles on the rictus and also on the tips of the feathers of the chin. The colours have been described *l.c.*

9. **Androphilus everetti** Hartert (*anteà*, p. 69).

This interesting little bird was found all over the Bonthain Peak and surrounding hills, from about 2000 feet near Indrulaman to above 7000 feet near the summit. Unless some of the specimens are wrongly sexed, there is no constant difference in size between the sexes, but some of the birds from the higher elevations are longer, one of them being a perfect giant, with a wing of 64 mm. in length. In some specimens the feathers of the breast have dark shaft-stripes.

10. **Acmonorhynchus aureolimbatus** (Wall.).

Indrulaman and Makassar. Specimens from these places do not differ from those from Northern Celebes. The iris is burnt sienna-colour. Bill black; mandible greyish; legs and claws black. The species is included in the genus *Prionochilus* in the *Cat. B.* X., though that genus is said to have "a distinct bastard primary," and *P. aureolimbatus* does not have it. I have therefore provisionally accepted the proposed generic name of *Acmonorhynchus* for this bird.

11. **Dicaeum celebicum** Müll. & Schleg.

Makassar and Indrulaman.

12. **Dicaeum nehrkorni** Blas.

Herr Prof. Dr. Wilh. Blasius has been kind enough to compare one of our specimens with the type of *D. nehrkorni* and found them to be the same species. It has never been described in a scientific journal. The original description appeared in the *Braunschweigische Anzeigen*, a newspaper (!), and was, I believe, reprinted in

Russ's *Isis*, both places not easily accessible to an ornithologist ; and the *female* has never been described, as far as I know. I therefore append a short description of both sexes :—

♂ ad. Top of the head and forehead, feathers of the rump (somewhat elongated), and a small spot on the upper breast scarlet ; hindneck and remiges black ; back, scapulars, and upper wing-coverts deep steel-blue ; ear-coverts, chin, throat, and sides of body ashy, darker on the latter ; axillaries, tufts under the wing, under wing-coverts, under tail-coverts, and abdomen white, a blackish stripe along the middle of the abdomen.

Total length about 80 mm. ; wing 49—51 mm. ; tail about 26 mm. ; culmen 9—10 mm.

"Iris brown ; bill, feet, and claws black" (A. Everett).

♀ ad. (breeding). Upperside dark ashy grey, crown washed with rufous brown, rump light scarlet ; wings and tail blackish. Underside whitish ; sides of head and neck, sides of body, and an (often irregular) line along the middle of the abdomen ashy ; axillaries, under wing- and under tail-coverts white.

"Iris brown; bill black; base of mandible paler; feet bluish grey; claws blackish."

The immature *male* resembles the *female*, but seems to be darker above, and has *no scarlet* on the rump in very early age.

This pretty bird was not rare near Indrulaman, 2000 to 3000 feet, and was also met with on the Bonthain Peak at heights of 5000 to 6500 feet.

13. **Cinnyris frenata dissentiens** subsp. nov.

An adult pair in good fresh plumage from Indrulaman (October 1895) are evidently most nearly related to *C. frenata plateni* Blas., the form of this sunbird which inhabits many parts of Celebes, and which is *very* closely allied to *C. frenata typica*. The new form is less greenish and very much darker above, where it is of a dark OLIVE colour, and the abdomen is *much* paler yellow. The colour of the throat of the *male* is also of a different shade, but this is liable to individual variation.

Besides these two skins we have received five from Saleyer, which I must refer to this same form. The abdomen of all these Saleyer specimens is paler sulphur-yellow, and the under tail-coverts whiter ; but the specimens are not quite alike, and none of them is in such fresh plumage. They are also slightly paler and more greyish above (but not greenish, like *C. frenata typica*), but I am inclined to ascribe these differences to the more worn plumage.

14. **Cinnyris porphyrolaema** (Wall.).

This rather distinct Celebes species was procured at Bulekomba and Makassar. A young *male* from the latter place (September) is in full moult, the dark black and metallic feathers appearing here and there in the dull plumage, chiefly so on the wings and flanks. Another *male*, in full plumage, has the first primaries not yet full grown.

♂. "Iris brown ; bill glossy black ; legs dull black ; claws blackish."

15. **Aethopyga flavostriata** (Wall.).

One *male* from Indrulaman, quite similar to a skin from North Celebes in the Tring Museum, but bill (and wing ?) rather shorter; culmen 18 mm.; wing damaged, but apparently a little shorter.

16. **Anthreptes malaccensis celebensis** (Shell.).

Makassar. Common.

17. **Myzomela chloroptera** Walden.

Bonthain Peak, from 2500 to above 6000 feet.

♂ ad. Iris brown; bill very dark brown, almost black; legs and claws light olive-brown.

♀ ad. Iris brown; bill very dark brown, basal portion paler; legs and claws olivaceous brown.

18. **Melilestes celebensis meridionalis** Mey. & Wigl. (*Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 11).

On Bonthain Peak, at elevations of 6000 feet and above.

The sexes are alike in colour, but the *females* have shorter wings and bills.

19. **Zosterops anomala** Mey. & Wigl. (*l.c.* 1896, p. 12).

Apparently common at Indrulaman. The bare black ring round the eyes without white plumes, surrounded by some black feathers, characterises this species easily. It is well described, *l.c.*

20. **Zosterops sarasinorum** Mey. & Wigl. (*J. f. O.* 1894, p. 114).

Dr. A. B. Meyer has kindly compared one of our specimens with his type in the Dresden Museum and declared them to be the same. The description, however, does not quite agree. The breast and abdomen are not "fast rein weiss," but of a pale sulphur-yellow, more so in the middle, the under tail-coverts of the same yellow as the *middle* of the throat. The forehead is greenish yellow. Dr. Meyer's specimens were collected by Messrs. Sarasin on Mount Klabat, in the Northern Peninsula of Celebes, at elevations of 2000 metres. Mr. Everett's skins came from elevations above 6000 feet from Bonthain Peak.

21. **Zosterops intermedia** Wall.

Specimens from Indrulaman and Bonthain Peak to elevations of about 6000 feet.

22. **Chlorocharis squamiceps** Hartert (*antea*, p. 70).

L.c. I gave a diagnosis and description of this new species to which I have little to add. It was collected at elevations of 6000 to about 7000 feet, where it seemed to be common. The specimens are all alike, mostly in fairly fresh plumage, but some moulting. The bill of the skins is black; the legs seem to have been bluish, with yellowish or greenish soles. The mandible and legs are light-coloured in skins of *Chlorocharis emiliae*, but I cannot find any characters to separate the two species generically; and, as stated *l.c.*, I consider *Chl. emiliae* to be closely *related to Zosterops, from which genus it is perhaps not separable.* Unfortunately no tongues have been secured of my new species.

23. **Motacilla boarula melanope** (Pall.).

Makassar and Bonthain Peak, up to about 6000 feet.

24. **Motacilla flava** L.

Bulekomba.

25. **Munia pallida** Wall.

Two *females* from Bulekomba and Makassar. One of them, in quite freshly moulted plumage, has the top of the head and the hindneck strongly washed with greyish brown; but the other specimen, in abraded plumage, is *much paler* on the head. I therefore do not think that the Celebes bird differs from that from Lombok and Flores, of which I could compare six skins in the British Museum. (See also Mey. & Wigl., *Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 13.)

26. **Munia atricapilla brunneiceps** (Wald.).

See Mey. & Wigl., *l.c.* p. 13. They mention considerable individual variations. Four skins from Indrulaman do not vary much and are typical *brunneiceps*. The birds mentioned by me in Nov. Zool. II. p. 469, from Bunguran, have much darker heads and more rufous backs. So they resemble more the purely black-headed *M. atricapilla typica*, but much of their bright colour may be due to their being in very fresh plumage. I have seen Bornean specimens agreeing with those from Bunguran, though most of them are also slightly paler on the head, and yet a little darker than those from Celebes.

27. **Scissirostrum dubium** (Lath.).

Indrulaman. "Iris dark brown; bill deep chrome-yellow; legs light chrome; nails pale sepia."

28. **Calornis minor** (Bp.).

♂ ♀. "Iris scarlet." Indrulaman.

The principal home of this small *Calornis* appears to be the islands south of Celebes, such as Sumbawa, Flores, Timor, Lombok, etc., and it is much less known as an inhabitant of Celebes, where *C. panayensis* abounds in many parts; but it has been recorded from Celebes long ago by Dr. A. B. Meyer in *Sitz. Ber. Naturf. Ges. Isis*, 1884, I. p. 48, and *Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 4. The tail of this species is certainly not much graduated, but only slightly rounded, nearly square; and altogether *C. minor* stands not very far from *C. chalybea*, though it is decidedly smaller, and the neck much more purple. The wings of the two Indrulaman specimens measure 64—66 mm.

29. **Basileornis celebensis** Gray.

Indrulaman. ♂ ♀. "Iris dark brown; bill greenish white; legs wax-yellow; claws blackish brown."

Specimens from North and South Celebes do not differ.

30. **Acridotheres cinereus** Bp.

Makassar, where it is common.

31. **Artamus leucogaster** (Valenc.) and **A. monachus** Bp.

Indrulaman.

32. **Dicrurus leucops** Wall.

Makassar and Indrulaman. ♂. "Iris milk-white."

33. **Oriolus celebensis meridionalis.**

In *Abh. und Ber. Kön. Zoolog., etc., Mus. Dresden*, 1896, No. 1, p. 14, Messrs. A. B. Meyer & L. W. Wiglesworth have remarked that North and South Celebes birds differ, those from the south having more black in the plumage, and that this point will be discussed in the authors' work on the birds of Celebes. Hofrath Dr. Meyer then wrote me that in the MS. they called the southern Oriole *O. celebensis meridionalis*, and I accept their name herewith, as I consider it a good subspecies. The most characteristic feature of the southern form is the broad black eye-stripe, which fully encircles the occiput, *broadly and quite uninterrupted*. The secondaries are blacker. Makassar and Indrulaman. ♂. "Iris crimson lake; bill reddish sienna-brown; legs olive-grey; claws deep brown."

34. **Gazzola typica** Bp.

Both sexes of this very rare crow from Indrulaman (2500 feet to about 7000 feet on Bonthain Peak). "Iris warm brown." The wing of the *female* about 4 mm. shorter than that of the *male* (208 and 212 mm.).

35. **Corvus enca** Horsf.

Indrulaman, Makassar. Several local varieties of this crow may be distinguished with the help of sufficient material.

36. **Streptocitta albicollis** (Vieill.).

Makassar. This species represents *Str. torquata* in Southern Celebes.

37. **Pachycephala bonthaina** Mey. & Wigl.

A series of skins, collected from elevations of little over 6000 feet to the summit of Bonthain Peak (nearly 9000 feet), belongs, no doubt, to the species named *P. bonthaina*, and well described by Messrs. Meyer & Wiglesworth in *Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 10. Both sexes agree well with the description, except that the under tail-coverts are not of the same colour as the lower back, rump, upper tail-coverts, and flanks; but they are brownish ochraceous, while the latter parts are greenish olive-yellow. The *female* differs from the *male* only in the chin and throat being striped and spotted with pale buff, but the termination of the yellowish cap is not less abrupt than in the majority of the *males*. There is also an immature *male*, which has the whole upperside washed with olive, the whole underside striped with pale brownish buff, the head and neck olive-brown. It seems from this not impossible that *P. bonensis* (Mey. & Wigl., *Abh. und Ber. Mus. Dresden*, 1894-5, No. 4, p. 2) is, after all, the same as *P. bonthaina*, but adult specimens of the northern bird must be awaited to decide by.

38. **Pachycephala meridionalis** Büttik. (*Not. Leyden Mus.* XV. p. 168, 1893).

Indrulaman and Bonthain Peak to above 6000 feet. Iris chocolate; bill black; legs and feet pale bluish grey; nails dark grey.

Wing of *males*, 84 mm.; of *females*, 80—81 mm.

39. **Graucalus leucopygius** Bp.

Indrulaman and Makassar. Iris yellowish white; bill and legs black. A young *male* (September 1895) has the feathers of the head, back, and rump with a terminal buffy white and a subterminal blackish bar; the remiges with buffy white narrow edges; the upper wing-coverts with broad buffy white edges; feathers of throat and breast with blackish subterminal bars.

40. **Volvocivora morio** (Müll.).

Indrulaman, common; very variable. Only rather aged *males* seem to have the throat and upper breast black; the underparts of the *females* and young are more or less deep buff.

♂ juv. and ♀. "Iris chocolate; bill, feet, and claws black."

♂ ad. "Iris dark brown; bill, feet, and claws black."

41. **Lalage leucopygialis** Walden.

Indrulaman. It is wrong to quote *L. leucopygialis* Gray, as the latter author never has described the bird. "The iris of the *male* is chocolate-brown; bill, legs, and claws black."

42. **Lalage timoriensis** (S. Müll.).

Indrulaman and Makassar.

43. **Muscicapa griseosticta** (Swinh.).

Indrulaman.

44. **Muscicapula westermanni** Sharpe.

Mey. & Wigl. (*Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 9) have already shown that this bird inhabits Celebes, but they had received one pair only, and believed that they differed slightly from typical *M. westermanni* from Java and Borneo. Mr. Everett sent a number of fine *males* and two *females*, as well as a young bird. These I have compared with the large series of the species in Tring and in London, and I am able to state that they do not differ in anything from typical *M. westermanni*. The young bird has the feathers of the upperside fringed with black and variegated with a large buff subterminal spot, those of the underside bordered with black.

45. **Muscicapula hyperythra** (Blyth).

Two pairs from elevations of about 6000 feet on Bonthain Peak do not differ in colour from *Muscicapula hyperythra*. Compared with skins of that species from North Borneo, the white line extending from the forehead backwards over the eye is broader and longer. This character, however, does not seem to have any constancy, and Himalayan specimens in the British Museum are perfectly similar to those from Celebes. But the wings of the Celebes birds before me are longer, those of the *males* measuring 65 mm., those of the *females* 61 and 62 mm., while those of my *males* from Borneo measure 56 to 59 mm., those of *females* from the same place 56 mm.; and Messrs. Sharpe & Oates give only 58 mm. as the length of the wing of Indian *males*. So it would seem that the Celebes birds differ in having longer wings, but a larger material than I have before me at present is desirable to work out the local forms of *M. hyperythra*, of which there may be several.

I have not seen *M. hyperythra* recorded from Celebes before.

46. **Siphia omissa** Hartert (*antea*, p. 71).

Indrulaman.

♀. "Iris dark brown; bill black; legs light purplish brown; claws pale sepia."

47. **Siphia bonthaina** sp. nov.

♂. Supra olivacea, remigum marginibus exterioribus rufescentibus; cauda tectricibusque superioribus castaneis. Macula supralorali magna pallide ochracea. Mento, gutture, jugulo, pectore ochraceis. Abdomine subcaudalibusque albis. Al. 65 mm., caud. 47 mm., culm. 13 mm., tars. 19 mm.

♀ similis, pectore guttureque pallidioribus.

Hab. Monte Bonthain Peak dicta, Celebes

Above olive, quills margined with rufous brown on the outer webs and with light brown on the inner webs. Tail deep chestnut, more brownish on the tip; upper tail-coverts of the same colour. A large spot over the lores; from the base of the bill to the middle of the eye pale ochraceous. Chin, throat, and breast light ochraceous. Abdomen white, bases of feathers slate-colour. Under tail-coverts white with an ochreous shade; under wing-coverts very pale brownish. L. t. about 110 mm.; wing 65 mm.; tail 47 mm. The *female* has the wing only 61 mm., the tail 45 mm., and the chin, throat, and breast are very much paler than in the *male*.

The only pair sent was procured by Mr. Everett's men, at an elevation of about 6000 feet, on Bonthain Peak.

This species belongs to the little section of the genus *Siphia*, as limited in the *Cat. B.* by Dr. Sharpe, in which the sexes are very much alike, both being olive or brown above and with more or less rufous tails, to which *S. erithacus* from Palawan belongs. The birds from Bonthain Peak differ considerably from all the species I am acquainted with and do not agree with any description.

48. **Gerygone flaveola** Cab.

One *male* from Indrulaman.

49. **Hypothymis puella** (Wall.).

Indrulaman and Makassar.

50. **Rhipidura teysmanni** Büttik.

Five skins from Indrulaman.

"Iris dark brown; bill dark sepia; base of mandible white; legs purple-grey."

The *female* and immature *male* have the throat-patch not pure black, but rather washed with greyish.

51. **Culicicapa helianthea** Wall.

Bonthain Peak, from Indrulaman to above 6000 feet elevation.

♂♀. Iris dark brown; maxilla dark sepia; mandible ochraceous orange; legs and claws light sepia; soles of feet yellow. The sexes do not differ perceptibly, but young birds have lighter breasts and are not so yellowish above.

52. **Cryptolopha sarasinorum** Mey. & Wigl. (*Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 9).

This excellent new species was found in numbers on the Bonthain Peak, where it was discovered by the brothers Sarasin in the same month when Mr. Everett collected there, *i.e.* October 1895, from Indrulaman to above 6000 feet.

The iris is dark brown; bill sepia-brown; mandible ochreous, tinged with sepia; legs lead-blue; claws light brown.

53. **Stoparola meridionalis** Büttik. (*Notes Leyden Mus.* 1893, p. 170).

Found at Indrulaman, and up to elevations of about 6000 feet. The sexes are alike in colour, but the wing of the *female* seems to be 2 or 3 mm. shorter. The iris is chocolate-brown; the bill, legs, and claws black.

A young bird from Bonthain Peak, 6000 feet, caught in October, has subterminal light brown spots and black tips to the feathers of the upperside; the feathers of the underparts are buff, bordered with black.

54. **Caprimulgus affinis** Horsf.

A perfectly adult *male*, Makassar, September 1895.

55. **Collocalia esculenta** (L.).

Indrulaman and up to about 6000 feet on Bonthain Peak. On November 2nd a colony was found breeding in a cave near Indrulaman. The nests were *not edible*, but consisted of moss, rootlets, lichens, and little twigs, agglutinated and fixed to the walls of the cave with saliva. Eggs were found in a number of nests, and there were always two (or one only if incomplete) in a clutch. The eggs measure from 17 to 18 by 10 to 11·1 mm. They are not quite equal at both ends, but one end is decidedly more pointed.

Messrs. Meyer & Wiglesworth mention of specimens from the island of Banggai that their wings were 69 to 90 mm. long, while those from North Celebes had wings 85 to 97 mm. long. Those from Indrulaman have the wings 95 to 102 mm. long. Unless many of the skins before me are wrongly sexed, which seems not to be possible, these differences are not sexual, nor can I account for them in any other way.

56. **Halcyon chloris** (Bodd.).

Up to at least 6000 feet on Bonthain Peak.

57. **Ceycopsis fallax** (Schl.).

♀. Indrulaman, 2300 feet, October 1895. "Iris dark brown; bill and feet and nails bright coral-red; middle of culmen faintly tinged with black."

This specimen differs from three skins from Lambeh, North Celebes, in having the interscapular region of the same brown colour as the wing-coverts and scapulars, while the Lambeh skins have the interscapulium light rufous. Hofrath Meyer, who has more material to compare, kindly informed me that he had specimens from the north which did not differ from our Indrulaman skin.

58. **Coracias temmincki** (Vieill.).

September, Makassar; November, Bulekomba.

"♀ ad. Iris chocolate; bill black; feet olive-yellow; claws black."

59. **Microstictus wallacei** (Tweedd.).

Indrulaman. "Iris lemon-yellow; bill black; feet greyish olive; claws blackish brown."

60. **Iyngipicus temmincki** (Malh.).

Indrulaman and Makassar.

♂. "Iris crimson-lake; bill black; mandible grey towards the base; feet dirty greenish; nails brown."

61. **Cuculus intermedius** Vahl.

Two grey *males*, Indrulaman. One of them is very much broader-barred than the other.

Two *females*, Indrulaman, both in the *rufous* plumage. "Iris raw sienna-brown; bill brownish black; basal half of mandible greenish yellow; eyelids pure chrome-yellow; feet wax-yellow; claws light brown."

62. **Cacomantis virescens** (Brügg.).

Indrulaman and Makassar.

63. **Chalcococcyx malayanus** (Raffl.).

♂ ♀. Indrulaman and Makassar. ♂. "Iris clay-brown; eye-wattle scarlet; bill black; legs greyish black; claws black."

64. **Chalcococcyx basalis** (Horsf.).

A *female* belonging to this species, shot on the Bonthain Peak 6000 feet high. The longer wing (this ♀ has it 97 mm. long), *both* webs of the second rectrix from outside being rufous for the basal two-thirds, the rather broader and paler bands of the breast, a superciliary whitish line, and a broad dark line from the eye along the sides of the neck distinguish this species without difficulty from *Ch. malayanus*, which is a usual inhabitant of Celebes. I am not aware that *Ch. basalis* has been found before in Celebes, but as it inhabits "Australia, Aru Islands, Timor, Flores, Lombock, Java, and reoccurs in Malacca" (Shelley, *Cat. B.* XIX. p. 295), it is not to be wondered at much.

65. **Scythrops novaehollandiae** Lath.

Indrulaman. ♂ ad. "Iris, orbit, cere, and nostrils crimson-lake; bill horn-white, clouded with plumbeous grey; feet dark plumbeous."

66. **Surniculus muschenbroeki** Meyer.

The greatest surprise to me in this collection was a pair, or rather two *males*, of this cuckoo, of which only one specimen, a *female*, procured in Batjan by Dr. A. B. Meyer's hunters, was known. Cf. Meyer in Rowley's *Orn. Misc.* III. p. 164, *Cat. B.* XIX. p. 230. Though the specimens before me agreed fully with the original description, I thought it best to have them compared with the type, and therefore sent them to Dr. Meyer, who kindly wrote me that they fully agreed with his bird. The wing of *S. muschenbroeki* has been given as 140 mm., while my specimens have wings of 134—135 mm. only; but Dr. Meyer was kind enough to inform me that really the wing of his bird is only 136 mm. long, according to his own recent

measuring. In one of our *males* the white on the occiput is much more developed than in the other, and in the type there is *a little* less even than in the latter. The white on the shortened outer rectrices is also a little more marked in the two Celebes specimens, and one of them has also a narrow white tip to one of the longest rectrices. All these characters, however, vary much in the other species of *Sumiculus*, and they also differ in the two specimens from Celebes.

The specimens were shot at Indrulaman, and are in perfect plumage.

67. **Phoenicophaes calorhynchus meridionalis** (Mey. & Wigl.) (*Abh. und Ber. Mus. Dresden*, 1896, No. 2, p. 11).

Three skins from Indrulaman (*breeding* at the time, according to Mr. Everett) differ considerably from the bird from Northern Celebes in having a much paler crown and a decidedly paler throat, and it seems that also the tail is about half an inch longer than in any of the northern specimens. Messrs. Meyer & Wiglesworth have (*l.c.*) proposed the name of *Rhamphococcyx calorhynchus meridionalis* for this form, and the former gentleman kindly compared one of our specimens with their type. The discovery of Count Berlepsch of the difference between the *Phoenicophaes* from the Malay Peninsula and Borneo in the different form of the nostrils clearly shows that the genera *Dryococcyx*, *Urococcyx*, *Rhinococcyx*, and *Rhamphococcyx* cannot be upheld wisely, and the Count also encloses the *Phoenicophaes* of Ceylon in the same genus, the latter name thus having the priority as the generic title of the group.

68. **Centropus javanicus** Dumont.

Indrulaman. "Iris dark brown; bill black; legs and claws blackish plumbeous (*females*)."

69. **Pyrrhocentor celebensis** (Quoy & Gaim.).

Indrulaman. "♂. Iris crimson-lake; bill and orbital skin black; legs and claws blackish plumbeous." These specimens do not belong to *P. celebensis rufescens*, a well recognisable subspecies recently described by Messrs. Meyer & Wiglesworth, who received it from Toukean. Two of the cotypes of the latter are in the Tring Museum.

70. **Tanygnathus mülleri** (Müll. & Schleg.).

Apparently common at Indrulaman. The ovaries of the adult *females* showed (in October) no sign of enlarged eggs. The bills of the *females* from Indrulaman are white, those of the *males* red.

71. **Prioniturus platurus** (Temm.).

Apparently not rare at Indrulaman. ♂ wing 181—183 mm. ♂. "Iris dark chocolate; bill black, basal half nearly white; feet greenish grey."

72. **Loriculus stigmatus** (Müll. & Schleg.).

Some specimens from Makassar and one from Indrulaman. The adult *male* from Makassar has the red of the crown extended much farther back than the *male* from Indrulaman.

73. **Trichoglossus ornatus** (L.).

Indrulaman. ♂ ad. "Iris orange; bill orange-red; feet greenish grey; nails dark brown."

74. **Pisorhina manadensis** (Quoy & Gaim.).

Indrulaman. ♂. October 1895. "Iris ochreous orange; cere pale brownish; bill olivaceous horn; feet brownish white; claws horn-yellow, the longer ones brown on the distal half."

75. **Ninox punctulata** Quoy & Gaim.

Three *males* from Indrulaman and Makassar. "Iris dark chocolate; bill horn-black; tip and mandible pale horn-colour; feet white; claws dark brown." In the two other specimens the bill is greenish horn-colour, blackish towards the base.

The *male* with the dark bill is of a deep blackish chocolate-colour above; the whitish spots incline to cross-bars only on the back and upper wing-coverts; the markings on the breast and abdomen are very deep brown. The other two *males* are of a paler brown above; the dark colour on the breast and abdomen is more rufous brown; the pale markings above are more like cross-bars, and in one they are really short cross-bars everywhere. When Sharpe described the species in *Cat. B.* Vol. II. p. 183, he said that the whitish spots "inclined to bars nowhere except on the secondaries, and here very minute." However, such specimens seem to be rarer than those where there are cross-markings.

76. **Strix rosenbergi** Schleg.

Indrulaman and Makassar.

♂. "Iris white; bill horn-white, clouded with brown in the middle of the maxilla; feet dirty brownish white; claws dark brown."

This fine owl seems to stand, by its large size as well as by its richly spotted underside and other colour-characters, farther away from *Strix flammea typica* than any of its other numerous subspecies, and may probably well be kept specifically distinct. The wing of our *females* is 330 mm. long, that of our *male* 320.

77. **Spilornis rufipectus** Gould.

Makassar, Indrulaman, and Bonthain Peak, up to about 6000 feet above the sea.

♂ ad. "Iris golden yellow; bill black, basal portion plumbeous grey; mandible plumbeous grey, its apical portion black; cere dirty greenish; eyelids dark yellow; skin of loral region yellow; legs wax-yellow; claws black."

♂ juv. "Iris golden yellow; loral skin yellow; legs dark wax-yellow; claws black."

The colour of the breast varies in the old bird, it being much paler in some, in fact as pale as in *Spilornis sulaensis*, darker in others. The whole throat and ear-coverts are deep black in an apparently freshly moulted bird.

Mr. Everett procured, during October 1895, fully adult birds, quite young ones, and others in change of plumage.

There seem to me not to be sufficient reasons to separate the Sula birds specifically. They can only form a subspecies, those from Peling and Banggai (of which I have now five before me) standing between the two forms and hardly being separable from *Spilornis rufipectus*. See Meyer & Wiglesw., *Abh. und Ber. Mus. Dresden*, No. 1, p. 7, 1896.

78. **Baza celebensis** Schl.

♂. Indrulaman. ♀. Indrulaman. "Iris orange-brown; bill and cere black; legs white; claws brown." The *male* agrees with the figure of this species in *Cat. B.* Vol. I. Pl. X. Sharpe calls it there *Baza erythrothorax*, but Schlegel's name has evidently priority, the article of Sharpe being only received by the Zoological Society of London in June, and therefore certainly not published in that same month. The *female* has the top of the head rufous, broadly streaked with black. It seems to be immature.

79. **Butastur liventer** (Temm.).

Makassar, where it is said to be common. The rufous colour of tail and wings is darker when the feathers appear and fades when they are worn. The upperside is sometimes darker (evidently fresh plumage), sometimes paler, and the dark shaft-stripes are more or less distinct.

80. **Spilospizias trinotatus haesitandus** subsp. nov.

Seven skins of adult birds from Bonthain Peak, from Indrulaman to above 6000 feet, differ from a great number of specimens from North Celebes in having the abdomen paler, in fact white for its greater part, the vent and under tail-coverts *pure* white, the thighs pure white or with a very faint rosy shade on their upper part only. Above they are mostly very dark, the head and hindneck being distinctly paler than the back and rump. Hofrath Dr. A. B. Meyer has confirmed the above-noted differences *in litt.* I therefore give it a subspecific name, and I believe this to be the right course. The *males* are smaller than the *females*, but do not differ in colour.

The totally different well-known spotted young bird has the iris lake, bill black, loral region and base of mandible orange-chrome, legs dark chrome, claws black. The adult *male* has the iris chocolate-brown, the bill jet-black, base and cere orange, legs chrome-yellow, claws black. A young *female* in the spotted plumage shows a few slaty feathers above and some salmon-coloured ones on the breast. The generic name of *Spilospizias* is now often used for this bird, but Sharpe (*Cat. B.* I. 1874) included it in the genus *Astur*. I am inclined to think that it cannot be separated from *Astur*.

81. **Accipiter rhodogaster** (Schleg.).

Makassar and Bonthain Peak to above 6000 feet. It is remarkable how closely this bird must at a distance resemble the *Astur trinotatus* of Celebes.

82. **Tinnunculus moluccensis occidentalis** Mey. & Wigl.

Cf. *Abh. und Ber. Mus. Dresden*, 1896-97, No. 2, p. 8, February 1896, where the authors have for the first time separated the very distinct Celebes form from *Tinnunculus moluccensis typicus*. The lighter underparts, lighter under wing-coverts, and the whitish grey ear-coverts are very characteristic. A specimen from Java (collected by Mr. Whitehead) is also referable to this subspecies.

Mr. Everett sent some skins from Makassar and from about 6000 feet on Bonthain Peak.

83. **Circus assimilis** Jard. & Selby.

♂ and ♀ ad., ♀ juv., with feathers of crown, sides of head and neck broadly margined with rusty rufous. ♂ and ♀ juv. from Indrulaman and Makassar.

♀ ad. "Iris brown; bill black, basal part pale plumbeous; cere and lores greenish; legs very pale wax-yellow; claws black."

♂ juv. "Iris olive-brown; bill black, basal portion pale grey; cere greenish yellow; lores light greenish; legs very pale wax-yellow; claws black."

♀ juv. "Iris golden yellow."

84. **Milvus migrans affinis** (Gould).

♂ ♀. Makassar. The *female* has the culmen distinctly yellow towards the base (in skin).

85. **Ptilopus meridionalis** (Mey. & Wigl.).

Leucotreron fischeri meridionalis Mey. & Wigl., *Orn. Monatsber.* I. p. 12; *Ptilopus meridionalis* Salvad., *Cat. B.* XXI. p. 74.

Bonthain Peak and surrounding hills from about 2500 feet to above 6000 feet. The *female* of this beautiful pigeon is slightly more greenish above, a little more brownish below, and a little smaller. ♂ wing 172—175 mm., ♀ wing 165—166 mm. "♀. Iris orange-red; bill dark leaf-green; feet dull purplish; nails brownish plumbeous."

86. **Ptilopus temmincki** (Des Murs & Prév.) (*Cat. B.* XXI. p. 115).

Ptilopus formosus Gray of the majority of authors.

Indrulaman.

87. **Carpophaga forsteni** (Temm.).

Bonthain Peak, 6000 to 6500 feet.

88. **Osmotreron wallacei** Salvad. (*Cat. B.* XXI. p. 42, Pl. II.).

"♂. Iris orange." "♀. Iris rufous brown, with thin outer ring of dull orange; bill greenish white; cere and base of mandible light green; bare orbital skin lemon-yellow, tinged with green; feet carmine; nails pale brownish grey."

Indrulaman, nesting in October. The *male* rather more brick-red than specimens from Minahassa, Peling, but otherwise not different.

It is remarkable how closely allied this species is to *O. griseicauda* of Java, though the differences pointed out by Salvadori are quite constant.

89. **Osmotreron vernans** (L.).

Bulekomba, S. Celebes, November 1895, moulting.

Wing (complete) 142 mm. (= 5·6 inches).

90. **Chalcophaps indica** (L.).

Indrulaman.

91. **Turtur tigrinus** (Temm. & Knip.).

Indrulaman.

92. **Geopelia striata** (L.).

Makassar.

93. **Turacoena manadensis** (Q. & G.).

♂. October, Indrulaman. "Iris light brick-red; bare orbital and loral skin carmine; bill black; feet black, tinged with purple-red; claws black."

♀. October, Indrulaman. "Iris orange-red; orbital skin carmine; feet brown; claws brown."

94. **Macropygia albicapilla** Bp.

♂ and ♀. Indrulaman, October 1895. "♂. Iris with the inner ring blue, the outer carmine; bill black; feet carmine; claws dark brown."

The feathers of the hindneck of the *male* have very strong purplish reflections, but otherwise it agrees with specimens from other parts of Celebes.

95. **Gallus gallus** (L.).

Bulekomba.

96. **Turnix rufilatus** Wall.

Makassar and Indrulaman. ♂. "Iris white; bill greenish yellow; tip and ridge of culmen brown; legs greenish yellow." The *female* has the forehead and lores black, but the *male* has these parts speckled dark brownish black and white or whitish.

97. **Hypotaenidia philippinensis** (L.).

♀ ad. Bulekomba. "Iris crimson-lake; bill light red; apical third horn-brown; legs greyish white."

98. **Gallinula chloropus orientalis** (Horsf.).

♂. Bulekomba. All the specimens of *Gallinula chloropus* from the East now before me are very much smaller than those from Europe, so that I am inclined to believe it can stand as a well-marked subspecies. The *male* from Bulekomba (apparently adult) has the wing only 154 mm.; Sharpe gives 7·3 inches = 185 mm as the length of the *male* of the species in the *Cat. B.* XXIII. p. 173.

99. **Phoyx manilensis** (Meyen).

Bulekomba. Sharpe considers the Eastern Red Herons to be specifically distinct from the *Ardea purpurea* of Europe, and also places them in a separate genus, *Phoyx*.

100. **Ardetta cinnamomea** (Gm.).

Bulekomba.

101. **Bubulcus coromandus** (Bodd.).

Bulekomba.

102. **Ardeola speciosa** (Horsf.).

Makassar.

103. **Nettion gibberifrons** (Müll.).

(See Salvadori's description and remarks *Cat. B.* XXVII. pp. 255, 256.)

November, Bulekomba. ♂. "Iris lake-red; bill above and feet shining lead-grey." The *females* are *decidedly* smaller than the *males*, the culmen being about 8 mm. shorter, the wings about 10 mm., the middle toe about 4 or 5 mm. shorter. The difference in size of the sexes is remarkable, and seems a further proof that *N. gibberifrons* is really quite distinct from *N. castaneum*, though the *females*, according to Count Salvadori, seem not distinguishable.

It is evident from the above list that much interesting work is still left for an able collector on the higher mountains of Celebes. Such forms as *Merula celebensis*, *Androphilus*, *Chlorocharis*, and perhaps *Siphia bonthaina* show interesting similarities with the ornis of the high mountains of Borneo. The butterflies, I believe, will show corresponding facts. It is most probable that all the very high mountains from North India to the outmost branches of the Indo-Malayan region have great similarities in the fauna of their highest regions—witness the Himalayas, the Gunong Ijau in Perak, the Kina Balu, the high mountains in Java and Sumatra, and Bonthain Peak. They may be remainders of very ancient times, as the fauna of the intervening plains is often totally different. Similar cases are known to exist in Europe and elsewhere. It is most desirable that more of the higher regions of high mountains—that is to say, the parts from above 3000 feet and upwards—should be explored; and there are many left untouched or but partly known, even in better known countries, such as the Malay Peninsula, Sumatra, and Java. It is also of utmost interest to know whether the highest peaks in New Guinea take part of the Indo-Malayan highland ornis, though it is more likely, perhaps, that they are, and have always been, out of their influence.

Species like *Surniculus muschenbroeki* and *Lalage timoriensis* represent Moluccan and Sundanese elements, the occurrence of which will probably appear less remarkable when all the gaps between the different larger groups are filled in, for instance when a thorough exploration of the Sula group has taken place—witness also the ornis of Saleyer, Djampea, and Kalao.

II.

THE BIRDS OF SALEYER, DJAMPEA, AND KALAO.

After the successful exploration of Bonthain Peak in South Celebes, Mr. Everett sent his men to *Saleyer*, and afterwards went there himself, and also to the islands of *Kalao* and *Djampea*, between Flores and the southern part of Celebes and Saleyer. On some maps they are called "Schiedam Islands," but this name is not generally known. *Saleyer*, Salayer, Seleyer, Selayer, Silajara, or Boegeroens Island, is about forty miles long, but only from one to seven miles in width. "It is very populous, and the people are industrious, raising considerable quantities of produce. The teak tree has been planted, and flourishes; cattle, fowls, and vegetables are plentiful, and the woods abound with deer. It is said that this island is the division of the climate systems of the eastern and western parts of the archipelago, the rainy season being reversed, and conforming to the west with the north-westerly and to the east with the south-easterly monsoon" (Findlay, *Indian Archipelago Directory*, p. 803).

Not much is known of the fauna of Saleyer, but lepidoptera have been collected there by several collectors. Ornithologically it was unexplored until 1889, when Prof. Max Weber obtained there twenty-two specimens of birds, representing fourteen species, from January 13th to 19th. Dr. Büttikofer gave a list of these in Weber's *Zoolog. Ergebnisse einer Reise in Niederländisch Ost-Indien*, Vol. III. The species obtained by Prof. Weber were :—

1. *Haliaëtus leucogaster* (Gm.).
2. *Alcedo bengalensis* Gm.
3. *Halcyon chloris* (Bodd.).
4. *Siphia banyumas* (Horsf.).*
5. *Pachycephala teysmanni* Büttik.
6. *P. orphea* Jard.
7. *Artamus leucogaster* (Valenc.).
8. *Lalage timoriensis* (Müll.).
9. *Chibia leucops* (Wall.).
10. *Treron griseicauda* Gray.†
11. *Ptilopus melanauchen* (Salvad.).
12. *Macropygia macassariensis* Wall.
13. *Erythra phoenicura* (Penn.).
14. *Totanus hypoleucos* (L.).

It will be seen from the following article that Mr. Everett's collections have added a good number of species to the Saleyer list. "Small as the number of species recorded by me from Saleyer may be," says Büttikofer, *l.c.*, "it proves nevertheless, by the presence of *Pachycephala orphea* and *Lalage timoriensis*, that the ornis of this island, which must geographically be looked upon as a continuation of the Southern Peninsula of Celebes, and may also be regarded so ornithologically, represents some relationship with the ornis of the Timor group, though not with that of Flores, as one might have expected from the geographical situation."

Djampea, Jampea, Tjampeah, or Tana Djampea (the land of Djampea), is the largest island of the little group sometimes called the "Schiedam Islands," and is about fifteen miles in length. It has a rugged appearance and is mountainous, the hills being covered with high trees, but it terminates to the eastward and northward in low points. There are rivers with good water. No birds, as far as I know, have ever been recorded from Djampea, though a list of lepidoptera from that island has been given by Snellen.

Kalao, or *Lumbego* as it is called by the natives, lies less than ten miles to the south-east from Djampea, and is a narrow mountainous island, thirteen or fourteen miles in length from east to west. Off the east end is *Bonerate* Island, with a safe channel between. No list of birds from Kalao has ever been given, nor does any one seem to have collected any birds there; but Messrs. Sarasin visited Bonerate and collected there five species of birds, which were recorded by Messrs. Meyer & Wiglesworth in *Abh. und Ber. Mus. Dresden*, No. 1, 1896, p. 16. They are :—

1. *Artamus leucogaster* (Valenc.).
2. *Cyrtostomus* sp.
3. *Zosterops intermedia* Wall.
4. *Oriolus boneratensis* n. sp.
5. *Megapodius duperreyi* L. & G.

The following list will show the excellent ornithological work done by Mr. Everett and his men on these islands, and we confidently hope that we shall soon receive collections from him from other hitherto unexplored or but imperfectly known islands of the Eastern Archipelago.

1. Pratincola caprata (L.).

♂ ♀. Saleyer.

* This is my *S. omissa*.—E. H.

† This is *Treron wallacei* Salvad.—E. H.

2. **Phylloscopus borealis** (Blas.).

Saleyer, one specimen; Kalao, two specimens.

3. **Dicaeum splendidum** Büttik. (*Notes Leyd. Mus. t.c.*).

A series of both sexes from Djampea. The principal differences from *D. mackloti* are the colour of the throat, which is much lighter, more vermilion, and extends farther down on the breast, and the greatly diminished dark surroundings of the red throat. They are broad and deep black in *D. mackloti*, while they are blackish grey and narrow in *D. splendidum*. The colour of the back varies and is not constantly different in the two species. My birds have been compared with the type in Leyden.

The *female* is dark olive-grey above and on the sides of neck and head; rump and upper tail-coverts vermilion; the wings bluish black, with narrow olive outer edges; tail bluish black. Below creamy white. Axillaries, under wing-coverts, and inner wing-lining white. Wing 51—52 mm. The immature *male* is like the *female*.

♂. "Iris dark brown; bill black; mandible grey, palest at base; feet and claws very dark grey, almost black." ♀. "Iris dark brown; basal portion of maxilla and two-thirds of mandible dull orange; feet and claws greyish black."

Dr. Büttikofer described this species from Makassar! (See *Cinnyris teysmanni*, *Rhipidura celebensis*.)

4. **Cinnyris frenata dissentiens** Hartert (*antea*, p. 152).

As mentioned above, there are five skins from Saleyer, four adult *males* and one immature *male*, which are paler below than my type from Indrulaman, but I have only one from the latter place in the most perfect and freshest plumage, while those from Saleyer are not in such fresh plumage. However, I think it most likely that the Saleyer bird always differs slightly from that from South Celebes. In that case it would have to be considered, so to say, a form of *C. frenata dissentiens*, just as the latter is rather a form of *C. frenata plateni* than of *C. frenata typica*; but we can only call the present form *C. frenata dissentiens*, and, in case that from Saleyer should constantly differ, would have to call it, by a trinomial, a subspecies of *C. frenata*, as otherwise we should get into a perfect labyrinth of names, which would be impossible to use.

5. **Cinnyris teysmanni** Büttik. (*Notes Leyd. Mus.* XV. p. 179, 1893).

Common on the islands of Djampea and Kalao; specimens from the two islands do not differ. I sent a *male* to my friend Dr. Büttikofer, who kindly compared it with the type and found them to be identical. The pectoral tufts, however, are more or less tinged with orange in nearly all the specimens before me, but this is absent in a few, probably fading in time. The adult *male* is very exactly described by the author (*l.c.*), but the *female* was not known. It is greyish olive above, washed with green on the rump and the margins of the quills. A whitish yellow supercciliary line over the eye. Beneath lemon-yellow, paler in younger birds, and always paler on the throat and under tail-coverts. Under wing-coverts and inner lining of wing whitish. Outer rectrices broadly tipped with white, these tips decreasing in extent

towards the middle, so that the centre ones are only narrowly fringed with white on the tip. Wing about 2 or 3 mm. shorter than in the *male*.

The species has originally been described from the Makassar district in Celebes. It was collected by the distinguished Dutch botanist Teysmann. As the bird is so common on Djampea and Kalao, but was not found in Saleyer, nor near Makassar by recent collectors, one cannot help being somewhat sceptical with regard to the locality "Makassar district," especially as Teysmann travelled over many parts of the Eastern Archipelago, no original labels, as far as I know, having been attached to his birds. Some of his many important discoveries are species peculiar to the Celebes highlands, as we have seen in the preceding article on the birds of Bonthain Peak.

6. **Myzomela chloroptera** Wald.

Saleyer and Djampea. The same as the Celebes form. The young *male* is like the adult *female*. Many intermediately coloured specimens.

7. **Zosterops intermedia** Wall.

Saleyer, Djampea, and Kalao. The species was first described from Celebes (Makassar), but it is said to occur also in Lombok and Ternate.

8. **Anthus gustavi** Swinh.

Djampea and Kalao. This species breeds in Siberia and wanders southwards to Timor, Celebes, and the Moluccas.

9. **Motacilla flava** L.

Saleyer, Kalao.

10. **Munia molucca** (L.).

A series from Saleyer and Kalao. They agree entirely with specimens from Celebes. These latter have been included with his subspecies *propinqua* (from Flores) by Sharpe, *Cat. B.* XIII. p. 368, though he admits that they stood somewhat between the two forms, and have been united with *M. molucca* by Büttikofer, Weber's *Reise*, III. p. 280. Messrs. Meyer & Wiglesworth also say that they are intermediate, but call them *M. molucca* (*Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 13). I cannot see any constant differences between Celebes and Moluccan birds, and those from Saleyer and Kalao do not differ either, though *some* few specimens have perhaps a little whiter breast, thus apparently pointing towards the Flores form.

11. **Artamus leucogaster** (Valenc.).

Saleyer and Djampea. The young bird (Djampea) has a brown beak, a very pale grey throat, the feathers on the back tipped with ochraceous brown, the remiges and rectrices tipped with whitish.

12. **Calornis minor** (Bp.).

Saleyer and Djampea. ♀ juv. "Iris olive-yellow; bill and legs dull black."

13. **Dicrurus leucops** Wall.

♂ ♀. Saleyer. One very young without the glossy tips to the feathers.

14. **Oriolus boneratensis** Mey. & Wigl.

Abh. und Ber. Mus. Dresden, 1896, No. 1, p. 16 (January 1896). Found in Djampea and Kalao, but more numerous in Kalao. This large Oriole has been well characterised by the authors, who had one *female* from Bonerate, collected by Messrs. Sarasin; but it is perhaps nearer to *O. broderipi* than one might have imagined from their description. The size of the bill in *O. broderipi* varies considerably, as does the length of the wing. So does also the width of the black surrounding the crown, but there always remains a considerably larger yellow spot on the crown in *O. boneratensis*, the bill is always larger, and the black surrounding the crown is narrower. The speculum on the wing is mostly *larger* than in *O. broderipi*, but smaller in some (not all) *females*. The primaries do *not* have yellow tips, as they have in *O. broderipi*, but the secondaries *are* tipped with yellow, though the latter varies very much in extent, is wider and more greenish in some *females* and (probably younger) *males*, and is wanting in a few of the *females*. The yellow tips to the secondaries, however, are larger in *O. broderipi*. The extent of black on the rectrices varies much, as in *O. broderipi*, though it is generally extended more towards the tips, but the central rectrices are also tipped with yellow, as in *O. broderipi*, in every one of the large series before me.

The colour is of a *pure and perfect orange* in some specimens; in others some feathers are orange, others yellow; in some the whole plumage is washed with yellow, while others are of a pure lemon-yellow without a shade of orange, and of the latter some have the mantle faintly tinged with greenish. These variations in colour are either due to age or perhaps to food, but not to sex or locality, specimens from Kalao being perfectly similar to those from Djampea. Herr Hofrath Meyer has kindly compared some of my birds with his type of *O. boneratensis*, and declared it to be the same bird. The wing measures 162—173 mm., the tail 123—133, the tarsus 26—29, the culmen 36—38. The sexes are alike, unless many are wrongly sexed.

♂. "Iris deep cinnabar-red; bill white, tinged with rosy red; feet dark olivaceous grey." ♀. "Iris crimson-lake; bill horn-white, tinged with rose-colour; feet dark lead-grey."

15. **Pachycephala teysmanni** Büttik. (*Notes Leyd. Mus.* XV. p. 167).

A series from Saleyer only. ♂. "Iris brown; bill jet-black; legs and feet with claws dark grey." Dr. Büttikofer has kindly compared one of our *males* with his type, and found them to be quite alike. He described it from South Celebes. Further researches must show whether it occurs there too, or whether it is restricted to Saleyer.

The *female* resembles the *male*, but the white of the throat does not extend so far down towards the breast; the top of the head is not dark slaty-grey but paler grey, the lores tinged with ochraceous, the ear-coverts pale fawn-colour with paler shafts. Wing 73 mm. A very young *male*, just out of nest, resembles the old *female*; but the breast and abdomen are white streaked with dark brown, the mantle washed with brown. In the fully adult *male* in fresh plumage the ear-coverts are darker than the crown, in fact almost black.

The *female* of *P. teysmanni* resembles much the *female* of *P. everetti*, but the latter has a larger bill, the head not clear grey, the back and rump not so greenish. The *males* are, as a comparison of the descriptions will show, entirely different, the

latter belonging to the section of the genus in which the *males* are black and yellow and the *females* quite different, while the former belongs to the group in which the sexes differ but slightly.

16. **Pachycephala everetti** sp. nov.

Pachycephala ex affinitate specierum *P. melanura*, *P. clio*, *P. fulvotincta* dictarum, sed ultimae proxima. ♂ ad. Capite et collari pectorali nigris. Mento gulaque pure albis. Pectore, abdomine, subcaudalibus aurantio-flavis. Subalaribus flavescentibus. Tibiarum plumis nigris et flavis. Collari nuchali (saepe indistincto) flavo, tectricibus supracaudalibus nigris, plus minusve flavo limbatis, notaeo reliquo virescente olivaceo-flavo, plus minusve nigro intermixto. Remigibus nigris, pogoniis externis cinereo marginatis. Tectricibus alae nigris. Rectricibus nigris, olivaceo-viridi terminatis. Al. 80 mm.; caud. 64—66; culm. 19; tars. 23. ♀ ad. Supra olivaceo-brunnea, capite grisescente, uropygio ochraceo lavato. Remigibus nigrescentibus, pogoniis externis uropygii colore limbatis. Cauda olivacco-viridi. Gula albida. Subcaudalibus citrino-flavis. Gastraeo reliquo ochracco-lutoso. Subalaribus albidis. Magnitudine maris.

Hab. Insula Djampea sic dicta.

A fine series of this new species from Djampea. The top of the head to the nape, the surrounding of the eyes and ear-coverts, and connected with this black area a band across the jugulum black. Chin and throat white, rest of under surface orange-yellow, a little more orange on the breast; thighs black, but with broad yellow tips to the feathers; an indistinct yellow collar across the hindneck. Interscapulium, back, and rump greenish olive-yellow, more or less mottled with black, caused by the feathers being black towards the base; wing-coverts black, some of the larger sometimes with narrow yellow edges; upper tail-coverts black, sometimes narrowly edged with olive-yellow; wing-quills black, primaries with narrow grey outer edges, secondaries with pale brownish tips; tail black, tipped with olive-green. This is the colour of the majority of specimens. The black lower parts of the feathers above are more or less conspicuous, from the greenish olive-yellow edges being narrower or broader. In a few specimens there are no black spots at all on the upperside. These must, I think, be very old individuals, as a bird just changing (by moult) from the immature dress to that of the adult has a fair amount of black on the back, though not on the rump. Perhaps, however, there is only much individual variation. In the spotless individuals the yellow collar on the hindneck is also more visible, while it is obsolete in the majority of specimens. The immature *male* is like the adult *female*. ♂. ad. "Iris crimson-lake; bill jet-black; legs plumbeous or plumbeous blue-grey; claws darker grey or brown." The *females* have the throat sometimes quite white, sometimes less so. The iris of the *female* and young *male* is brown.

Mr. Everett found this *Pachycephala* common on the island of Djampea. It resembles *P. fulvotincta* Wall. from Flores (Gadow, *Cat. B.* VIII. p. 196), which also varies somewhat, but has not so much orange on the breast, has the lesser wing-coverts black, the back not uniform as a rule, the *female* somewhat different in colour.

17. **Edoliosoma emancipata** sp. nov.

This new species, of which we have a fair series from Djampea only, is chiefly characterised in the *female*. The *male* very closely resembles that of *E. amboinense* Hartl. (as the species must be called according to Salvad., *Orn. Papuas.* II. p. 156,

not *E. ceramense*, as it is termed in *Cat. B.* IV. p. 47), but the wing seems to be slightly longer; the grey edges on the wing-coverts and secondaries are broader. The *female* differs entirely from that of *E. amboinense*, which is ashy brown above, in being above light slaty grey, and there is no fawn-coloured superciliary streak, as in the *female* of that species. The ear-coverts are light slaty grey, streaked with white. There is a slight brownish wash on the rump. The young bird is narrowly barred with dusky black on the upperside, as the remaining feathers in one of the *females* clearly indicate.

♂ ad. Wing 132—138 mm.; tail 113; culmen 25—26; width of bill at nostrils 9; tarsus 23. ♀ ad. "Iris chocolate-brown; bill jet-black; legs, feet, and claws greyish black." Wing 129–132 mm.

Several of the species of *Edoliosoma* are very closely allied, and a large material from many places is still required to understand them thoroughly.

The *male* of *E. timoriense* is quite different from *E. emancipata*, not having any black in the face. *E. tenuirostris* of Australia is much like it, but the wings and wing-coverts are bordered with grey only, not with grey and white outer edges; the *females* also differ.

18. **Lalage timoriensis** (S. Müll.).

Saleyer, Djampea, Kalao. (Büttik., *l.c.*, Saleyer.)

19. **Culicicapa helianthea** Wall.

♂. Saleyer. Identical with specimens from Celebes.

20. **Gerygone flaveola** Cab.

Like the specimen from Indrulaman, but looking paler because not in such fresh plumage.

Two *males* from Saleyer.

21. **Myiagra rufigula** Wall.

Djampea and Kalao. ♀. "Iris dark brown; bill black; mandible pale blue, with black tip; legs and claws greyish black."

The *male* and *female* are well described in the *Cat. B.* The younger *female* (and *male*) are still more uniform above than the adult *female*, and the throat is still paler. This species bears much resemblance with *M. albiventris* from Samoa, but the greyish (not deep black) lores, the smaller bill, and the greater extent of the rufous colour underneath distinguish it without difficulty.

The species is otherwise an inhabitant of the Timor group of islands.

22. **Siphia omissa** Hartert.

See *antea*, pp. 71 and 157.

A fine series from Saleyer shows that the birds from that island entirely agree with those from Celebes. The *male* of *S. omissa* is paler blue above than that of *S. banyumas*, the bill is a little narrower, but altogether the differences between the *males* are trifling, while those between the *females* of the two species are very obvious.

The feet in *S. omissa* are described on the labels as "light purplish brown," while they are given as "dark brownish grey" on labels attached to skins of *S. banyumas* from Borneo, also collected by Mr. Everett. The legs of *S. omissa* look mostly much paler in dry skins than those of *S. banyumas*.

23. **Siphia djampeana** sp. nov.

♂ mari *S. omissae* similis, sed macula gulari alba, rostro majore, regione malari et auriculari nigris distinguendus. ♀ maris *S. omissae* colore, sed rostro majore.

Hab. Insula Djampea sic dicta.

A good series of this fine new *Siphia* from Djampea. It is remarkable that the *female* of *S. djampeana* does not resemble the *female* of *S. omissa*, but only differs from its own *male* in the almost total absence of the white throat-spot, thus closely resembling the *male* of *S. omissa*, or rather more so that of *S. banyumas*, which also has a tiny whitish spot just below the black chin. In fact it can only be distinguished from the *males* of *S. banyumas* and *S. omissa* by a slightly larger bill and darker, almost entirely black, ear-coverts and malar region.

The *male* of *S. djampeana* is above everywhere uniform blue, the forehead and a narrow line to over the eye lighter and brighter blue. Lores, from nostrils to eye, chin and malar region, with ear-coverts, black, the latter slightly tinged with blue. A white gular patch, larger in adults, smaller in young birds, under the chin; all the rest of the under surface orange-rufous. Under wing-coverts white, washed with orange-rufous. "Iris dark brown; bill black; legs and feet dark purplish grey; claws blackish." Wing 78—81 mm.; tail 67—69; tarsus 18—19; culmen 17.

The young bird is above brownish, spotted with orange-rufous; there is no black on the chin, and the feathers of the breast have blackish edges.

24. **Siphia kalaoensis** sp. nov.

♂ mari *S. djampeanae* similis, sed gula, jugulo, pectoreque albis haud difficile distinguendus. ♀ mari similis, sed macula gulari et pectoris lateribus tantum albis, itaque mari *S. djampeanae* simillima.

Hab. Insula Kalao sic dicta.

A good series of *males* and two *females* from Kalao. This species bears about, though not quite, the same relationship to *S. djampeana* as the latter does to *S. omissa*, the *male* of *S. djampeana* being obviously different, while the *female* of *S. kalaoensis* is practically indistinguishable from the *male* (not so from the *female*) of *S. djampeana*.

♂ ad. Upperside entirely like that of *S. djampeana*. On the underside the black chin is often washed with blue, the throat and breast are white, the abdomen pale orange-rufous, the under tail-coverts white, more or less washed with pale orange-rufous. Under wing-coverts white, a little washed with orange-rufous. The *female* is like the *male*, except that the breast is strongly washed with orange-rufous and that the under tail-coverts are coloured like the abdomen. The *female* is, therefore, practically indistinguishable from the *male* of *S. djampeana*, but the breast is paler. Wing 76—78 mm.; tail 65—68; tarsus 19—20; culmen 16—17. The *female* is a little smaller, with the wing 72 mm.

The increase in white on the underparts in these flycatchers from Celebes and Saleyer to Djampea and Kalao is very interesting, and it would be a pleasure to

know whether or not the other islands more to the south and south-east also have such forms, in which the white may still more increase in extent.

A closer examination of the fauna of Flores especially would, I believe, reveal many interesting forms, as the island is but imperfectly known.

25. **Rhipidura celebensis** Büttik.

This species was described by Dr. Büttikofer in his excellent review of the genus *Rhipidura* in *Notes Leyden Mus.* XV. p. 79, as coming from Makassar, Celebes. Future explorations will have to prove whether it ever occurs there, but I cannot help doubting it somewhat, as it was found by Everett and his men in Kalao and Djampea only, but not in Saleyer nor in Celebes. Dr. Büttikofer has been kind enough to compare our *male* from Kalao with his type, and found it identical with the latter. It is the only specimen Mr. Everett sent from Kalao, but there are two *males* and a *female* from Djampea. They have the jugular black spot not of such a deep black, the abdomen and breast not so pure white, but *more or less* tinged with fulvous, the forehead not so bright rufous, and the upper wing-coverts tipped with rufous. Notwithstanding these differences, they belong, I think, to the same species, as those from Djampea seem to be, all three, immature birds, one of them undoubtedly being young, and the characters in which they differ not being equally developed in them. The *male* (Djampea) has the "iris dark brown; bill dark brown; mandible ochreous, dark brown towards the tip; legs pale grey."

26. **Monarcha inornatus** (Garn.).

Common on Djampea Island.

♂. "Iris dark brown; bill pale slate-blue, whitish at tip; legs and claws dark slate-blue."

♀. "Iris dark brown; bill horn-black, white at the tip; legs slate-blue; claws brownish grey."

The specimens are what I believe to be typical *M. inornata*. They are slightly paler rufous on the abdomen than specimens from Peling and Banggai. See Mey. & Wiglesw., *Abh. und Ber. Mus. Dresden*, 1896, No. 2, p. 14.

27. **Monarcha everetti** sp. nov.

Monarcha mari chalybeo-atra, uropygio, supracaudalibus, pectore, abdomine, corporis lateribus, subcaudalibus, axillaribus, subalaribus, remigum pogoniis internis ad basin, caudae basi imo albis, remigibus lateribus tribus extimis latissime, quarta minore pro parte in apice albis. Femina supra brunnescente grisea, loris albidis, alis brunneis, subtus albida, ochraceo-rufo lavata, cauda nigra, albo notata, sicut in mari.

Al. ♂ 69 mm.; caud. 72; tars. 19; culm. 16.

Hab. Insula Djampea sic dicta.

A good series of adult *males* was collected on the island of Djampea in December 1895. They are black with a steel-blue gloss, the tail less glossy. The rump and upper tail-coverts, breast, abdomen, sides of body, axillaries, and under wing-coverts, inner webs of remiges towards the base, the utmost base of tail, broad tips to rectrices, about 25 mm. in first, about 20 mm. in second, about 15 mm. in third, and a small tip of a few mm. in fourth, white. Thighs black, some of the feathers with white tips. The primaries have more or less indistinct brownish edges in the middle of the outer webs. "Iris dark brown; bill and legs light blue; claws dark grey." Length

about 14 cm.; wing 66—69 mm.; tail about 70—72; tarsus 19; culmen 16—17. Several evidently immature specimens, *males*, have the mantle dark cinereous grey, but the steel-black colour of the adult *male* seems gradually to spread over it in one specimen, as if it was changing its colour. The feathers of the throat and jugulum in these specimens are tipped with white.

There is only one specimen, in abraded plumage, that is marked "♀." It differs entirely from the *male*, as we might expect in any *Monarcha* or *Piezorhynchus*. It is above cinereous grey, slightly washed with brown. Lores whitish. A spot behind the eye pale whitish grey. Wings dark brown, inner webs white towards the base. No white on rump and upper tail-coverts; tail as in the *male*. Under surface whitish, washed with pale orange-rufous, especially on the breast; abdomen almost white. Thighs pale brownish; under wing-coverts and axillaries dirty white. "Iris chocolate; bill pale lead-blue, black at apex; legs dark slate-blue; claws blackish." As this specimen comes from the same island, as the size of bill and markings of tail agree with those of the *male* (wings not exactly measurable, being much abraded and partly damaged), I do not at all doubt that this bird really is the *female* of *M. everetti* mihi, and we know that the *females* in this genus always differ from the *male*, in some cases even more strikingly than in this. The species belongs to *Piezorhynchus*, if that genus can be separated from *Monarcha*, as limited in the *Catal. of Birds*, Vol. IV. It does not agree with any of the known species, though the coloration is of a pattern common in so many birds.

28. **Pitta virginalis** sp. nov., or **Pitta irena virginalis** subsp. nov.

Pittae speciei *P. irenae* dictae similis sed macula mentali nigra minore (interdum indicata tantum), stria superciliari brunnescentiore et multo latiore, ala paullum breviore distinguenda. Ala 103—109 mm.

Hab. Insula Djampea sic dicta.

♂♀ ad. Bill horn-black (A. Everett) (evidently pale at base in *P. irena*—in skin). Iris dark brown; crown, nape, and side of head deep black; broad superciliary stripes from the base of the bill to the nape, where the two approach each other a little, deep buff, very faintly, hardly perceptibly, tinged with greenish towards the end; mantle, outer edges of remiges, greater wing-coverts, and tips of the black rectrices dark green; rest of remiges black, with a white speculum on the primaries. Under wing-coverts black; lesser wing-coverts and rump pale shiny sky-blue; upper wing-coverts black, with narrow dark green edges. Chin more or less black, generally for about 10 mm., in one for 13 mm., and in one white with a few black feathers only. (In *P. irena* black for about, at least, 25 mm., and reaching in a point towards the throat.) Beneath deep fawn-colour; throat white, shading into the fawn. Centre of lower abdomen, crissum, and under tail-coverts scarlet, on the abdomen tinged and mixed with black. Thighs fawn; legs and feet white, tinged with pinkish; claws dark grey.

Total length about 170—180 mm.; culmen 25; wing 103—109; tail 38—39; tarsus 35.

As said before, this beautiful and hitherto unknown form of *Pitta*, from an ornithologically hitherto quite virgin island, is nearest to *Pitta irena* from Timor and some other small islands of the Timor group, but is at once distinguished by the very broad (twice as broad) superciliary stripe of deep buff or fawn-colour, and by the smaller extent of the black on the chin, also by a slightly shorter wing.

Future explorations of the adjoining islands and larger series of *P. irena* must decide whether we have to keep the Djampea form as a species or as a subspecies. Of *Pitta irena* I have only seen two skins, one in the Tring Museum and one in the British Museum.

From *Pitta vigorsi*, from Banda, Dammar, Timorlaut, it is distinguished by some black on the chin (there is *none* in *P. vigorsi*), and by a differently coloured superciliary stripe, also slightly different dimensions; from *P. concinna*, from Lombock and Flores, also by a differently coloured superciliary stripe, which in the latter passes into a very pale blue behind the eye, and by much less black on the throat. *Pitta vigorsi*, *irena*, and *concinna* are different from each other, but at least as closely allied as *P. virginalis* to any of its congeners. Wishing to have a comparison made with the type, I sent a skin of my new species and our skin of *P. irena* to Dr. Büttikofer, who informed me that the latter entirely agreed with the type, while the one from Djampea "was unlike any *Pitta* in the Leyden Museum," where they have all the allied forms.

29. **Macropteryx wallacei** (Gould).

Both sexes from Saleyer. Not different from Celebes specimens.

30. **Collocalia esculenta** (L.).

Two *females* from Kalao. Wing in both 93 mm. long, which is considerably shorter than in our Celebes specimens. See Mey. & Wiglesw., *t.c.* No. 2, p. 14, where measurements from 69 to 101·6 mm. are given, and *antea*, p. 158.

31. **Collocalia francica** (Gm.).

Two fully-feathered nestlings and a number of nests and eggs from Pulau Batu, Djampea, taken on December 6th, 1895. At this date nests contained eggs (always two each), and young in all stages. The nests are good white "edible" ones, some (probably older ones) being less white, two nests or more often hanging together. The eggs, being large in proportion to the bird, measure 19·8 by 13·4, 20·4 by 12·9, 19 by 13·3 mm. The wings of the nestlings are not measurable. The tarsi have a few scanty feathers on them; the rump is of a pale brownish grey, not very obvious. It is a pity there is no adult bird with them.

32. **Caprimulgus macrurus** Horsf.

A typical *male* from Saleyer, wing 184 mm.; a *female*, wing 178 mm., and a nestling from Djampea.

33. **Halcyon chloris** (Bodd.).

Saleyer and Djampea. The bills measure as follows (from anterior end of nostril to tip): ♂ Saleyer, 40 mm.; ♂ Saleyer, 37 mm.; ♂ Djampea, 41 mm.; ♀ Djampea, 39·5 mm. On the whole the specimens from Celebes, and the islands north and east of it, seem to be somewhat short-beaked; but the individual variation is very great, even in the same country. See Mey. & Wigl., t. c, No. 2, p. 12, 1896.

34. **Alcedo ispidoides** Less.

Saleyer and Djampea.

35. **Eurystomus orientalis** (L.).

A pair from Djampea. I consider them to be typical *E. orientalis*. (See Meyer & Wigl., *t.c.* No. 2, p. 13.)

36. **Cuculus intermedius** Vahl.

Saleyer, Djampea, Kalao. Adult in grey plumage, all marked "*male*," some young; *females* in grey as well as in rufous plumage. In one adult *male* wing 7·95 inches long. (See Shelley, *Cat. B.* XIX. pp. 241 ff.)

37. **Centropus javanicus** Dumont.

Djampea and Kalao. ♂. "Iris chocolate-brown." ♀. "Iris dark brown" (Djampea).

38. **Cacatua sulphurea** (Gm.).

Two *females* from Djampea seem to belong to this species, though the bills are very small. They measure only 24 mm. from end of cere to tip. The wings 223 to 230 mm. They are exactly like Celebes specimens, except for the small size of the bills, and they do not belong to *C. parvula* from the Timor group, which hardly deserves more than subspecific rank, though it certainly is not the same as *C. sulphurea*. ♀. "Iris crimson-lake; orbital skin white; bill greyish black; feet dark grey; claws blackish."

39. **Tanygnathus megalorhynchus** (Bodd.).

Common on Djampea Island.

♀ ad. "Iris, before skinning, white (probably pale yellow in life?); bill deep wax-red; feet olivaceous grey; claws blackish grey." The *females* are considerably smaller than the *males*, specially with smaller beaks and shorter wings, but the variations in size are also remarkable apart from sex.

The distribution of this parrot is remarkable. Salvadori (*Cat. B.* XX. p. 428) gives it as follows: "Western coast of Northern New Guinea, Western Papuan Islands, Northern Moluccas or Halmahera group, Sanghir and Talaut Islands; according to Meyer, also Togian Islands." *T. affinis* inhabiting the *Southern* Moluccas and *C. subaffinis* the Tenimber Islands, one might have expected these rather than *T. megalorhynchus* on Djampea.

40. **Trichoglossus forsteni** Bp.

This beautiful species was found to be common on Djampea Island. "The iris (♂) is orange; the bill orange-red; feet dark grey; claws brown." One specimen from Sumbawa, collected by Guillemard, in the Tring Museum, the same specimen which has been described in the *Cat. B.* XX. by Salvadori and will be figured in the monograph of the *Loriidae* by Mivart, has the head above intermixed with some dirty greyish bluish feathers, the ear-coverts more purple, and but an indication of the broad purplish blue band behind the greenish yellow band on the hindneck. It is moulting, and the plumage partly abraded. A specimen in the Leyden Museum, kindly lent me by Dr. Büttikofer, which has been compared with the type in the same museum, is perfectly alike. The wing of this species measures 139—146 mm. This species has only been recorded from Sumbawa!

41. **Strix flammea** L.

Kalao. Typical *S. flammea*, which has nothing to do with the large and powerful *Strix rosenbergi* of Celebes. "Bill white; feet sepia-brown; claws dark horn-grey."

42. **Ninox scutulata japonica** (Schleg.).

♀. Kalao. "Iris golden; bill olive-green, clouded with horn-black; feet wax-yellow; claws blackish brown."

43. **Baza reinwardti** (Müll. & Schleg.).

♂. December 1895, Djampea. "Iris yellow; cere, mandible, basal half of maxilla light plumbeous; apical half of maxilla jet-black; feet white; claws brown." The number and position of the bands in this widespread species vary considerably.

44. **Elanus hypoleucus** Gould.

December 1895, Kalao.

45. **Pernis** spec.

One specimen, marked *female*, November 1895, Saleyer. A large bird, remiges moulting, wing 440 mm. The whole underside is buff or ochraceous buff, some feathers (older ones) paler, others (the new ones) darker and brighter. The throat is surrounded by an irregular black band, the feathers of the lower throat and upper breast have narrow deep brown shaft-lines, but all the breast, abdomen, flanks, scapulars, and under wing-coverts are uniform, without a trace of bars or bands. Upperside dark brown as in most *Pernis*, not differing from many specimens of *P. ptilonorhynchus*. I believe this bird to belong to the latter species, but not to *P. celebensis*, unless it is an unknown plumage of the latter species, of which we do not yet know very much.

46. **Accipiter gularis** (Temm. & Schleg.).

In spite of the instructive articles of Gurney (*List Diurn. B. of Prey*, App. O, pp. 165—177) and Grant (*Ibis*, 1896, pp. 104—107), I found it difficult to name the three specimens from Djampea before me, but at last came to the conclusion that they must be (immature?) *A. gularis*. The breast is longitudinally marked in the two *females*, as well as in the one *male*; the line along the centre of the throat very narrow, and absent in one of the *females*. No shade of rufous anywhere on the underside. The fourth primary is longest, and 6 to 8 mm. longer than the fifth, while in an adult (rufous) *male* of what I consider to be *A. manillensis* the fifth primary forms the tip of the wing and is slightly longer than the fourth! I wish somebody would give distinctive characters for these birds of the *young* as well. The material at this Museum is but scanty at present.

♂. "Iris golden; cere Indian yellow; loral region greyish green; bill black; basal portion bluish plumbeous; legs wax-yellow; claws black." ♀. "Iris golden; skin of orbital and loral regions and cere dull yellowish green; bill black, basal portion light lead-grey; legs pale wax-yellow; claws black."

47. **Astur torquatus** (Temm.).

Adult and young specimens from Djampea and Kalao. The young bird is above brown; the feathers white at base, some of this white being shown on the hindneck;

all feathers margined with rusty rufous; shoulders deep rufous. Underside white; chin, throat, and breast longitudinally striped with brown; abdomen with more rounded pale rufous spots. Thighs entirely rufous, the feathers with paler edges. Quills more distinctly barred than adult birds. A *male* shows most instructively some of the barred feathers of the entirely different adult plumage on the breast. ♂ adult wing 195 mm., ♀ adult wing 230 mm. "Iris pale golden."

The species is widely spread. - Sharpe in the *Cat. B.* I. gives only Timor as its "habitat," but see Schlegel, *Mus. d'Hist. Nat. Pays-Bas Accipitres*, p. 91, etc.

48. **Tinnunculus moluccensis occidentalis** Mey. & Wigl.

Djampea and Kalao. Similar to those from Celebes (*anteà*, p. 162).

49. **Spilornis rufipectus** Gould.

Saleyer, November 1895. Two adult birds. Throat slaty black; feathers under the eye and ear-coverts dark grey, somewhat in contrast with the throat, and specially so with its lower, darker part. In the adult bird from South Celebes (see *anteà*, p. 161) all these parts are alike and much darker, while they are also nearly alike, but altogether very much paler, in a bird from North Celebes. These birds are very variable.*

50. **Pandion haliaetus leucocephalus** Gould.

1 ♀. Kalao, December 1895. Wing 440 mm. The head is nearly quite white, though there are some dark spots on the occiput. I am inclined to place this bird with the subspecies *leucocephalus*, which cannot possibly be called a species, the smaller size and the whiter head being the only characters to distinguish it, and both these being rather variable. I have before me, for example, in the Tring Museum, specimens from the Solomons with pure white head, as well as others which are more densely striped than any from North Asia, etc., before me now, though they agree in being generally a little smaller.

51. **Osmotreron wallacei** Salvad.

One *male* from Saleyer. It is exactly as brick-red on the mantle as the *male* from Indrulaman which I mentioned *anteà*, p. 163. It is possible that the specimens from South Celebes, including those from Saleyer, are all like these two, and in this case they would have to be recognised as a slightly differentiated form and would deserve a subspecific name. As the colour of the mantle seems to vary a little according to age or freshness of plumage, it is not possible to decide about this question from the scanty material now before me.

52. **Osmotreron wallacei pallidior** subsp. nov.

A series from Djampea and Kalao are closely allied to *O. wallacei typica* from Celebes, the *males* agreeing in the colour of the mantle with the *northern* specimens, and not with those from South Celebes and Saleyer, but being larger, with a stronger bill and a little longer wing, the head paler grey, the throat lighter and a little more washed with grey, the entire breast and abdomen of a paler green, the anal region

* I may here remark that my birds from Bunguran, Natuna Islands (Nov. Zool. I. p. 182 and II. p. 476), are, in my opinion, the same species as *Sp. salvadorii* Berl., *op. cit.* II. p. 73.—E. H.

more white and the under tail-coverts slightly paler. The brownish orange spot in front of the shoulders is very much paler and occupies a larger area. ♀ ad. "Iris orange; orbital skin vivid yellowish green; basal half of bill pale green, apical half ivory-white, with a faint green tinge; feet carmine; claws light grey." Wing of *males* 157—161 mm.; tail 95—98; tarsus 20—22; bill from hind-end of nostrils to tip 16—17, height from angle of mandible 9. *Female* same dimensions.

This form resembles *O. sanghirensis*—which, however, appears to me to be only a subspecies of *O. wallacei*—in its powerful bill and its long wing, but it differs from it in colour, as it does from *O. wallacei typica*. It has nothing to do with *O. griseicauda*, as it has the black on the lateral tail-feathers as strongly developed as in *O. wallacei typica* and *sanghirensis*, if not more so.

The *female* of *O. wallacei pallidior* is chiefly remarkable for its paler mantle washed with greyish.

53. **Ptilopus melanocephalus** (Forst.).

Both sexes from Saleyer, Djampea, and Kalao. Büttikofer (*t.c.* p. 287) has already mentioned this form (under the name of *P. melanauchen* Salvad.) from Saleyer. It is certainly highly remarkable that Saleyer, which is so close to Celebes, has *P. melanocephalus* and not *P. melanospilus* from Celebes! The latter is without difficulty distinguished from *P. melanocephalus* by its throat-spot *and under tail-coverts* being orange and not lemon-yellow. This, and also *P. chrysorrhous* and *P. xanthorrhous*, can be distinguished from *P. melanocephalus* and from each other, though it is not always very easy, and they may after all be best considered subspecies; but, curiously enough, the most northern form, *P. bangueyensis* Meyer, is closest to the most southern form, *P. melanocephalus*, and there are some specimens (*males*) which I cannot with certainty distinguish from typical *P. melanocephalus*, though the black occipital spot is *mostly* (but not always!) tinged with purple. (See on the subject Büttik., *l.c.*; Salvad., *Cat. B.* XXI. pp. 142-6; Mey. & Wigl., *Abh. und Ber. Mus. Dresd.* 1896, No. 2, p. 19.)

Salvadori himself has (*Cat. B.*) not sustained his *P. melanauchen*, but united the birds from Java, Flores, Sumbawa, Sumba, and Lombok under the name of *P. melanocephalus*. Büttikofer's remark (*l.c.*) seems to strengthen Salvadori's more recent view, though perhaps Javan specimens are, on the whole, a *little* paler yellow on the throat. The birds from Saleyer, Djampea, and Kalao do not differ from each other. ♂ (Djampea). "Iris yellow, with orbital ring and bill bright yellow-green; feet carmine; claws dark brownish grey." *Males:* wing 118—119 mm.; *females:* 113—115 mm.

54. **Carpophaga rosacea** (Temm.).

Five specimens from Djampea. ♂. "Iris crimson-lake; bill dark grey, clouded with black; cere dull carmine; feet dull dark carmine; claws dark grey."

The rosy vinous colour of the head and breast and abdomen varies much. In some specimens, I think those that have worn their plumage longer, or perhaps in less mature ones, it is almost entirely absent. This species is widely spread, reaching from the Timor group to the Tenimber and Key Islands, to Halmahera and Celebes. (Salvad., *Cat. B.* XXI. p. 199.)

55. **Carpophaga concinna** Wall.

Several specimens from Djampea. They are perfectly similar to those from other localities, the vinous tinge on the nape mostly very strong.

Comparing Key specimens with a very large series from many localities (Sanghir Islands, Siao, Dammar, Timorlaut, and Djampea), I do not find that they differ in size, but that the entire under surface is not light grey, but creamy white, with only a very faint cinereous tinge. I consider it worth a subspecific name, and propose for it the name of **C. concinna separata**.

56. **Myristicivora bicolor** (Scop.).

Djampea.

57. **Macropygia macassariensis** Wall.

A fine series of this rare pigeon from Djampea and Saleyer. There is evidently no difference between the sexes, except that the wing of the *female* is about 5 to 10 mm. shorter. The *male* has "the iris with an outer ring pink and an inner ring blue. The pink ring becomes orange after the bird has been dead for some while. Bill very dark sepia-brown; the cere light carmine; the feet carmine." The adult bird is well described by Büttikofer in his list of Saleyer birds, p. 288, and by Salvadori in *Cat. B.* XXI. p. 343. Younger birds are darker; the head is deep blackish brown, each feather tipped with rufous. Breast and abdomen washed with rusty brown, the upper wing-coverts margined with rusty rufous. The iris of the younger birds is "chocolate-brown; bill and feet dark sepia-brown."

58. **Esacus magnirostris** Geoff.

December, Kalao.

59. **Gallinago megala** Swinh.

November 22nd, Saleyer.

60. **Tringa ruficollis** Pall.

November, Saleyer.

61. **Himantopus leucocephalus** Gould.

Saleyer.

62. **Totanus littoreus** (L.) (= **glottis** L.).

Saleyer.

63. **Totanus calidris** (L.).

Saleyer.

64. **Charadrius fulvus** Gm.

Saleyer.

65. **Strepsilas interpres** (L.).

Saleyer.

66. **Poliolimnas cinereus** (Vieill.).

Djampea, December 1895.

67. **Erythra phoenicura** (Forst.).

Saleyer. Büttikofer has already recorded this species from Saleyer.

68. **Nycticorax caledonicus** (Gm.).

♀. Djampea, December 1895. "Iris golden; ophthalmic and loral regions, base of maxilla, with a line on the sides, and the mandible light grass-green; rest of maxilla and small stripe near apex of mandible black; legs light yellowish green; claws brownish grey."

69. **Butorides javanicus** (Horsf.).

♂. November 22nd, Saleyer.

70. **Bubulcus coromandus** (Bodd.).

♂. November 1895, Saleyer.

71. **Nettion gibberifrons** (Müll.).

One pair, a *male* and a *female*, from Saleyer. Again the *female* has a distinctly shorter bill, though there is no difference in the feet, and the wing is only a trifle shorter. (See *antea*, p. 165.)

72. **Microcarbo melanoleucus** (Vieill.).

♀. December 1895, Djampea.

73. **Megapodius duperreyi** Less. & Garn.

Djampea and Kalao. ♂. "Iris cinnamon-brown; bill dull Indian yellow; skin of ophthalmic and loral regions and of throat dull crimson; legs vermilion-red; upper surface of toes blackish brown; claws black."

A mound with a large number of eggs was found on Kalao on December 21st. The eggs measure from 82 to 88 mm. by 50 to 52 mm. The species is known from Bonerate and Saleyer. (Meyer & Wiglesw., *Abh. und Ber. Mus. Dresden*, 1896, No. 1, p. 16.)

O. Grant was evidently justified in uniting the different forms that have been separated of this bird, but if it should be found possible to separate some subspecific forms, then it would seem that the birds under consideration would belong to *M. gouldi* Gray.

Valuable as the present collections undoubtedly are, they are probably not exhaustive for any of the islands; therefore any conclusions we may draw from them must be subject to alterations, or even be erroneous for a great part, when we come to know everything from all these islands. Even among the few birds collected on Saleyer by Max Weber there was a land-bird, *Pachycephala orphea*, which was not obtained by Everett. The differences between Kalao and Djampea would be great if we could with any certainty judge from the absence of a species in the collection from one island that it did only occur on the other. This, however, would be hazardous; but from the difference between the two new species of *Siphia* on the two islands, and from the absence of some of the most numerous species from Djampea among the Kalao skins, and *vice versâ*, we must conclude that the ornis of Djampea and Kalao is not entirely the same, though, of course, much alike in its general character. From the present material it would seem that both Djampea and Kalao have as much, or rather more, in common with the Lesser Sunda Islands and Timor than with Celebes. Besides a few forms probably peculiar to them

(*Oriolus boneratensis*, *Siphia djampeana* and *kalaoensis*, *Monarcha everetti*, *Pachycephala everetti*, *Pitta virginalis*, *Edoliosoma emancipata*), and some (*Cinnyris teysmanni*, *Rhipidura celebensis*, *Dicaeum splendidum*) of which the distribution outside of these islands is, in my opinion, doubtful, and further, besides many widespread species, we find of true Celebensian species on Djampea, for example, the *Myzomela chloroptera* and *Macropygia macassariensis*. On the same island is a common bird, the *Trichoglossus forsteni*, hitherto only recorded from Sumbawa! From Timor we have invaders, as *Myiagra rufigula* and *Lalage timoriensis*, and we might also count as such the *Pitta* and *Dicaeum*, which have their allies there, and others. But I cannot see a species hitherto known from Flores, except some of the widespread forms, among the birds of Djampea and Kalao, nor are the affinities of any of the new forms with the Flores group, but rather with species from Timor or Celebes, with the exception of *Pachycephala everetti*. It is, of course, possible that this is partly due to our imperfect knowledge of the fauna of Flores, but we might possibly better understand the greater connection with the Timor group if we knew the birds of Ombai, Pantar, Lomblem, Solor, Adonara, Kalatua, etc., of all of which we know very little or nothing at all.

An interesting feature is also the occurrence of the large *Tanygnathus megalorhynchus* on Djampea. Being chiefly an inhabitant of the *Northern* Moluccas (its place being taken by *T. affinis* in the *Southern* Moluccas), it is also known from some islands skirting round the large island of Celebes, such as Sanghir, Talaut, and the Togians, but never as yet found on the mainland of Celebes itself.

The Celebensian species have evidently spread down to Djampea and Kalao by the way of Saleyer, and it seems not very probable that forms inhabiting Djampea and Kalao and not Saleyer are found in Celebes (cf. *Cinnyris teysmanni*—a bright and lively little bird, which is not likely to be overlooked where it is anything like common).

A glance at the lepidoptera seems to show that they are much more related to the fauna of the Lesser Sunda Islands, Flores, Timor, etc., than to that of Celebes.

The ornis of Saleyer is evidently that of South Celebes in general, but some few forms of the Timor region seem to have invaded it, such as *Pachycephala orphea* (see Büttikofer, *l.c.*), *Lalage timoriensis*, *Calornis minor*, the latter two (and most likely *via* Saleyer) extending also to South Celebes. *Caprimulgus macrurus* also seems to have reached Saleyer from the south, as it is not of usual occurrence in Celebes, if found there at all.

There are zoologists who are of the opinion that the distribution of such unwearied creatures as the birds, which may fly in one night to an island hundreds of miles distant from another (though certainly not from Egypt to Heligoland, as Gätke wishes to make one believe, without even an indication of proof), is of less value than that of such stationary animals as snails, shells, etc. However, I am not of the same opinion. Experience teaches us that birds on small islands are as much, and often much more, differentiated than any other animals. This is quite easy to understand, for birds, on account of their strong wings, are able to resist the agencies of distribution: they cannot be driven from island to island with wood or weeds like shells and insects; they can resist even a strong wind, while insects never can, but are carried away by it. In warmer climates most species find sufficient insects or vegetable food throughout the year, the soil not being covered with snow and ice, nor all the lower life disappearing for a long period. Therefore they are *very* stationary, and must be

looked upon as very important for the limitation of zoogeographical areas; but it is quite possible, and sometimes evident, that their distribution does not exactly correspond with that of other classes of animals, as totally different agencies may have acted upon them. The currents of the sea, for example, might have been acting in the dispersal of shells, while birds are not influenced by them. All such questions are as yet but little settled, and any material is welcome to clear them up.

I append a list of the species at present known from the three islands. In that of the Saleyer birds I have also inserted those recorded by Büttikofer and not found by Everett. They are only four, and the name of the author (Büttik.) is added to them.

The species described as new in this article are marked with an asterisk (*).

SALEYER.

1. Pratincola caprata.
2. Phylloscopus borealis.
3. Cinnyris frenata dissentiens.
4. Myzomela chloroptera.
5. Zosterops intermedia.
6. Motacilla flava.
7. Munia molucca.
8. Artamus leucogaster.
9. Calornis minor.
10. Dicrurus leucops.
11. Pachycephala teysmanni.
12. „ orphea (Büttik.).
13. Lalage timoriensis.
14. Culicicapa helianthea.
15. Gerygone flaveola.
16. Siphia omissa.
17. Macropteryx wallacei.
18. Caprimulgus macrurus.
19. Halcyon chloris.
20. Alcedo ispida bengalensis (Büttik.).
21. Alcedo ispidoides.
22. Cuculus intermedius.
23. Pernis spec.
24. Spilornis rufipectus.
25. Haliaetus leucogaster (Büttik.).
26. Osmotreron wallacei.
27. Ptilopus melanocephalus.
28. Macropygia macassariensis.
29. Gallinago megala.
30. Tringa ruficollis.
31. Himantopus leucocephalus.
32. Totanus littoreus.
33. „ calidris.
34. „ hypoleucus (Büttik.).
35. Charadrius fulvus.
36. Strepsilas interpres.
37. Erythra phoenicura.
38. Butorides javanicus.
39. Bubulcus coromandus.
40. Nettion gibberifrons.

DJAMPEA.

1. Dicaeum splendidum.
2. Cinnyris teysmanni.
3. Myzomela chloroptera.
4. Zosterops intermedia.
5. Anthus gustavi.
6. Artamus leucogaster.
7. Calornis minor.
8. Oriolus boneratensis.
9. Pachycephala everetti (*).
10. Lalage timoriensis.
11. Edoliosoma emancipata (*).
12. Myiagra rufigula.
13. Siphia djampeana (*).
14. Rhipidura celebensis.
15. Monarcha inornatus.
16. „ everetti (*).
17. Pitta virginalis (*).
18. Collocalia francica.
19. Caprimulgus macrurus.
20. Halcyon chloris.
21. Alcedo ispidoides.
22. Eurystomus orientalis.
23. Cuculus intermedius.
24. Centropus javanicus.
25. Cacatua sulphurea.
26. Tanygnathus megalorhynchus.
27. Trichoglossus forsteni.
28. Baza reinwardti.
29. Accipiter gularis.
30. Astur torquatus.
31. Tinnunculus moluccensis occidentalis.
32. Osmotreron wallacei pallidior (*).
33. Ptilopus melanocephalus.
34. Carpophaga rosacea.
35. „ concinna.
36. Myristicivora bicolor.
37. Macropygia macassariensis.
38. Poliolimnas cinereus.
39. Nycticorax caledonicus.
40. Microcarbo melanoleucus.
41. Megapodius duperreyi.

KALAO.

1. Phylloscopus borealis.
2. Cinnyris teysmanni.
3. Zosterops intermedia.
4. Anthus gustavi.
5. Motacilla flava.
6. Munia molucca.
7. Oriolus boneratensis.
8. Lalage timoriensis.
9. Myiagra rufigula.
10. Siphia kalaoensis (*).
11. Rhipidura celebensis.
12. Collocalia esculenta.
13. Cuculus intermedius.
14. Centropus javanicus.
15. Strix flammea.
16. Ninox scutulata japonica.
17. Elanus hypoleucus.
18. Astur torquatus.
19. Tinnunculus moluccensis occidentalis.
20. Pandion haliaetus leucocephalus.
21. Osmotreron wallacei pallidior (*).
22. Ptilopus melanocephalus.
23. Esacus magnirostris.
24. Megapodius duperreyi.

DESCRIPTION OF A NEW TOAD (*XENORHINA*) FROM NEW GUINEA.

By DR. A. GÜNTHER.

(Plate VIII. fig. 1.)

THE genus *Xenorhina* was established by Peters in *M. B. Berlin Ac.* 1863, p. 82 for *Bombinator oxycephalus* Schleg., *Handl. Dierk.* II. p. 58. t. iv. fig. 7. Through the kindness of Dr. Jentink, I have been able to compare a toad from the Clyde River with this species of Schlegel's: there is not the least doubt that they belong to the same genus; but *B. oxycephalus* has a larger tympanum (3 mm. in a specimen 39 mm. long.), a larger eye (2·2 mm.), and the first and second fingers of the same length. The contracted state of the snout and the warts on the tip of the snout, considered to be characteristic of the genus and species, are due to the strength of the spirit in which the typical specimen was preserved.

Xenorhina Peters.

Body and limbs stout; head broad and short, with the snout rounded. Eye very small, with round pupil. Mouth narrow; no teeth in the jaws or on the palate. Choanae widely apart, of moderate width. Tongue very large, oval, extending far into the pharynx, on the sides and behind narrowly free, with a deep groove running along its middle and terminating in the posterior margin of the tongue. Tympanum rather large, its outline being visible from below the general integument, below which it is hidden. Eustachian tubes rather wide, situated entirely on the side of the pharynx. Fingers and toes free, the latter with their extremities slightly dilated, and supported by T-shaped phalanges. Outer metatarsals united. No metatarsal tubercle or fold. Skin uniformly smooth. Diapophysis of sacral vertebra dilated.

Having one specimen only at present, I must defer the examination of the sternal apparatus.

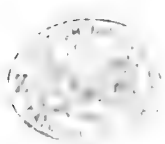
Xenorhina atra sp. nov.

The short snout has no *canthus rostralis* whatever, and the minute nostril is placed a little nearer to the end of the snout than to the eye. Fingers short, the first conspicuously shorter than the second, the second and fourth equal in length, the third projecting far beyond the others. Toes with the dilated tips smaller than the eye; the third rather longer than the fifth. Cleft of the mouth not extending backwards beyond the front margin of the orbit. Black, with an extremely fine threadlike greyish line along the median line of the back; sides more intensely black than back, and separated from it by a bluish shade. Snout and lower parts marbled with a very dark bluish grey.

Length of body	41 mm.
Length of orbit	1·4 „
Diameter of tympanum	2·4 „
Distance between vent and heel	35 „
Length of foot with tarsus	28 „
Length of foot without tarsus	17 „

J. Green del et lith. Mintern Br

1. XENORHINA ATRA 2,3. DIPLOPELMA BUNGURAHUM



EXPLANATION OF PLATE IV.

Fig. 1. One of the middle joints of the antennae of *Aganais ficus* ♀, side view.
„ 2. The same, front view.
„ 3. „ „ of ♂, front view.
„ 4. „ „ „ ♂, dorsal view.
„ 5. „ „ „ *Asota caricae* ♂, side view.
„ 6. „ „ „ „ „ ♂, front view.
„ 7. „ „ „ *A. heliconia* ♀, front view.
„ 8. „ „ „ „ „ ♂, „ „ from distal side.
„ 9. „ „ „ „ „ ♂, „ „ „ proximal side.
„ 10. „ „ „ „ „ ♂, side view.
„ 11. „ „ „ „ „ ♂, dorsal view.
„ 12. Clasper with harpe of *Asota heliconia semifusca*.
„ 13. Harpe of same, side view.
„ 14. „ „ „ dorsal view.
„ 15. Clasper with harpe of *A. egens*.
„ 16. Harpe of same, dorsal view.
„ 17. The same of another individual.
„ 18. „ „ „ *A. caricae*, side view.
„ 19. „ „ „ „ „ dorsal view.
„ 20. „ „ „ another individual, side view.
„ 21. „ „ „ „ „ dorsal view.
„ 22. „ „ „ *A. paliura*, dorsal view.
„ 23. Clasper with harpe of *A. ficus*.
„ 24. Harpe of same, dorsal view.
„ 25. „ „ „ side view.
„ 26. Clasper with harpe of *Peridrome orbicularis*.
„ 27. „ „ „ „ *Euplocia membliaria*.
„ 28. „ „ „ „ *Neochera inops*.
„ 29. „ „ „ „ *N. eugenia butleri*.
„ 30. „ „ „ „ *N. bhawana*.
„ 31. „ „ „ „ *Digama marmorea*.
„ 32. Uncus of *Asota heliconia intacta*, dorsal view.
„ 33. „ „ „ „ „ side view.
„ 34. „ „ *Spilobotys chloropyga*, dorsal view.
„ 35. „ „ „ „ side view.
„ 36. Fold before cavity on forewing of *Asota heliconia*.
„ 37. The same of *Aganais ficus*.
„ 38. „ „ „ *Peridrome orbicularis*.
„ 39. „ „ „ *Neochera eugenia*.
„ 40. „ „ „ *Digama hearseyana*.
„ 41. Costal portion of hindwing of *Asota heliconia* to show patch of thick scales before costal nervure.
„ 42. Some scales of that spot.
„ 43. The homologous organ of *Digama hearseyana*.
„ 44. A scale of that mark of *Asota heliconia*.*
„ 45. The same of *Neochera bhawana*.
„ 46. End of abdomen of *Asota plaginota* ♀.
„ 47. The same denuded.
„ 48. End of abdomen of *Asota caricae* ♀.
„ 49. The same denuded.

* There are too many stripes both in this and the next figure : see pages 194 and 208.

A single specimen was obtained by Mr. W. Day of the unfortunate Clarke Expedition on the Clyde River, within a few miles of the frontier between British and German New Guinea.

The same collection contained also *Gonyocephalus papuensis* (McL.), *Lygosoma mülleri* (Schleg.), *Lygosoma macrurum* (Gtnr.), *Lygosoma cyanurum* (Less.), *Lygosoma jobiense* (Meyer), *Gymnodactylus louisadensis* (De Vis), *Hyla dolichopsis* (Cope).

The figure 1 on Plate VIII. represents *Xenorhina atra*, the other figures (2 and 3) the beautiful *Diplopelma bunguranum*, described Nov. Zool. II. p. 501.

NOTES ON *HETEROCERA*, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.

By THE HON. WALTER ROTHSCHILD and DR. KARL JORDAN.

(Plate IV.).

AGANAIDAE (= HYPSIDAE) (*continued from p. 62*).

Aganais Boisd. (*continued*).

ALTHOUGH I agree with Dr. K. Jordan (see p. 62) that the difference in colour and pattern of the hindwings of *speciosa* (Drury), *undulifera* (Wlk.), and *subretracta* (Wlk.) is of no importance whatever in respect to specific or subspecific distinctness of these forms, I am not certain whether this species of *Aganais* could not be separated in two subspecies, one inhabiting West Africa from Sierra Leone to Angola, and the other occurring in South and East Africa. In the *male* sex, the South and East African specimens seem to me to be distinguishable from West African examples by the presence of a white band on the underside of the forewings outside the cell; this band runs from the costa mostly as far as the second median nervule. In West African individuals the band is either absent, or slightly marked behind the costal margin. My series of West and East African *males* is not large enough to decide if this distinguishing character holds good.

When writing the note on the varieties of *A. speciosa* on p. 62 I was not aware that in the December number of *Entomologische Nachrichten* p. 369. t. IV. f. 5 (1895) Karsch described and figured that form of ab. *undulifera* which has ochraceous hindwings as a new species, *Pseudhypsa baumanniana*.

Add to the four aberrational names this as fifth:—

5. Hindwings ochraceous, with black border: ab. *baumanniana* (Karsch).

W. R.

Anagnia Walker.

Hypsa. Group 2. *Anagnia* Walker, *Lep. Het. B. M.* II. p. 446 (1854).
Anagnia Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 296 (1859); Butl., *Tr. Ent. Soc. Lond.* p. 327 (1875); Kirby, *Cat. Lep. Het.* I. p. 383 (1891); Swinh., *Cat. Lep. Het. Oxf.* I. p. 83 (1892).
Hypsa, Snellen, *Tijdschr. v. Ent.* XXXI. p. 123 (1888).
Peridrome Wlk. Sect. II. (*Anagnia*), Hampson, *Moths of India* I. p. 467 (1892).

The genera *Anagnia* Wlk. and *Peridrome* Wlk. are remarkable for the development of conspicuous scent-organs in the *males*, which have much influenced the

structural characters of the species, more particularly so in *Anagnia* than in *Peridrome*.

As explained under *Asota* Hb., every joint of the antennae of *Aganaidae* bears (as in most other HETEROCERA) dorsally two transverse rows of elongate scales. In the *male* of *Anagnia subfascia* Wlk. the scales are partly less, partly more, prolonged, which disturbs the serial arrangement; on a number of joints beyond the middle of the antennae the scales are more than twice as long as usual, protrude laterally (and horizontally), and form a kind of tuft; the joints are not flattened, as Snellen says, *l.c.*, nor are they so thickened as in the utterly incorrect figure in *Tijdschr. v. Ent.* XXXI. t. 1. f. 1ª. The subdorsal setae of these joints are thicker than those of the other joints. In the *female* the scaling of the antennae is normal.

The second joint of the palpi bears in the *male* of *Anagnia* dorsally at the apex a tuft of elongate scales; the third joint is somewhat broadened towards the tip, and has a slight dorso-lateral carina. The scales at the interno-lateral portion of the upperside of the third palpal joint are prolonged, and being directed for- and upwards form a kind of crest; on the ventral side of the joint the scales are long only towards the apex, and are here directed backwards.

In the *female* of *A. subfascia* the second joint is $\frac{1}{2}$ mm. shorter, the third $\frac{1}{2}$ mm. longer, than in the *male*, and both joints are without tuft- or crestlike scaling.

The scent-organs on the fore- and hindwing of *A. subfascia* Wlk. have been described by Haase, *Iris* I. p. 167 (1887). I have to add that the elongate (hairlike) scales on the upperside of the forewing are, between costal margin and median nervure, directed backwards, while the scales of the rest of the woolly surface are directed obliquely forwards; in *Peridrome orbicularis* Wlk. all the hairlike scales are directed backwards.

The apical region of the forewing of *A. subfascia* is nearly normally scaled. On the hindwings above the scales are narrower in the *male* than in the *female*.

The neuration of the *male* of *Anagnia* is, in consequence of the development of the scent-organs, much distorted. In Hampson's figure, *l.c.* p. 448. f. 331, the neuration is incorrect. The cell of the forewing is strongly narrowed from the origin of vein 2 to the upper angle, which is very acute. Veins 2, 3, 4, and 5 are of equal distance from one another ($\frac{3}{5}$ mm.); in the apex of the cell projects a veinlet which originates between veins 4 and 5, and is seldom so plainly marked in other Aganaids as here; the upper discocellular veinlet, between vein 5 and the areole, is parallel to the costa; vein 6 comes from the areole; the basal portion of the areole, below the upper angle of the cell, is a half shorter than the apical or outer portion.

On the hindwing the upper discocellular veinlet is very oblique; veins 2 and 3 are shortly stalked together, and stand closer to vein 4 than this does to 5; veins 6 and 7 are stalked together.

The neuration of the *female* does not show that distortion in the apical region of the cell to either wing. The cell to the forewing is broadest towards the apex; the second partition of the median nervure, between veins 2 and 3, is nearly three times as long as the third portion, between veins 3 and 4; the upper discocellular veinlet is deeply incurved; vein 6 comes from the upper angle of the cell, not from the areole as in the *male*; the areole is much shorter than in the other sex, and its basal and apical portions are of nearly equal length. On the hindwing the cell is longer than in the *male*; vein 2 stands separate from 3; the second partition of the median nervure is about twice as long as the third partition.

Snellen, *l.c.*, united *Anagnia subfascia* Wlk. and *Peridrome orbicularis* Wlk. to

a subgenus of *Asota* (= *Hypsa*) which he calls *Aganopis* Butler. The genus *Aganopis* is erected by Herrich-Schäffer, *Auss. Schmett.* pp. 12 and 70, for *Peridrome orbicularis* Wlk., and has been described neither by its author nor by Mr. Butler. Why Snellen gave preference to this younger *nomen nudum*, instead of accepting the older name of *Anagnia* Wlk., I cannot understand, the more as Walker's diagnosis of *Anagnia* is not at all bad.

Snellen says, *l.c.*, that *orbicularis* Wlk.—Snellen writes *orbicularia* Moore—and *subfascia* Wlk. are different from the species of *Asota* (=*Hypsa*) only in the *male*; we shall see that this is not the case.

Hampson, *l.c.*, treats *Anagnia* Wlk. and *Peridrome* Wlk. as sections of *Peridrome* Wlk., and differentiates the two "sections" only by the secondary characters of the *males*. We can neither agree with Snellen nor with Hampson, though in one point both authors are perfectly right—namely, in objecting to base genera on differences in secondary sexual characters.

Peridrome and *Anagnia* may be characterised as follows:—

Anagnia, ♂ ♀ : Second joint of palpi at least half as long again as the third. Stridulating organ different from that of *Asota* Hb.; fold before cavity on forewing short, narrow, and covered with an irregular row of (twelve to fifteen) large but rather thin scales, here and there two or three scales of different size beside one another; on upperside of hindwing there is in ♂ a patch of thick scales near the base close to the black portion of the strongly developed scent-organ; in ♀ these thick scales are situate in the middle of costal region between costal vein and centre of apex of cell.

Neuration: Areole nearly as in *Asota*; vein 9 terminating in costal margin, vein 7 in apex of wing, which is quite an exception amongst *Aganaidae*; second partition of median nervure of either wing much shorter than the respective portion of the outer margin; veins 6 and 7 of hindwing on a short stalk (in nine individuals before me).

Peridrome, ♂ ♀ : Second joint of palpi about one-fourth (or less) longer than the third, slenderer and longer than in *Asota*. Cavity on forewing, as in *Euplocia*, deeper than in *Anagnia* and *Asota*, and basally sharply limited; fold before it as in *Anagnia*; corresponding patch of thick scales on hindwing standing in ♂ before and in apex of cell, in ♀ much more restricted than in ♀ of *Anagnia*.

Neuration: Vein 11 of forewing originating before middle of cell, areole much longer than the cell is broad; vein 8 terminating in apical angle of wing; second partition of median nervure of either wing about as long as the respective portion of outer margin; veins 6 and 7 of hindwing from a point, not stalked.

As the neuration and the stridulating organ are of remarkable constancy amongst the numerous species of *Asota* Hb., the peculiar development of these organs in *Anagnia* and *Peridrome* proves certainly that the species of *Asota* are much closer allied with one another than they are with *orbicularis* and *subfascia*, and that therefore these two insects cannot be included in *Asota*, as Snellen does. Whether *Anagnia* and *Peridrome* must be kept separate as two genera—that is another question. The chief differences between them are these: vein 11 stands before middle of cell in *Peridrome*, far beyond middle of cell in *Anagnia*; the basal portion of the areole is at least twice as long in *Peridrome* as in *Anagnia*; the second partition of the median vein of either wing is much shorter than the respective partition of the outer margin in *Anagnia*, while in *Peridrome* the partition is at least as long as the partition of the margin; vein 7 of forewing

terminates in apical angle in *Anagnia*, in *Peridrome* it is vein 8 which terminates there; on the hindwing veins 6 and 7 come from a point in *Peridrome*, and are stalked together in *Anagnia*. The second joint of the palpi is in *Anagnia* at least half as long again as the third one, whilst in *Peridrome* the second joint is only one-fourth longer than the terminal one. Moreover, the antennal joints of *Peridrome* are vertically broader than those of *Anagnia*; in the *male* of *Peridrome* the base of each joint forms a short subcylindrical stem, distinctly visible under a lens, and consequently the ventral subcariniform portions of two subsequent joints when looked at from the side are rather widely separate; while in *Anagnia* that stem is very short, and the ventral free portions of the joints are much closer together.

These discrepancies in the characters of *orbicularis* and *subfascia* not only justify a generic separation of the two insects, but demand it, considering that, if we in this case neglect such differences, we have consequently to do it also amongst the other Arctioid and Lymantrioid moths. K. J.

Peridrome Walker.

Hypsa. Group 1. *Peridrome* Walker (*nec Peridroma* Hübner, *Verz. bek. Schmett.* p. 227, 1816), *Lep. Het. B. M.* II. p. 444 (1854).

Aganopis Herrich-Schäffer, *Auss. Schmett.* I. p. 12. 70 (1855) (*Nom. nud.*); Butl., *Tr. Ent. Soc. Lond.* p. 325 (1875) (*Nom. nud.*).

Anagnia, Moore (*nec* Walker, 1854), *Cat. Lep. Ins. Mus. E. I. C.* II. p. 296 (1859).

Hypsa. A. (*Aganopis* Butler), Snellen, *Tijdschr. v. Ent.* XXXI. p. 123 (1888).

Aganopis, Kirby, *Cat. Lep. Het.* I. p. 384 (1891).

Peridrome, Hampson, *Moths of India* I. p. 496 (1892) (*Ex p.*); Swinh., *Cat. Lep. Het. Oxf.* I. p. 82 (1892).

Compare the notes under *Anagnia*.

There is, as in *Anagnia*, only one species known of this genus, and that is probably the reason why some entomologists objected to keeping *Anagnia subfascia* Wlk. and *Peridrome orbicularis* Wlk. generically separate.

P. orbicularis Wlk. occurs from Sikkim to Sambawa and the Philippine Islands. The variability of the species is but slight. In the *male* the size of the black spots on the underside of the wings is rather inconstant at every locality; the black spot at the anal angle of the hindwing above is sometimes absent. The black spots on the wings of the *female* also are not quite constant either in size or number.

Our only *female* from Sambawa differs remarkably from all our other *females* in the following particulars: the black discal spot on the forewing behind the middle of the cell, above and below, stands farther towards the base; a line drawn to connect the origin of vein 2 with the middle of the stridulating organ would be situate outside the spot, while in the specimens from other localities it would stand at the basal side of the spot; the orange region of the forewing above and below does not extend beyond the origin of veins 3 and 4; the black mark in the anterior angle of the cell to the same wing below is larger, rectangular; the blackish brown border to the hindwings is broader, having a width of 11 mm. at vein 7 and of 7 mm. at vein 4, while the respective measurements are in Indian examples 9 and 5 mm., or less. The *males* from Sambawa do not seem to me to be different from typical *orbicularis* Wlk.

P. orbicularis Wlk. is in the Tring Museum from Assam, Calcutta, Andaman Islands, Natuna Islands, Pulu Laut (S.E. of Borneo), Palawan, and Sambawa; Dr. Staudinger lent us a ♀ from Java. K. J.

Euplocia Hübner.

Phalaena Bombyx, Cramer, *Pap. Ex.* III. p. 175 (1782).
Euplocia Hübner, *Verz. bek. Schmett.* p. 172 (1816); Butl., *Tr. Ent. Soc. Lond.* p. 327 (1875); Snell., *Tijdschr. v. Ent.* XXXI. p. 118 (1888); Kirby, *Cat. Lep. Het.* I. p. 390 (1891); Hamps., *Moths of India* I. p. 495 (1892); Swinh., *Cat. Lep. Het. Oxf.* I. p. 83 (1892).
Hypsa. Group 3. *Euplocia*, Walker, *Lep. Het. B. M.* II. p. 447 (1854).
Aganais, Snellen, *Tijdschr. v. Ent.* XXII. p. 77 (1879).

As explained by Snellen, *l.c.* XXXI. p. 118 (1888), this genus is distinguished in the neuration by veins 6 and 7 of the forewing being stalked together, by veins 4 and 5 of fore- and hindwing coming from a point, and by the very narrow areole.

The antennae of the ♂ rather resemble those of *Neochera inops* (Wlk.) and *Asota caricae* (F.). The terminal joint is a little longer than the preceding ones; these are scarcely a fifth longer than (dorso-ventrally) broad; from the tenth joint they become gradually broader than long, and are in the middle of the antennae as broad as in *Neochera marmorea* Wlk. The joints are compressed, without the lateral impression found in most species of *Asota*, clothed with short hairs, which are about a third the length of the middle joints; the ventral and subdorsal bristles are a little thicker than in *Asota caricae* (F.), represented on Pl. IV. fig. 5.

The antennae of the ♀ are slenderer, and the apical joints therefore are relatively longer.

The genital armature of the ♂ differs remarkably from that of the other *Aganaidae*. The claspers (Pl. IV. fig. 27) are broad, and are ventrally before the apex produced into a sharp triangular tooth; their inside is very thickly clothed with elongate hairlike scales. The harpe consists of two almost fingerlike pieces: the exterior one, situate along the clasper, is the longest; it is strongly chitinous, and in its apical half somewhat curved away from the clasper towards the longitudinal axe of the body; the inner and more dorsal piece is less chitinous, rounded at the tip, and is from the middle, when viewed from the side, curved upwards.

The cavity on the underside of the forewing near the abdominal margin is rather deep and basally sharply limited; the raised fold bordering it in front is very narrow, and bears about five or six enlarged yellowish scales, one behind the other, which have the breadth of the fold, are more chitinised than ordinary scales, and occupy only the second fourth of the fold, while the basal fourth is clothed with smaller scales, of which two or three lie beside one another, and of which the apices are rounded (Pl. IV. fig. 38); the apical half of the fold is covered with narrow, elongate, rather acute scales, which are of the pale brown colour of the wing.

The corresponding portion of the stridulating apparatus on the hindwing is a patch of thick scales which has the same position as in *Neochera* Hb., but is less defined, and the scales composing it are more elongate, being partly almost tongue-shaped. The patch is less conspicuous than in *Neochera*, since its greater posterior portion has the colour of the rest of the wing, and the smaller anterior portion is only slightly, though distinctly, yellowish.

Neuration: Hampson's statement, *l.c.*, that *Euplocia* is devoid of an areole, is, I think, erroneous. Snellen, *l.c.* p. 115, mentioned already the presence of an areole in *Euplocia*, and I find that in all our specimens of *Euplocia* veins 10 and 8 are connected by a bar, or, which will perhaps be more correct to say, veins 8 and 9 are anastomosed together to form an areole—which version is the correct one can, of course, only be decided by examination of the growing wing in the chrysalis;

anyhow, there is a narrow areole in all our specimens, though in some individuals, especially of the typical subspecies, the bar connecting veins 8 and 10 is so weak as to be nearly obliterated, so that on superficial examination the areole appears to be absent. The length of the areole is extremely variable; in our Andaman specimens, for example, the length varies from $1\frac{2}{3}$ mm. to 5 mm.

Veins 6 and 7 of the forewing are stalked together, which character does not occur again amongst *Aganaidae*; the length of the stalk is quite inconstant. Veins 3 and 4 come from a point, or are also, though shortly, stalked. The upper discocellular veinlet is deeply incurved (see Snellen, *l.c.*), more so than that of the hindwings.

Veins 6 and 7 of the hindwings are either shortly stalked together or are slightly separated from one another; veins 4 and 5 originate close together, while 3 is removed from 4.

The costal fold of the *male* of typical *P. membliaria* (Cram.) is, when spread out, covered on the upperside with rather small, oval, glandular scales (see Haase, *Iris* I. p. 168, 1887); and similar scales are situate just before and behind the costal vein. The long hairlike scales underneath the fold, which Hampson (*l.c.*) describes as a glandular tuft of long hairs, are not situate upon the lappet, but stand on a veinlike fold which is homologous to the actual costal margin of the *Aganaidae* without this scent-organ. These "hairs" are broadest at the tip, and are, in fact, elongate scales. In the form of *Euplocia* from Celebes and the Lesser Sunda Islands, which have the fold very narrow, the small glandular scales on the upper surface of the fold, when opened out, are similar to those found in *membliaria*, but the hairlike scales are much shorter and broader, and are lanceolate, with the tip rounded.

I do not understand what Haase, *l.c.*, means by stating that "in den übrigen untersuchten Arten war er [the costal fold] nicht ausgebildet," as *all males* of *Euplocia* have a costal fold.

The breadth of the fold is in the Indian and Andaman examples, in one of our Bornean individuals, and in one from Palawan, 3 mm.; in another specimen each from Borneo and Palawan the fold has a breadth of 2 mm., while in Java specimens it is slightly less than 2 mm.; in the examples from Pulu Laut (S.E. of Borneo), Celebes, the islands between Celebes and Flores, and from Sambawa and Adonara, the fold measures only $\frac{1}{2}$ mm.

To *Euplocia* Hb. belong the following insects: *membliaria* (Cram.) described from India or., *renigera* (Feld.) from Java, *moderata* Butl. also from Java, and *inconspicua* Butl. described from Celebes.

E. membliaria (Cram.) is the broad-folded form, and occurs in Burma, Siam, Malacca, Andaman Islands, Natuna Islands, Borneo, Palawan, and probably also on the Nicobar Islands and in Sumatra.

The *males* from Burma have often a small orange spot upon the discocellulars of the forewing, corresponding to the patch in the same place in the *female*; this spot we have not noticed in *males* from other localities.

The whitish nervular and internervular lines of the wings, especially those on the hindwings, are in typical *membliaria* longer than in *inconspicua*, but in some of our Celebes, Sambawa, and Djampea specimens they are quite as long as in certain individuals from the western localities.

The *females* vary especially in the development of the orange colour in the cell of the forewing. In *E. membliaria* the basal patch occupies almost two-thirds of the cell, and is mostly connected along the median nervure with the square, or slightly

reniform, patch upon the discocellulars; near the apex of the basal patch stands often a black dot. The discocellular mark is mostly smaller in the Java form than in typical *membliaria*, but there is a specimen (mountain form?) from Mount Gede, West Java, in Dr. Staudinger's collection in which the whole cell is filled up with orange, except a small mark near the apex at the subcostal nervure. The *female* of *inconspicua* is usually devoid of the discocellular patch, and the basal patch is mostly small; the individuals in our series vary in this respect rather much; the basal patch is either nearly absent or feebly marked, or is even as large as it is in certain Java specimens, and in one of our Celebes individuals there are orange scales upon the discocellulars.

From these remarks it seems to me to be pretty clear that Hampson, *l.c.*, was perfectly right in uniting the above-named four "species" to one species, which we have to divide into three subspecies: *E. membliaria membliaria* (Cram.), *E. membliaria renigera* (Feld.), and *E. membliaria inconspicua* Butl. K. J.

38. **Euplocia membliaria membliaria** (Cramer).

Phalaena Bombyx membliaria Cramer, *Pap. Exot.* III. p. 139. t. 269. f. c. D (1782) (India or., "♀" *ex err.*).

Euplocia membliare Hübner, *Verz. bek. Schmett.* p. 172. n. 1782 (1822).

Hypsa membliaria, Walker, *Lep. Het. B. M.* II. p. 448 (1854) (E. Indies; "North India" *loc. err.*).

Euplocia membliaria, Butler, *Tr. Ent. Soc. Lond.* p. 327 (1875) (Maulmein; "N. India" *loc. err.*); Hamps., *Moths of India* I. p. 496. n. 1131 (1891) (*Ex parte*; Maulmein, Siam, Andamans, Philippines; *nec* Java); Swinh., *Cat. Lep. Het. Oxf.* I. p. 83. n. 373 (1892) (*Syn. ex parte*: Cambodia, Siam, Philippines).

There are specimens of this insect in the Tring Museum from the Andaman Islands (5 ♂, 5 ♀), Pulu Laut (Natuna Islands, 1 ♀; Hose, September 1894), Borneo (2 ♂, 2 ♀), Palawan (1 ♂, 1 ♀); it has, besides, been recorded from Burma, Siam, and the Philippines; Dr. Staudinger gave us for inspection a specimen each from Penang and Mindanao.

The upperside of the wings is, in either sex of this and the other subspecies, opalescent blue in certain lights.

In Dr. Staudinger's ♀ from Mindanao the orange patches of the forewing are as much extended as in ordinary Andaman or Burma examples; the hindwing is without white longitudinal lines in the marginal region. K. J.

39. **Euplocia membliaria renigera** (Felder).

Euplocia membliaria, Moore (*nec* Cramer, 1782), *Cat. Lep. Ins. Mus. E. I. C.* II. p. 295. n. 679 (1859) (*Syn. excl.*: Java).

♀. *Aganais renigera* Felder, *Reise Novara, Lep.* I. t. 106. f. 2 (1874) (Java *accord. to explan. of pl. page* 1 *and the label at type-specimen*); Snell., *Tijdschr. v. Ent.* XXXI. p. 118. n. 2 (1888).

♂ ♀. *Euplocia moderata* Butler, *Tr. Ent. Soc. Lond.* p. 327. n. 3 (1875) (Java).

♀. *Euplocia membliaria* form *renigera*, Hampson, *Moths of India* I. p. 496. sub n. 1131 (1892) (Java).

The type-specimen of *renigera* (Feld.) is still preserved in the Felder collection; it is rather faded, and the orange patches on the forewing are therefore much paler than in fresh specimens.

The ♀ of Butler's *moderata* has the orange markings rather smaller than the type of *renigera*.

We know this form, which does not seem to be always distinguishable from *membliaria*, only from Java. K. J.

40. **Euplocia membliaria inconspicua** Butler.

Euplocia inconspicua Butler, *Tr. Ent. Soc. Lond.* p. 328. n. 4 (1875) (Macassar); Swinh., *Cat. Lep. Het. Oxf.* I. p. 83. n. 374 (1892) (Flores, Macassar).
Agnatis membliaria var. *radians* Snellen, *Tijdschr. v. Ent.* XXII. p. 77. n. 34 (1879) (Celebes: Bonthain, Balangnipa, Amparang).
Euplocia membliaria form *inconspicua*, Hampson, *Moths of India* I. p. 496. sub. n. 1131 (1892) ("Java" *ex err.*).

This form is in the Tring Museum from S. Celebes (W. Doherty, August and September 1892; 4 ♂, 6 ♀), Kalao (A. Everett, December 1895; 1 ♂, 2 ♀), Sambawa (W. Doherty, 1 ♂, 7 ♀), Adonara (W. Doherty, November 1891; 2 ♂), Pulu Laut (S.E. of Borneo; W. Doherty, March 1891; 4 ♂, 1 ♀). Swinhoe records it also from Flores.

The specimens from Celebes are of a darker shade than those from other localities; the Adonara specimens are palest.

The nervular and internervular lines are in Celebes *males* seldom marked on the upperside of the hindwings, while in three out of our four Pulu Laut examples and in one of the two Adonara *males* the white lines of the fore- and hindwings are as long as in Andaman specimens. In the Celebes *males* there appears often an orange line upon the costa of the forewing corresponding to the basal orange patch of the *female*.

In our Pulu Laut ♀ and in one of our Celebes ♀♀ the basal orange patch is represented by a small number of orange scales situate along the costa; in some other specimens from Celebes there is an orange line upon the costa, and in others again from the same place, as well as in two *females* from Sambawa, the basal patch has at the apex a width of 2½ mm. and attains a length (measured from the base of the wing) of 11 mm.; some orange scales are occasionally present upon the discocellulars. K. J.

Neochera Hübner.

Phalaena Bombyx, Cramer, *Pap. Exot.* III. p. 174 (1782).
Neochera Hubner, *Verz. bek. Schmett.* p. 173 (1816); Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 294 (1859); Butl., *Tr. Ent. Soc. Lond.* p. 328 (1875); Snell., *Tijdschr. v. Ent.* XXXI. p. 120 (1888); Kirby, *Cat. Lep. Het.* I. p. 389 (1891); Swinh., *Cat. Lep. Het. Oxf.* I. p. 84 (1892).
Hypsa. Group 4. *Neochera*, Walker, *Lep. Het. B. M.* II. p. 448 (1854).
Hypsa. Group 9. *Philona*, Walker, *l.c.*, p. 456 (1854).
Philona, Moore, *l.c.* p. 294 (1859); Butl., *l.c.* p. 325 (1875); Snell., *l.c.* p. 119 (1888); Kirby, *l.c.* p. 391 (1891); Swinh., *l.c.* p. 95 (1892).
Hypsa. Sect. I. (*Hypsa*), Hampson, *Moths of India* I. p. 498 (1892).

Notwithstanding Snellen, *l.c.*, enumerates a number of characters said to distinguish *Philona* from *Neochera*, to which generic names he puts as author Butler, instead of Walker and Hübner respectively, though Butler never published a line about the generic characters of the insects in question, I cannot accept *Philona* as a genus distinct from *Neochera*. Snellen differentiates *Philona* from *Neochera* by the following three characters (*l.c.* p. 116):—

1. *Philona*: "Rand van de middencel der voorvleugels tuschen ader 3 en 4 schuin";

Neochera: "Rand van de middencel der voorvleugels tuschen ader 3 en 4 recht."

I fail to find this difference. In our specimens of *N. inops* (Wlk.), *bhawana* (Moore), *marmorea* (Wlk.), etc., the partitions of the median nervure and the discocellular veinlets of the forewing do not exhibit any constant differences.

2. *Philona*: "hunne ader 7 uit de spits der aanhangcel";

Neochera: "hunne ader 7 uit het midden van den achterrand der aanhangcel."

The position of vein 7 is, neither in the forms referred to *Philona* nor in the various species of *Neochera*, constant. In all the insects in question the common stem of veins 8 and 9 comes from the tip of the areole (aanhangcel); in *inops* (Wlk.) vein 7 originates usually rather close to this stem, though it is always distinctly separate from it; sometimes vein 7 is farther removed, and occasionally it stands as far away from the tip of the areole as to originate at the apical third of the free (outer) portion of the areole. On the other hand, in *N. eugenia* (Cram.) and allies vein 7 originates generally midway between the apex of the areole and the cell, or is more basal, or stands even close to the anterior angle of the cell; in many individuals, however, vein 7 approaches the apex of the areole, and has often the same position as in such specimens of *inops* (Wlk.) in which that vein has the most basal position. On an average, vein 7 is, however, certainly more apical in *inops* than in *eugenia*, *marmorea*, etc., and in so far Snellen's statement would be correct, but as that character applies only to the greater number of specimens, not to all individuals, it is neither of generic nor of specific value.

3. *Philona*: "eindlid der palpen slechts een derde zoo lang als lid 2."

Neochera bhawana, p. 121: "eindlid der palpen korter dan de helft van lid 2."

I have measured the joints of the palpi of several specimens, and find that the terminal joint has a length of $\frac{3}{4}$ mm. in *inops*, while the second joint is $1\frac{1}{2}$ mm. long; the latter is therefore only twice, not three times, as long as the third joint. The only structural character of importance by which Walker, *l.c.*, differentiates *Philona* reads: "Third joint of the palpi less than half the length of the second."

The third palpal joint is shorter in *inops* than in *marmorea*, *eugenia*, *dominia*, etc., but this cannot serve to separate *inops* generically, since *N. marmorea* and *bhawana* take an intermediate position and approach more *inops* than *eugenia* and *dominia*. Moreover, *marmorea* and *bhawana* agree with *inops* and disagree with *eugenia* in another character, namely in veins 3 and 4 of the hindwings standing close together, whereas in *eugenia* and allies they are more or less widely separated (see Snellen, *l.c.* p. 121). This character again is not constant; there are specimens of *eugenia* in which those veins have the same position as in certain specimens of *inops* which are most extreme in respect to the separation of veins 3 and 4.

If *Neochera* is to be split up into two genera, *inops* (with *privata*), *marmorea*, and *bhawana* must come into *Philona*, and *dominia* and *eugenia* (with numerous subspecies) into *Neochera*, and *Philona* would be characterised by the somewhat shorter terminal joint of the palpi. However, that character is so slight, and the generic separation of *marmorea* from *eugenia* seems to me so unnatural, that I must treat *Philona* as a synonym of *Neochera*, the more so as *inops*, *marmorea*, *eugenia*, etc., have some remarkable characters in common which distinguish them at a glance from *Asota* (= *Hypsa*).

Snellen, *l.c.*, separated *Neochera* and *Philona* from *Asota* by the cell of the hindwing being longer than half the wing, and by the presence of a "viltachtig dick beschubde pleek" near the anterior margin of the hindwing. The first character is quite correct as regards *N. marmorea*, *bhawana*, *dominia*, and *eugenia* (inclusive of the subspecies); but in *N. inops* (and *privata*) the cell is mostly just half the length of the wing. In *Asota contorta* (Auriv.) (= *A. tortuosa* Snellen, *nec* Moore) the cell to the hindwing is also half as long as the wing [see Snellen, *l.c.* XXXVIII. p. 180 (1896)]; in *Aganais ficus* (F.) it is likewise of half the length of the wing. The proportion is

never quite constant: for example, in two specimens of *N. marmorea* the number of millimetres of the length of the cell and the length of the wing are respectively 14 and 26, and 14 and 27½; in *Asota plagiata*, 10 and 21, and 8 and 19; in *Asota lacteata*, 10 and 22, and 9½ and 20.

The second character mentioned by Snellen is of great importance, as that part of the stridulating apparatus, as well as the fold before the cavity of the forewing, are essentially different from the apparatus of *Asota*. The patch referred to by Snellen stands at the apex of the cell on the hindwing above, is rather sharply defined, and consists of enlarged, rounded, thick scales, the surface of which mostly has seventeen stripes; the spot has a glabrous, not a "viltachtig" appearance (Pl. IV. fig. 45, one of the scales, *N. bhawana*). In *Asota* the corresponding mark is elongate, smaller than in *Neochera*, and stands immediately behind the costal nervure (Pl. IV. fig. 41); the scales composing it are larger than in *Neochera*, and have usually thirty-five stripes (Pl. IV. fig. 44).

The fold in front of the cavity on the forewing below is narrow, and clothed with strong, enlarged, yellowish scales, which are rounded at the apex and cover one another for the most part, as shown on Pl. IV. fig. 39 (*N. eugenia*). The fold with these strongly chitinised and striate scales produces a sound by friction upon the scales of the before-described mark on the hindwing.

The scales between the costal margin and the middle of the cell of the upperside of the hindwing of *Neochera* are elongate, being at least four or five times as long as broad, while in *Asota* that portion of the wing is covered with short rounded scales which are scarcely half as long again as broad and slightly resemble the scales of the stridulatory patch. Just before the costal nervure, in the basal half of the hindwing, there is in *Asota* a streak of (mostly yellowish) hairlike glandular scales, corresponding to a similar streak behind the submedian vein on the underside of the forewing; neither streak is developed in *Neochera*.

Contrary to all species of *Asota* I could examine, the harpe of *Neochera* is very slender and long (Pl. IV. figs. 28, 29, 30).

Besides the cell of the hindwing being usually longer than in *Asota* (see above), there is very little in the neuration to distinguish *Neochera* by. The free apical portion of the areole is in *Neochera* shorter than the basal portion, while in *Asota* the reverse is mostly the case. Vein 11 of the forewing stands in *Neochera* farther away from the apex of the cell than in *Asota*, the basal portion of the costal vein to the hindwing is weaker than in *Neochera*, and the same portion of the subcostal nervure is mostly stronger than in *Asota*. These differences are, however, by no means constant.

The upper- and underside of the thorax, especially the tegulae, as well as the coxae, are in *Asota* clothed with long hairs, which give these parts of the body a woolly appearance. In all *Neochera* the upperside of the thorax is covered with relatively short scales, which do not conceal the outline of the tegulae; in *N. dominia* and *eugenia* also the underside is scaled, and the scales at the sides of the sterna and in front of the anterior coxae are very broad and rounded, while in *inops* the scales before the anterior coxae are longer and partly hairlike. The sterna of *N. marmorea* appears to be hairy, but the hairs are dilated at the apex, exclusive of those at the edges of the epipleurae, and differ in this from the hairs on the sterna of *Asota*.

The scaling of the wings of *Heterocera* is said by Kettelhoit, Schneider, and some others, who have compared the scales of various families, to differ from the scales of *Rhopalocera* in being generally without a basal sinus, which is always present in the greater portion of the wing-scales of *Rhopalocera*. Schneider mentions only

Castniidae, *Psychidae*, and certain *Noctuidae* (*Catocala*) as being provided with "sinus-scales." I find, however, that the sinus-scales are much more widely distributed amongst *Heterocera*, and that the term "Rhopalocera-scale" for sinus-scale and "Heterocera-scale" for scales without sinus, as applied by Kolbe, *Einführung in die Kenntniss der Insecten* p. 32 (1893), is misleading, and cannot be accepted. In *Aganaidae* sinus-scales are present amongst scales without sinus in all species, and in *Neochera marmorea* and *bhawana* nearly all the scales of the upper layer on both sides of either wing, which scales assume a metallic bluish gloss in certain lights, have a sinus, while the scales of the under layer are, to my knowledge, without sinus. Sinus-scales are also very common on the wings of *Agaristidae*. The scales with and without sinus are connected by all intergradations. The stridulatory patch of thick scales on the upperside of the hindwing is, in *Neochera* as well as in *Asota*, composed of sinus-scales (Pl. IV. figs. 44, 45), whereas the fold on the underside of the forewing is clothed with scales without sinus.

The following *Aganaidae* belong to *Neochera* Hb.:—

N. dominia (Cram.), *eugenia* (Cram.), *stibostethia* Butl., *basilissa* (Meyr.), *butleri* Swinh., *heliconides* Snell. = *zaria* Swinh., *marmorea* Wlk., *bhawana* Moore, *inops* (Wlk.), *privata* (Wlk.), and *cinerascens* Moore.

The other insects standing in Kirby's *Catalogue* under *Neochera* must be referred to *Asota*.

Those eleven names belong to insects of three different types, each type representing, in my opinion, one species, so that there would be only three species of *Neochera*; for want of intergradations, however, *bhawana* and *eugenia* must at present still be kept separate from *marmorea* and *dominia* respectively, so that the number of species is five.

1. *Inops*-type. Here belong *inops* (Wlk.), *privata* (Wlk.), and *cinerascens* Moore; the latter is a synonym of *privata* (Wlk.). The antennae are, as in all *Aganaidae* except *Aganais* Boisd., compressed. In the *male* each joint is clothed with long and with short thin hairs; the long ones are shorter than the joint, and dispersed all over the not-scaled portion of the joint. The two apical joints are of nearly equal length—the apex of the terminal joint is, as in the other *Aganaidae*, produced into a thin cone—and are about one-fifth longer than broad; the preceding joints are relatively and absolutely longer than the two apical ones; from the apical third of the antennae, towards the middle, the joints become gradually shorter and higher, and are from the middle to the base of the antennae shorter than vertically broad.

The *female* antennae are thinner than those of the *male*, all the joints except those of the basal fourth are longer than broad, and the hairs and bristles are shorter than in the *male*.

The claspers of the *male* (Pl. IV. fig. 28) have lost the solelike form usually present in *Aganaidae*. They are broad and outwardly convex at the base, and their apical half is transformed into a strongly chitinous hook, furnished at the inside half-way down to the base with a rather broad dilatation from which projects ventrally a sharp tooth. The claspers are without a clothing of hairlike scales at the inside, but are hairy outside. The dorsal, more chitinised, portion of the clasper turns at the base round towards the bipartite harpe, which consists of two sticklike pieces, one with nearly its entire length joined to the clasper, the other projecting free. There is little variation in the form of this apparatus, as it seems; the median

dilatation of the clasper, as well as the tooth projecting from it, are, however, slightly different in various individuals.

N. inops and *privata* agree in the structure of the antennae and genital armature perfectly, and as there is to my knowledge no other difference between the yellow *inops* and whitish *privata* than that of colour, I believe that Snellen, *l.c.*, is right in uniting *inops* and *privata* to one dichromic species. It remains, nevertheless, a curious fact that intergradations are unknown to science.

The stridulatory mark of thick scales on the hindwing is yellowish in *inops* and ab. *privata*, and becomes anteriorly often black in both forms.

The yellow form *inops* is in the Tring Museum from Bhutan, the Khasia and Naga Hills, Nias, Borneo, Java, and Palawan; Dr. Staudinger lent us specimens from Balabac and Mindoro; Hampson, *l.c.*, records it, besides, from Sikkim and Burma. The white form *privata* we have before us from the Andaman Islands, Sumatra, Nias, Pulu Laut (S.E. of Borneo), Borneo, and Java; Hampson records it, besides, from Burma and the Philippines. Timor and the Lesser Sunda Islands are inhabited by a slightly different subspecies of the whitish colour of *privata*. Apparently the white form does not occur in North India, and the yellow form not on the Lesser Sunda Islands inclusive of Timor, while the interjacent districts are inhabited by both.

Typical *inops* (Wlk.) comes from Assam; the specimens are somewhat larger than those from the Malayan Islands, and have the black border to the hindwings narrower than the individuals from Borneo and the Philippines; in our three examples from Palawan the cellule between veins 6 and 7 of the hindwing below is all black, while in Indian and Andaman individuals the yellow area penetrates into that cellule. The two ventral rows of black spots on the abdomen are in North Indian *inops* rather large, and in most examples from the Malay Archipelago and the Philippines more or less obliterated. K. J.

41. **Neochera inops tenuimargo** Rothsch. subsp. nov.

♂ ♀. Differs from *N. inops* ab. *privata* (Wlk.) in the white colour of the underside of the forewing being of a purer white tint, in the black border to the hindwing, though extending beyond vein 2, being narrow, having at vein 6 a width of only 3½ to 4 mm., and in the black costal border to the hindwing being either absent or feebly marked.

Hab. Dili, Timor (*type*; W. Doherty, May 1892); Alor (W. Doherty, October 1891); Pura (W. Doherty, October 1891); Adonara (W. Doherty, November 1891).

In the narrow black border to the hindwing this geographical form resembles much certain yellow specimens from Assam, but the black border is in the latter individuals, when it is as narrow as in *tenuimargo*, shorter, not reaching vein 2. W. R.

2. *Dominia*-type. Here come *dominia* (Cram.), *eugenia* (Cram.), *stibostethia* Butl., *basilissa* (Meyr.), *butleri* Swinh., *heliconides* Snell. = *zaria* Swinh., and a number of new forms described below by Mr. Rothschild.

All these insects are distinguished from the other forms of *Neochera* by the longer terminal joint of the palpi.

The antennae do not essentially differ from those of *inops* (Wlk.); but the thin hairs of the *male* antennae are longer, those near the edges of the middle joints being as long as, or a little longer than, the joints.

The claspers resemble those of *inops* much more than those of *marmorea*; they are broad and outwardly convex at the base, Pl. IV. fig. 29 (*butleri* Swinh.); the apical half is narrow, strongly chitinised, somewhat twisted, and bent down to form a strong hook. There are only a few hairs on the inner side of the clasper. The harpe is very slender, twisted, and much curved, and is dorsally between tip and middle slightly denticulate.

The stridulatory patch of thick scales on the hindwing is more or less square, and generally of a black colour, but becomes often yellowish buff anteriorly behind the costal nervure.

K. J.

42. **Neochera dominia** (Cram.).

Phalaena Bombyx dominia Cramer, *Pap. Exot.* III. p. 123. t. 263. f. A. B (1782) (Coromandel).
Noctua chione Fabricius, *Spec. Ins.* II. p. 213. n. 20 (1781) (Ind. or.); id., *Ent. Syst.* II. p. 19. n. 34 (1793) (*Syn. et var. excl.*).
Neochera dominia Hubner, *Verz. bek. Schmett.* p. 173. n. 1784 (1816); Butl., *Tr. Ent. Soc. Lond.* p. 329. n. 6 (1875) (Coimbatoor, S. India); Snell., *Tijdschr. v. Ent.* XXXI. p. 121. n. 3 (1888).
Hypsa dominia, Hampson, *Moths of India* I. p. 499. n. 1136 (1892) (*Localities erroneous*).

This insect occurs in South India only; Hampson records it by mistake from Sikkim, Assam, Burma, and Java. The differences between *dominia* and the North Indian *butleri* are not very important, and are only such of degree. Though the absence of the orange colour from the head, thorax, two basal segments of the abdomen and from the base of the forewings, the entirely white upperside of the forewings, and the long blue-black streaks on the hindwings, between the median and submedian veins, distinguish *dominia* at once, I have little doubt that *dominia* is nothing else but the South Indian form of that widespread species of which *eugenia*, *basilissa*, *butleri*, etc., are subspecies, considering that all those distinguishing characters are very inconstant in *butleri* and allies, of which we have long series of individuals. Certain *butleri* approach *dominia* very closely in the orange colour being much reduced, in the forewings above being almost pure white, and in the posterior spots of the macular marginal border to the hindwings being produced towards the base. We have not seen any specimens of *Neochera* from the districts between Calcutta and Madras, where probably specimens occur which overbridge the gap between *dominia* and *butleri*. If this turns out in future to be so, there will be only one species of the *dominia*-type, and the name of *dominia* will have to stand for that species; for the present *dominia* must be kept separate specifically.

The other "species" of *Neochera* which belong to the *dominia*-type (see above) are all subspecies of one species, the eldest name of which is *eugenia* (Cram.).

K. J.

43. **Neochera eugenia butleri** Swinh.

Hypsa dominia, Walker (*nec* Cramer, 1782), *Lep. Het. B. M.* II. p. 448 (1854) (E. Indies, N. India, Silhet; *nec* Java).
Neochera dominia, Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 295. n. 677 (1859) (Cherra Punji; *nec* Java).
Neochera marmorea, Moore (*nec* Walker, 1856), *P. Z. S.* p. 677 (1867) (Cherra Punji); Butl., *Tr. Ent. Soc. Lond.* p. 329. n. 5 (1875) (*p.p.*: Silhet, N. India, Maulmein); id., *Ill. Typ. Sp. Lep. Het. B. M.* V. p. 43 (♀, *nec* ♂). t. 87. f. 11 (♀) (1881).
Neochera eugenia, Snellen (*nec* Cramer, 1782), *Tijdschr. v. Ent.* XXXI. p. 120 (1888) (*Ex p.*; Rangoon).
Neochera butleri Swinhoe, *Cat. Lep. Het. Oxf.* I. p. 84. n. 377 (1892) (Assam, Silhet, Cambodia).
Hypsa butleri, Hampson, *Moths of India* I. p. 499. n. 1135 (1892) (Maulmein, Penang).

We have this form from the Khasia and Naga Hills, Burma, the Shan States, and the Malay Peninsula; Swinhoe records it from Cambodia.

The amount of white on the head and thorax is very variable; in some specimens the white colour is by far prevailing on these parts. The base of the abdomen is, in a few examples, quite as white as in *dominia*. The forewings vary from being nearly as white as in *dominia* to having the darker tint of *N. eugenia herpa* Snell. from Celebes. The veins are broader white than in the subspecies from the Malayan and Papuan Islands. The blue-black spots of the marginal band to the hindwings are seldom all isolated in *butleri*; mostly the two, three, or four anterior ones are merged together or touch one another; the posterior ones remain separate by the nervules. The spot before and that behind vein 3 vary in our series of thirty-four specimens from 4 to 8 mm. The fringe of the hindwing is all white, not spotted between the nervules with blue-black, or very faintly so. On the underside the white colour on the forewing is always much extended, and the hindwings have, near the apex of the cell, a black spot corresponding in position to the stridulatory patch of thick scales of the upperside, but composed of normal scales like the rest of the disc. K. J.

44. **Neochera eugenia javana** Rothsch. subsp. nov.

Hypsa dominia, Walker (*nec* Cramer, 1782), *Lep. Het. B. M.* II. p. 448 (1854) (*Pro p.*; Java).
Neochera dominia, Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 295. n. 677 (1859) (*Ex p.*; Java).
Neochera bhawana, Butler (*nec* Moore, 1859), *Tr. Ent. Soc. Lond.* p. 328. n. 2 (1875) (*Ex p.*; ♀, Java).
Neochera eugenia var. *herpa* Snellen (*nec* Snellen, 1879), *Tijdschr. v. Ent.* XXXI. p. 120 (1888) (Java; *nec* Celebes).
(?) *Hypsa dominia*, Hampson, *Moths of India* I. p. 498. n. 1136 (1892) (*Ex p.*; Java).

Differs from the darkest specimens of *butleri* by the white lines upon the veins of the forewing being narrower, the marginal spots to the hindwing forming an almost uninterrupted band, and the fringe of the hindwings being black between the veins.

The posterior spots of the marginal band to the hindwing are slightly separated from one another; the white spots at the end of the nervules are not restricted to the fringe, as in typical *eugenia*, but are distinctly produced upon the wing.

Hab. Java.

This form is a transition to the Celebensian *herpa* Snell. and the Timorese *proxima* Rothsch. subsp. nov. W. R.

45. **Neochera eugenia herpa** Snellen.

Agonais eugenia var. *herpa* Snellen, *Tijdschr. v. Ent.* XXII. p. 78. n. 35 (1879) (Bonthain).
Neochera eugenia var. *herpa* Snellen, *l.c.* XXXI. p. 120 (1888) (Celebes; *nec* Java).

Differs from the Java form especially in the submedian fold of the forewing being much broader white on the disc. In a specimen from Tombugu, E. Celebes, this white line is patchlike, and so broad in the middle as to touch the median nervure.

From Celebes and Sanghir in the Tring Museum. K. J.

46. **Neochera eugenia fumosa** Rothsch. subsp. nov.

♂ ♀. Forewings as in *heliconides* Snell., but veins thinner white, especially at the extremities; below, the subapical white patch cut short at vein 3. Hindwings suffused with bluish black scales, especially in the middle of the disc. Border to hindwing as in *herpa* Snell., *i.e.* spots between the median nervules somewhat longer than in *javana* Rothsch.

Hab. Sambawa (*type*; W. Doherty *leg.*; 5 ♂, 4 ♀); Pulu Laut (S.E. Borneo; W. Doherty, May 1891; 6 ♂, 2 ♀); Pura (W. Doherty, October 1891; 2 ♀).

Some of my Pulu Laut specimens, and an example from Sambawa in Dr. Staudinger's collection, have the hindwings as dark as they are in the Philippine form *heliconides* Snell., and are distinguishable from that form only by the slightly thinner white spots on the fringe of the forewing, and by the basal half of the median nervules of the hindwing being much less white.

Another Sambawa specimen in Dr. Staudinger's collection is like the Java form, but has the marginal border to the hindwing a little broader between the median nervules.

Borneo and Sumatra individuals of *eugenia* are unknown to me. W. R.

47. **Neochera eugenia proxima** Rothsch. subsp. nov.

♂♀. Forewing paler than in *herpa* Snell.; submedian fold narrower white and subapical white patch of underside marked above. Marginal band to hindwing as in *herpa*; white colour of fringe more restricted.

Differs from *basilissa* (Meyr.) in the darker forewings, in the costal border to the hindwings being bluish green and well marked, not obliterated in the basal half of the wing, in the submedian fold of forewing above being narrower white, and in the bluish black colour of the marginal band to the hindwing being at anal angle more extended and more pronounced.

Hab. Timor (W. Doherty: Dili, May 1892, *type*; Oinainisa, November and December 1891, 7 ♂); Alor (W. Doherty, October 1891; 1 ♂); Adonara (W. Doherty, November 1891; 4 ♂); Kalao (A. Everett, December 1895; 1 ♂, 1 ♀); Port Darwin, N.W. Australia (2 ♂).

Two *males* from Adonara have the hindwing somewhat shaded with fuscous, and one of them is not distinguishable from *fumosa* m. The two Kalao individuals lead over to *herpa* by the submedian fold being broader white than in typical *proxima*.

Specimens from Port Darwin, N.W. Australia, come much closer to *proxima* than to the Queenslandian *basilissa* (Meyr.). W. R.

48. **Neochera eugenia basilissa** (Meyrick).

Hypsa basilissa Meyrick, *Proc. Linn. Soc. N. S. Wales* (2). I. p. 767. n. 108 (1886) (Cooktown and Cairns).

The large series of specimens from Queensland in the Tring Museum does not exhibit much variation in the essential characters of this subspecies. The pale forewings have the subapical white patch of the underside also marked above; the posterior region of the wing between the median nervure and abdominal margin is much suffused with white; the nervules are rather thinly white on the disc, and become a little broader white near the outer margin; the fringe is white at the extremities of the nervules.

On the hindwings the white area is not shaded with fuscous scales, the stridulatory mark often assumes a tawny tint at the edges; the bluish black border of the wing is not quite continuous, since the lower median and submedian veins remain thinly white when traversing the band; in this respect *basilissa* agrees best with *herpa* Snell.; the spot between veins 1^a and 1^b is mostly very feebly marked; the abdominal margin is seldom shaded with fuscous.

The meso- and metathorax are much more white than orange, often nearly all white; the first abdominal segment is white, with some orange scales dorsally.

On the underside the costal bluish green border of the hindwing is partly obliterated, especially towards the base.

Known to us from Northern Queensland, Cooktown and Cairns. K. J.

49. **Neochera eugenia stibostethia** Butler.

Neochera stibostethia Butler, *Tr. Ent. Soc. Lond.* p. 329. n. 4 (1875) (Buru); Swinh., *Cat. Lep. Het. Oxf.* I. p. 85. n. 378 (1892) (Buru).

The head, thorax, and the base of the abdomen are white as in *dominia*, but there are mostly a few orange scales at the edges of the tegulae and the metathorax.

Known to us only from Buru. K. J.

50. **Neochera eugenia affinis** Rothsch. subsp. nov.

Neochera eugenia, Swinhoe (*nec* Cramer, 1782), *Cat. Lep. Het. Oxf.* I. p. 84. n. 375 (1892) (*Ex p.*; Ternate).

Differs from *eugenia* (Cram.) in the black border to the hindwing being narrower, having at vein 4 a breadth of 4 mm. only; the band is much better defined and posteriorly slightly produced towards the disc; the white area outside the cell is not shaded with fuscous. The fringe of the hindwing and the veins of the forewing are as in *eugenia*. The thorax is orange, with the usual black spots large, those on the tegulae often merged together, as in *eugenia*.

The dorsal and ventral spots of the abdomen are always large and transverse; the ventral ones are often confluent to form transverse bands; there appear black lateral spots round the stigmata.

Hab. Halmahera (*type*; W. Doherty, August 1892; 2 ♂, 1 ♀); Ternate (W. Doherty; 1 ♂, 1 ♀); Batjan (W. Doherty, March 1892; 2 ♀); Morotai (Bernstein; 1 ♀).

This form stands, as regards the pattern of the hindwing, intermediate between typical *eugenia* and *herpa*. The white veins of the forewing are very prominent.

W. R.

51. **Neochera eugenia papuana** Rothsch. subsp. nov.

Neochera eugenia, Butler (*nec* Cramer, 1782), *Tr. Linn. Soc. Lond.* p. 328 (1875) (Dorey, Aru); Swinh., *Cat. Lep. Het. Oxf.* I. p. 84. n. 375 (1892) (*Ex p.*; Mysol, Aru, Dorey, N. Guinea).

♂ ♀. Veins of forewing thinner white than in *eugenia*, and mostly without white scales (or nearly so) near the outer margin. Head, thorax, and base of abdomen particoloured with orange and white. Blue-black border to hindwing 4 to 5 mm. wide at vein 4, very slightly produced towards disc between veins 1 and 4, well defined; white area not shaded with fuscous, pure white. Fringe to hindwing all black, or with traces only of the usual white dots at the ends of the veins. Dorsal black markings of abdomen rather small.

The white patch on the underside of the forewing situate between the cell and abdominal margin is very variable in size, and is often a mere line. The mesothorax is sometimes more white than orange; the metathorax is mostly all white, as is usually the case with the first abdominal segment. The black dorsal spots of the abdomen never form transverse bands, as in *eugenia* and some other subspecies, and are often reduced to minute points, or are even absent.

Hab. Dutch and German N. Guinea (*type* from Humboldt Bay); Waigeu; Aru; Mysol; and probably all the islands near the western peninsula of N. Guinea.

It seems to be a rather common insect, the most prominent features of which are the uniform blue-black border to the hindwing and the very thinly white veins of the forewing. W. R.

52. **Neochera eugenia eugenia** (Cramer).

Phalaena Bombyx eugenia Cramer, *Pap. Exot.* III. p. 235. t. 398. f. M (1782) (Amboina).
Noctua echione var., Fabricius, *Ent. Syst.* III. 2. p. 19. sub n. 34 (1793).
Neochera eugenia, Hübner, *Verz. bek. Schmett.* p. 173. n. 1783 (1816).
Hypsa eugenia, Walker, *Lep. Het. B. M.* II. p. 449. n. 5 (1854).
Neochera eugenia, Snellen, *Tijdschr. v. Ent.* XXXI. p. 120 (1888) (*Ex p.*).

On Amboina and Ceram.

The white veins of the forewing are thin and nearly all of even breadth from the base to the outer margin; the fringe is all black except at the hinder angle, seldom with some white scales at the extremities of the veins. The blue-black border to the hindwings is broad, not interrupted, and between the median and submedian veins irregularly produced towards the base; those veins themselves remain rather broadly white; the rest of the wing is suffused with fuscous, but is whiter than in *heliconides* from the Philippines; the fringe has very small white spots, except at the hinder angle, where nearly all the scales of the fringe are white; the abdominal margin, except fringe, is more or less broadly bluish black.

The spots on the tegulae are usually merged together. The black spots of the abdomen vary very much in size; sometimes they are as small as in *butleri*, while in other individuals they form transverse bands, as in *affinis* Rothsch.; the ventral markings are generally enlarged. K. J.

53. **Neochera eugenia fuscipennis** Rothsch. subsp. nov.

♂ ♀. Forewing as in *papuana* mihi. Border to hindwing very broad, gradually shading off on the disc; outer half or nearly the whole of the wing suffused with fuscous, the white colour often (*type*) reduced to a narrow space at the inside of the stridulatory patch; white spots mostly absent from fringe of hindwing.

The other characters as in typical *eugenia*.

Hab. New Britain (4 ♂, 5 ♀).

Sometimes scarcely distinguishable from *eugenia*, to which it is much nearer related than to *papuana*. W. R.

54. **Neochera eugenia heliconides** Snellen.

Neochera eugenia var. *heliconides* Snellen, *Tijdschr. v. Ent.* XXXI. p. 121 (1888) (Philippines).
Neochera zaria Swinhoe, *Cat. Lep. Het. Oxf.* I. p. 85. n. 380 (1892) (Manila).

Occurs on Palawan, Mindoro, and Luzon, and probably also on the other islands of the Philippine group.

Snellen, *l.c.*, identified this insect erroneously with Moore's *Neochera heliconioides*, *P. Z. S.* p. 6 (1878), which is an *Asota*, not a *Neochera*. The characters of "*heliconides*" mentioned by Snellen are quite sufficient to recognise the present form of *eugenia*, and therefore Snellen's name must stand instead of Swinhoe's name of *zaria*.

The veins of the forewings are near outer margin broader white than in *fumosa* Rothsch.; the hindwings are all bluish black except the base, the basal half of the costal region, a patch beyond the stridulatory mark, and the greater portion of veins 1 to 4, which are whitish or white. From the darkest specimens of *fumosa* this

form differs scarcely in any other character than in the extremities of the veins of the forewing being broader white. In the extent of the blue-black colour on the hindwing *heliconides* surpasses most specimens of typical *eugenia*. The white fringe to the hindwings with very small black dots, and the rather evenly suffused basal two-thirds of the same wing on which the thin white veins are rather sharply picked out, distinguish *heliconides* easily from dark specimens of *eugenia* and *fuscipennis*.

K. J.

3. *Marmorea*-type. Here belong two forms, *marmorea* Wlk. and *bhawana* Moore, which are structurally the same and differ only in the colour of the hindwing; intergradations are not known to us.

The antennae of the *male* of *bhawana* are thicker than those of *eugenia*, and the fine hairs near the base and the apex of each joint are more prolonged, forming a basal and an apical row which join each other just below the scaled dorsal portion of the joint. In this character *N. bhawana* and *marmorea* are nearly related with most *Asota*; there are, however, no lateral impressions on the joints in *Neochera*. The ten to twelve terminal joints are longer than broad, especially the four last ones; thence towards the base the joints become broader than long. In the *female* the fine hairs are all short and of even length, and the antennae are thinner than in the *male*.

The claspers (Pl. IV. fig. 30) resemble more those of *Asota* than of *Neochera eugenia* and *inops*, being broadest towards the apex and having almost the shape of a shoe-sole; on the inside they are thickly hairy. The harpe is very slender and long; see Pl. IV. fig. 30.

K. J.

55. **Neochera marmorea** Walker.

Hypsa marmorea Walker, *Lep. Het. B. M.* VII. p. 1674 (1856) (Silhet); Hamps., *Moths of India* I. p. 498. n. 1134 (1894) (*Ex p.*; *localities partly erroneous*).

Neochera marmorea, Butler, *Tr. Ent. Soc. Lond.* p. 329 (1875) (*Syn. ex p.*): id., *Ill. Typ. Lep. Het. B. M.* V. p. 43 (♂, *nec* ♀). t. 87. f. 10 (♂) (1881); Snell., *Tijdschr. v. Ent.* XXXI. p. 121. n. 5 (1888); Kirby, *Cat. Lep. Het.* I. p. 390. n. 2 (1891) (*Ex p.*): Swinh., *Cat. Lep. Het. Oxf.* I. p. 84. n. 376 (1892) (Silhet).

This insect is known from Northern India (Silhet, the Khasia and Naga Hills), and is in Lower Burma, the Shan States, Tenasserim, Malacca, and on the Greater Sunda Islands represented by *N. bhawana* Moore.

The abdomen of *marmorea* has, at least on the basal segments, three dorsal and two ventral rows of black spots, as already stated by Walker. The lateral spots of *marmorea* which stand near the lateral edge of the dorsal plate of the segment are wanting in *eugenia* and *inops*. Those lateral spots mentioned under *N. eugenia affinis* stand on the pleural piece of the somites and are also present in *marmorea*.

Walker's description gives the essential characters as regards the colour: "Head black, with white bands; . . . abdomen with three rows of black dots; underside with lateral black dots; . . . hindwings white from interior border to the disk."

In the Tring Museum from the Khasia and Naga Hills.

K. J.

56. **Neochera bhawana** Moore.

Neochera bhawana Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 295. n. 678. t. 7*a*. f. 4 (♂) (1859) (Java): Butl., *Tr. Ent. Soc. Lond.* p. 328 (1875) (Java): Snell., *Tijdschr. v. Ent.* XXXI. p. 121. n. 2 (1888) (Java, Sumatra): Swinh., *Cat. Lep. Het. Oxf.* I. p. 85. n. 381 (1892) (Borneo, Singapore).

The white colour of the posterior region of the hindwing of *marmorea* is in

bhawana absent, except on the veins. The subcostal nervules on the upperside of the hindwing are in *marmorea* white just outside the stridulatory patch of thick scales, while in *bhawana* they are not, or seldom, white there.

In the Tring Museum from Java, Sumatra, Borneo, and the Shan States.

K. J.

Asota Hübner.

Phalaena Noctua, Linné, *Syst. Nat.* ed. X. p. 512 (1758).
Noctua, Fabricius, *Syst. Ent.* p. 596 (1775).
Phalaena Bombyx, Cramer, *Pap. Ex.* III. p. 175 (1780).
Hipocrita vulgaris Hübner, *Samml. Ex. Schmett.* t. 190 (1806).
Asota Hübner, *Verz. bek. Schmett.* p. 164 (1822) [*Type : javana* (Cram.)].
Hypsa Hübner, *l.c.* p. 172 (1822) [*Type : silvandra* (Cram.)] ; Walk., *Lep. Het. B. M.* II. p. 444. n. 65 (1854) (*Ex p.*) ; Moore, *Cat. Lep. Ins. Mus. E. I. C.* II. p. 292 (1859) ; Butl., *Tr. Ent. Soc. Lond.* p. 315 (1875) (*Ex p.*) ; Snell., *Tijdschr. v. Ent.* XXXI. p. 122 (1888) (*Ex p.*) ; Swinh., *Cat. Lep. Het. Oxf.* I. p. 85 (1892) ; Kirby, *Cat. Het.* I. p. 388 (1892) ; Hamps., *Moths of Ind.* I. p. 498 (1892) (*Ex p.*).
Damalis Hübner, *l.c.* p. 172 (1882) [*Type : coricae* (F.)] ; Swinh., *l.c.* p. 93 (1892).
Aganais Boisduval, *Voy. Astrolabe, Lép.* p. 248 (1832) (*Nom. nud.*) ; Snell., *l.c.* XXII. p. 77 (1879) (*Ex p.*) ; Kirby, *l.c.* p. 385 (1892) (*Excl. of insularis* Boisd.).
Hypsa. Group 5. *Hypsa*, Walker, *l.c.* p. 449 (1854).
Hypsa. Group 6. *Aspa* Walker, *l.c.* p. 452 (1854) [*Type : pithos* (F.)].
Hypsa. Group 7. *Damalis*, Walker, *l.c.* p. 453 (1854).
Hypsa. Group 10. *Petalia* Walker, *l.c.* p. 457 (1854) [*Type : plagiata* Wlk.].
Hypsa. Subgenus *Damalis*, Butler, *Tr. Ent. Soc. Lond.* p. 319 (1875).
Hypsa. Subgenus *Aganais*, Butler, *l.c.* p. 322 (1875) (*Excl. of insularis* Boisd.).
Hypsa. Subgenus *Agape*, Butler, *l.c.* p. 322 (1875) (*Excl. of chloropyga* Wlk.).
Petalia, Butler, *l.c.* p. 326 (1875) ; Swinh., *l.c.* I. p. 95 (1892) ; Kirby, *l.c.* p. 385 (1892).
Neochera, Butler, *l.c.* p. 328 (1875) (*Ex p.*) ; Kirby, *l.c.* p. 390 (1892) (*Ex p.*).
Agape, Swinhoe, *l.c.* p. 93 (1892) (*Ex p.*) ; Kirby, *l.c.* p. 387 (1892) (*Ex p.*).
Antichera Snellen, *l.c.* XXXVIII. p. 180 (1896) [*Type : contorta* (Auriv.)].

I unite under the (eldest) name of *Asota* Hb. all those *Aganaidae* which are distinguished by the following principal characters :—

Fold in front of the cavity on forewing with one enlarged carinate scale ; hindwing above with an elongate spot of thick scales just behind costal nervure in the middle of the wing ; the last but one joint of the antennae shorter than the last but two, and at the utmost as long as broad, mostly shorter ; third joint of palpi seldom a little shorter, mostly as long as or longer than the second.

In neuration the species of *Asota* come very near *Neochera eugenia* (Cram.).

The "genera" *Damalis* Hb., *Hypsa* Hb., *Aspa* Wlk., *Petalia* Wlk., and *Antichera* Snell. I cannot keep separate from *Asota* Hb. ; the types of these "genera" differ from one another only in the pattern, sometimes in the shape, of the wings, and in secondary sexual characters, as in fact do nearly every two species of *Aganaidae*. Under *Asota* Hb. we have therefore united all Aganaids which do not belong to *Spilobotys* Butl. = *Agape* Snell., *Aganais* Boisd., *Peridrome* Wlk., *Anagnia* Wlk., *Euplocia* Hb., *Digama* Moore, and *Sommeria* Hb. The number of the species will in this paper be considerably reduced, as our series of specimens prove to us that many of the "species" are only geographical races and not distinct.

Structurally the variety within the genus *Asota* Hb. is nearly as great as it is in respect to pattern. I give here a general account of the structural characters of *Asota*, and shall make some more remarks under the various species.

As in the other *Aganaidae*, the front of the head is in *Asota* Hb. slightly widened behind, is anteriorly faintly convex in the middle, and generally a little broader than each eye is high.

The eye is almost circular in all *Aganaidae*, a little more rounded in front than behind, not triangularly projecting beneath, as in *Agaristidae*. When viewed from the side, with the object somewhat higher than the eye of the observer, the eye of *Aganaidae* shows a faint trace of emargination, or rather depression, near the antennae.

The antennae are always sexually different, and their structure is, at least in the *male* sex, often convenient to prove specific distinctness of superficially similar forms. The antennae of the *females* are the more simple ones, and may therefore be described and compared first.

The joints (Pl. IV. figs. 5 to 11) are compressed, being vertically thicker than transversely; as the compression takes place especially ventrally, the transverse section of a joint has an ovate outline. The degree of compression is somewhat different according to the species; it is lowest in *A. caricae* (F.), and seems to be highest in *A. egens* (Wlk.). The basal joints are cylindrical, or nearly so, and the apical joints are also less compressed than the middle ones. The apex of each joint is ventrally produced into a tooth; the apical joint, which is longest and thinnest of all, is at the tip produced into a thin cone. The last but one joint is as long as broad, or slightly shorter, and is always shorter than the last but two; the preceding ten to twelve joints are also longer than broad. The joints consist of an internal and external chitinous sheath, and are clothed dorsally with scales and laterally and ventrally with hairs. There are two transverse rows of elongate scales on each joint, amongst which stand, besides, some thin hairs. The apical row of scales projects upon the base of the next joint.

The hairs, which form a moderately dense covering upon the convex sides and the ventral portion of the joint, are very fine, short, and depressed, and are longer in *A. egens* (Wlk.), *heliconia* (L.), *papuana* (Boisd.), and others, than in *A. caricae* (F.).

Each joint bears two pairs of large bristles: the ventral pair is situate (one bristle at each side of the joint) near the apex; the other pair is basal, subdorso-lateral, and stands near the base of the basal row of scales. The subdorsal bristles are always longer and thicker than the ventral ones; both pairs vary in length, rather considerably, according to the different species. Besides these four bristles, there are, as mentioned before, some dorsal hairs projecting from between the two rows of scales, and these hairs assume on the apical joints a more or less bristle-like character, but remain always thinner than those principal bristles.

The antennae of the *males* are built up after the same type, but are always different in every species in certain points from those of the respective *females*. They are more compressed; the free ventral portion is higher, more cariniform; the joints, especially the apical ones, are shorter; the clothing of thin hairs is longer, at least near the base and apex of the joint, and the bristles are much stronger. The last but one joint is in all *males* shorter than it is vertically broad. In detail there is rather much variation amongst the different species, not only in respect to the length of the hairs and bristles and the size of the joints, but also as regards the structure of the joints. There are three principal modifications of the *male* antennae of *Asota*, which may here be represented by the antennae of *A. caricae* (F.), *A. heliconia* (L.), and *A. contorta* (Auriv.).

In *A. caricae* (F.) the apical joint is twice as long as broad, the penultimate one is somewhat shorter than broad, the preceding six joints are somewhat longer than broad, and the following ones become gradually broader than long, the middle joints being about one-fifth broader than long. The ventral compressed dilatation of the

middle joints is scarcely one-half the breadth of the body of the joint (Pl. IV. fig. 5). The sides of the joints are convex; the fine hairs about one-third or one-fourth of the length of the joints, and all of nearly equal length. The ventral bristles are slightly longer than the joints; the larger subdorsal bristles are about half as long again as the joints, and the dorsal fine bristles remain very thin and have nearly the length of the joint.

The antennae of *A. versicolor* (Don.) are similar to those of *caricae*; but all the joints except the terminal one are broader (vertically) than long, the setae are stronger, and the sides are very faintly flattened in the middle close to the dorsal scaled portion; the fine hairs are extremely faintly longer at base and apex of the median joints.

The antennae of *A. plaginota* (Butl.) are of the *heliconia*-type, and therefore quite different from those of *caricae*.

The bulk of the species of *Asota*—in fact all species exclusive of *caricae*, *versicolor*, *contorta*, and an undescribed species allied to *contorta*—have the antennae of the *heliconia*-type, and differ from *caricae* in having a lateral impression on each joint (except apical one), and in the fine hairs in front of and behind this impression, or the hairs all along apical and basal edges, being prolonged.

A. plana (Wlk.) and allies come nearest to *A. caricae* (F.) and *versicolor* (Don.). The last ten or twelve joints (except the penultimate one) are longer than broad; the middle joints are about one-fourth broader than long. The impression mentioned before is rather slight, deepest near the large subdorsal bristle, and gradually fades away ventrally; the edges of the joint are somewhat raised near the impression, and the hairs on these slight ridges are much prolonged, being about of the length of the joint.

The antennae of *A. albivena* (Wlk.) = *vitessoides* (Snell.) are similar, but all the joints except the apical one are broader than long.

The impression becomes deeper in *A. heliconia* (L.) (Pl. IV. fig. 10); the edges of the joints are more raised; the ridges are, however, not on the same level, but the basal one is more dorsal, the apical one more ventral. In consequence of the different position of the ridges, a front view of a detached middle joint from the distal side shows a dilatation of the joint in the ventral half (Pl. IV. fig. 8), while the joint appears broadest in the dorsal half when it is viewed from the basal side (Pl. IV. fig. 9). The hairs on the ridges are longer than in *A. plana* (Wlk.); when looked at from above, these hairs protrude at each side like brushes; the two brushes nearest to a subdorsal bristle belong to two subsequent joints (Pl. IV. fig. 11). The large subdorsal bristles are more than three times as long as the joint; all the joints are broader than long, except the terminal one; the middle ones are about half as broad again as long.

In *A. egens* (Wlk.) and allies the impression is still deeper, the cariniform (ventral) portion of the joints is higher, and the bristles are stronger.

The third chief modification of the *male* antennae is found in *A. contorta* (Auriv.) and an undescribed Bornean species, not in *A. tortuosa* (Moore), to which Snellen puts *contorta* (Auriv.) as a synonym, by mistake I think. Here the apical ten joints, inclusive of the penultimate one, are longer than broad. The ventral subcariniform dilatation of the joints assumes quite a different aspect from that of the *heliconia*-type, in consequence of its becoming (longitudinally) very short, being about half the length of the stem of the joint, and being transversely dilated. The two lateral ridges of the *heliconia*-type stand here very close together, as the

joint is so short, have for the most part merged together, and are very high. In a transverse section, or in a front view, of a middle joint, the diameter of the stem of the joint is much shorter than that of the ventral dilatation, the outline being somewhat like this 8. The hairs upon the ridge are much longer than in any other Aganaid, being about three times the length of a joint; they stand in two rows, as in *heliconia*, but these rows join each other near the subdorsal bristle, as in *Neochera marmorea* Wlk. In a side view, the ventral dilatation appears as a short square tooth of which the vertical diameter is shorter than the vertical diameter of the stem of the joint; while in a ventral view the processus is transverse and somewhat rhombiform. The subdorsal bristle is very strong and long; the ventral pair is present on the apical elongate joints, but is obliterated on the other joints.

The strong subdorsal bristles of *A. contorta* (Auriv.), *egens* (Wlk.), and other species of *Asota* remind one of the lateral processus found in *Aganais* Boisd., if one examines the antennae quite superficially under a very weak lens, but are by no means homologous with that processus. On p. 61 I tried to point out the difference between the antennae of *Aganais* Boisd. and *Asota* Hb.; on Pl. IV. figs. 1, 2, 3, 4, I now give front and dorsal views of an antennal joint of ♂ and ♀ of *Aganais ficus* (F.), which will at once show to the reader, when comparing figures 5 to 11, the remarkable differences described on p. 61.

The antennae of all *Aganaidae* are similar to those types described in these lines. The *heliconia*-type we rather frequently meet with amongst *Geometridae*.

The palpi of *Asota* do not exhibit much variation. The second joint is generally slender, at the base curved, and somewhat twisted; the third is very thin, slightly thickened towards the tip, and is in *A. caricae* (F.) as long as, in *egens* (Wlk.) shorter than, and in *heliconia* (L.) longer than, the second joint; the difference in length between the second and third joint is always slight, except in *A. contorta* (Auriv.) and *tortuosa* (Moore), which have the second joint shorter and thicker than it usually is in *Asota*, and the third joint more prolonged.

The thorax of *Asota* and all other *Aganaidae*, inclusive of *Agape* Snell., bears just in front of the hinder edge of the mesoscutum in the middle line a rounded impression often filled up with a brownish matter. This impression is most easily seen in *Neochera*, on account of the thorax of this genus being less hairy than that of *Asota* or *Peridrome*, and looks here like a small black spot. This impression is the mouth of a gland which I have not yet found in other moths; it is certainly not present in *Aletis* Hb., *Nyctemera* Hb., and *Pelochyta* Hb., which some authors have associated with the *Aganaidae*.

The abdomen of *A. caricae* (F.) is in the *female* remarkably different from that of all other *Aganaidae*, and resembles that of *Lymantriidae*. For comparison I give two figures of the tip of the abdomen of *A. plaginota* (Butl.) and two of *caricae* (F.). The seventh segment is in the ♀ of *plaginota* (Butl.) and all other *Aganaidae* conical; the dorsal plate is longer than the ventral one, and is covered, like the rest of the abdomen, with narrow elongate scales, which are at the apical edge of the segment somewhat prolonged (Pl. IV. fig. 46). Fig. 47 shows the tip of the abdomen denuded.

In *A. caricae* (F.) the seventh segment (fig. 48) is shorter and thicker than in other *Aganaidae*, not conically narrowed towards the apex, and is covered, like the eighth segment, with long curly hairs, which form a conspicuous anal tuft. In the

denuded abdomen of *caricae* (fig. 49) we find the seventh and eighth segments being longitudinally much folded; the eighth segment is much more prominent than in other *Aganaidae*. In consequence of the folding of the last segments their surface is much increased, and the amount of wool which finds place here is considerable.

The genital armature of the *males* of *Asota* does not seem to me to be of much interest from a systematic point of view; the various species differ very little in the form of the claspers, harpes, and unci, at least those species which I could dissect *caricae* (F.), *plana* (Wlk.), *paliura* (Swinh.), *heliconia* (L.) and various subspecies, *egens* (Wlk.), *australis* (Boisd.), *versicolor* (F.), and some others. I have not examined the genital armature of *A. contorta* (Auriv.), *tortuosa* (Moore), and *isthmia* (Wlk.), which are perhaps more different in respect to those organs than the other species.

The clasper and harpe of *A. heliconia semifusca* (Butl.) from the Solomon Islands are represented in fig. 12 of Pl. IV. The claspers are covered with long hairs on the outside, and have a very dense covering of hairlike scales on the inside; these latter hairs are directed from the apical and ventral side towards the back and base. The harpe is a short chitinous piece turned upwards at the apex, which is horizontally widened out and excavated, so that in a dorsal view the harpe has the form of a spoon (fig. 14); the apical portion is asymmetrical; the edges are very sharp.

The organs of *A. egens* (Wlk.) (fig. 15) do not show much difference from those of *A. semifusca* (Butl.); the lower edge of the clasper is more rounded, the harpe is more symmetrical at the apex and broader. Figs. 16 and 17 represent the harpes of two individuals of *egens* (Wlk.), and we notice that the harpes are not quite identical.

The clasper and harpe of *A. caricae* (F.) are also nearly the same as those of *semifusca*. Figs. 18, 19, 20, 21 give a dorsal and side view of the harpes of two individuals; the inconsistency in the harpe is here again visible.

The harpe of *A. paliura* (Swinh.) (fig. 22) again does not show any obvious peculiarity.

The uncus of *Asota heliconia intacta* (Wlk.) is represented by figs. 32 and 33 in dorsal and side view; it consists of two pieces, a strong basal angle and a slender, slightly undulate, apical piece. The latter has a tooth at the apex, and is furnished with hairs on the upperside, especially in the middle. The unci of *egens*, *caricae*, and other species agree with that of *intacta*.

On the whole we shall, I think, be correct in stating that the genital armature will not be of much help in defining the species of *Asota*.

The claspers of *Aganais ficus* (L.) and *speciosa* (Drury), fig. 23, differ in being almost symmetrical; the apex is not turned upwards. The harpe (figs. 24 and 25) is short, spoonlike, with the apex produced into a sharp point.

The claspers of *Spilobotys* Butl. = *Agape* Snell. are much longer than those of *Asota*. The basal piece of the uncus of *Spilobotys chloropyga* (Wlk.) (figs. 34, 35) has a broad processus at each side; the hairs upon the dorsal edge of the apical piece are shorter than in *Asota* Hb.

The claspers of *Digama marmorea* Butl. from Queensland (fig. 31) stand in form intermediate between those of *Asota* and *Aganais*, and are narrower than in both these genera. The harpe is longer and much slenderer than in *Asota* and *Aganais*, not spoon-shaped, consisting of one sticklike piece.

The neuration of the wings of *Asota* Hb. much resembles that of *Neochera*

eugenia (Cram.), but vein 11 of the forewing originates closer to the areole, vein 3 to the fore- and hindwing stands closer to vein 4, and the cell of the hindwing is shorter. In *Asota contorta* (Auriv.), not in *A. tortuosa* (Moore), the cell to the hindwing is just half the length of the wing, while in the other species of *Asota* the cell is shorter. The apical portion of the areole, beyond origin of vein 6, is generally longer than the basal portion.

The structure of the stridulating organ is peculiar. The cavity on the forewing is well limited only in front, not at the basal side, as in *Peridrome* Wlk. and *Euplocia* Hb.; the fold in front of the cavity (Pl. IV. fig. 36) is rather broad, and is covered with irregularly arranged scales which are rounded at the apex; in the middle portion of the fold the number of such scales standing beside one another and partly covering each other is, across the fold, about eight or ten. There is in the middle of the fold one large obliquely placed scale of a yellowish colour, which is thicker and more chitinous than normal scales are, and has one or more sharp longitudinal ridges. The scales immediately beside this one are also enlarged and yellowish, and are attached to one another and to that large scale to form a rather strong organ for friction against a patch of thick scales on the upperside of the hindwing. This patch (Pl. IV. fig. 41) stands along the anterior side of the costal nervure, is longer than broad, of a yellowish colour in all species, and consists of large, slightly pentagonal, scales with a basal sinus and thirty-five surface ridges (Pl. IV. figs. 42 and 44) [*Asota heliconia* (L.)]. The stridulating organ does not vary much in *Asota*, neither according to individuals nor to different species, and is readily distinguished from that of all other Aganaids.

The homologous organ of *Aganais ficus* (F.) (Pl. IV. fig. 37) comes very near that of *Asota*; there are, however, three or four large scales on the fold before the cavity of the forewings.

In *Digama* Moore the fold is very narrow, and is covered by twenty-two to twenty-four transverse, somewhat asymmetrical, thick scales which stand in a single longitudinal row and are strongly ribbed longitudinally (Pl. IV. fig. 40). The corresponding mark upon the upperside of the hindwing is a regularly arched row (Pl. IV. fig. 43) of about fifteen thick scales which stands between costal margin and costal nervure.

All *Asota* species have on the underside of the forewing the basal half of the cell between median and submedian nervure covered with hairs, and there is a stripe of hairs just behind the submedian vein which extends from the stridulating organ down to the base of the wing, and is, like a similar stripe on the upperside of the hindwings before the costal nervure, most probably a scent-producing organ.

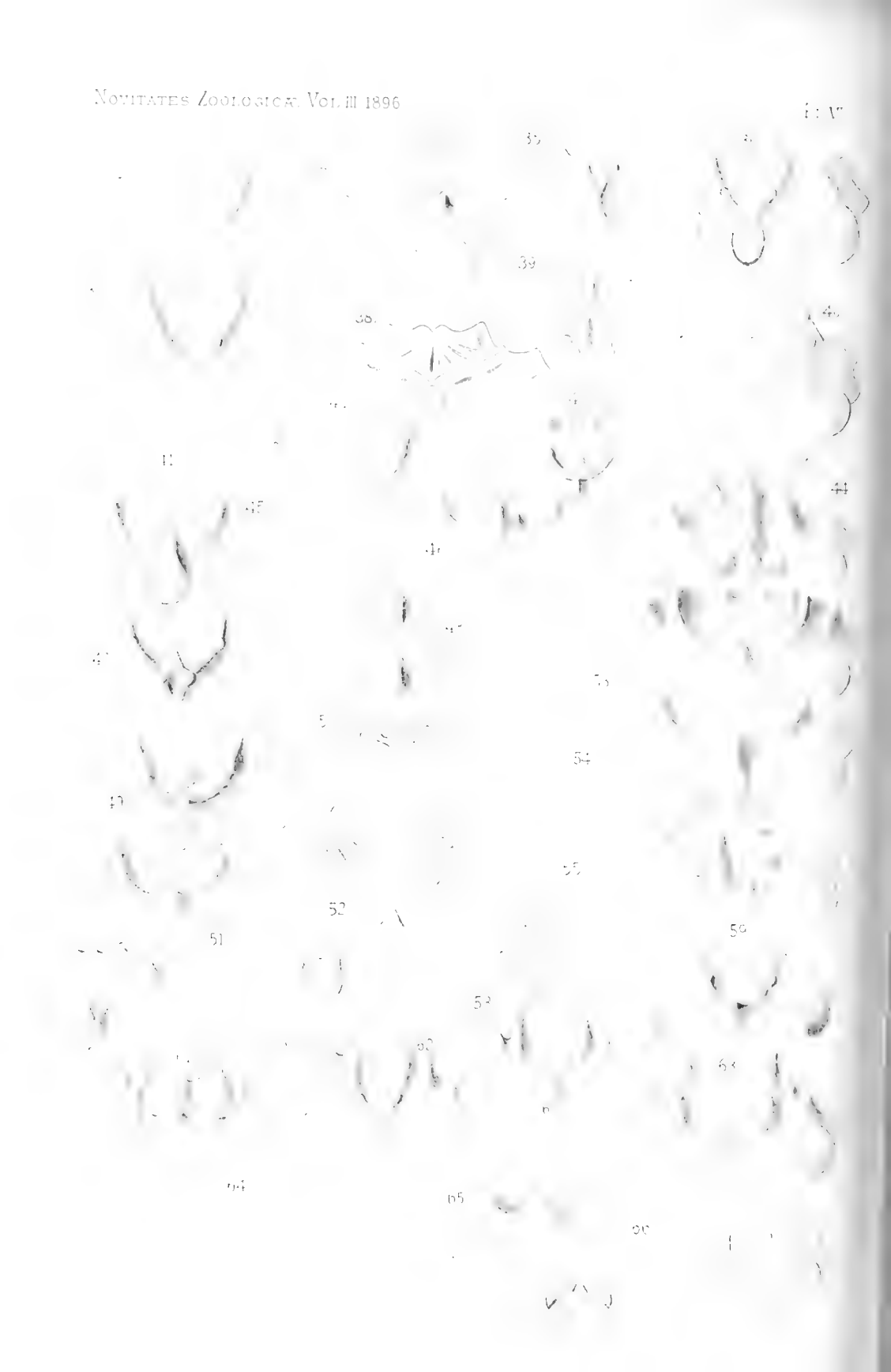
K. J.

(*To be continued.*)


1
2

EXPLANATION OF PLATE V.

Fig. 1. Genus 1 to 6.
„ 2. „ 7 „ 114.
„ 3. Kopf von *Ceracupes*.
„ 4. „ „ *Taeniocerus*.
„ 5. „ „ *Aulacocyclus*.
„ 6. „ „ *Passalus*.
„ 7. „ „ *Rimor*.
„ 8. „ „ *Odontotaenius*.
„ 9. „ „ *Oggyes*.
„ 10. „ „ *Proculejus*.
„ 11. „ „ *Soranus*.
„ 12. „ „ *Popilius*.
„ 13. „ „ *Sertorius*.
„ 14. „ „ *Undulifer*.
„ 15. „ „ *Eriopterus*.
„ 16. „ „ *Erionomus*.
„ 17. „ „ *Rhodacanthopus*.
„ 18. „ „ *Neleuops*.
„ 19. „ „ *Lophocephalus*.
„ 20. „ „ *Morosophus*.
„ 21. „ „ *Prosoelitus*.
„ 22. „ „ *Mandius*.
„ 23. „ „ *Severus*.
„ 24. „ „ *Pertinacides*.
„ 25. „ „ *Ptichopus*.
„ 26. „ „ *Veturius*.
„ 27. „ „ *Verres*.
„ 28. „ „ *Verroides*.
„ 29. Unterlippe von *Proculus*.
„ 30. „ „ *Cyphoproculus*.
„ 31. Kopf von *Paxillus*.
„ 32. „ „ *Paxilloides*.




68
69
71
72
73
74
75
76
77
78
79
82
81
83
85

EXPLANATION OF PLATES VI. AND VII.

FIGURE

33. Kopf von Paxillosomus.
34. „ „ Macrolinus.
35. „ „ Tiberius.
36. „ „ Episphenus.
37. „ „ Polyacanthopus.
38. „ „ Phoronaeus.
39. „ „ Valerius.
40. „ „ Phoronaeosomus.
41. „ „ Toxentotaenius.
42. „ „ Epiphanus.
43. „ „ Tetraracas.
44. „ „ Cassius.
45. „ „ Lucilius.
46. „ „ Synesius.
47. „ „ Thryptocerus.
48. „ „ Petrejus.
49. „ „ Phanocles.
50. „ „ Vindex.
51. „ „ Oeneus.
52. „ „ Ninus.
53. „ „ Ptychotrichus.
54. „ „ Calidas.
55. „ „ Semicyclus.
56. „ „ Tarquinius.
57. „ „ Ciceronius.
58. „ „ Solenocyclus.
59. „ „ Flaminius.
60. „ „ Trichostigmus.

FIGURE

61. Kopf von Stephanocephalus.
62. „ „ Didimus.
63. „ „ Vitellinus.
64. „ „ Pentalobus.
65. „ und Unterlippe von Omegarius.
66. „ „ „ „ Gonatas.
67. „ „ „ „ Tatius.
68. „ „ „ „ Vellejus.
69. „ „ „ sowie Fühler von Labienus.
70. „ „ „ sowie Fühler von Pelops.
71. „ „ „ von Pelopides.
72. „ „ „ „ Eriocnemis.
73. „ „ „ „ Plesthenus.
74. „ „ „ „ Phraortes.
75. „ „ „ „ Aurelius.
76. „ „ „ „ Episphenoïdes.
77. „ „ „ „ Cetejus.
78. „ „ „ „ Pharochilus.
79. „ „ „ „ Heterochilus.
80. „ „ „ „ Mastochilus.
81. Unterlippe von Analaches.
82. Kopf und Unterlippe von Epilaches.
83. „ „ „ „ Laches.
84. „ „ „ „ Basilianus.
85. „ „ „ „ Acerajus.

DIE PASSALIDEN DICHOTOMISCH BEARBEITET.

Von A. KUWERT.

(Tafel V. VI. VII.).

1TER THEIL.—DIE GRUPPEN UND GATTUNGEN.

ANMERKUNG.—Herr W. von Rothschild versprach vor einigen Jahren dem Verfasser, für die Veröffentlichung der Monographischen Bearbeitung der Passaliden Sorge tragen zu wollen, und gab dies Versprechen hauptsächlich in Rücksicht darauf, dass infolge der ungenügenden Beschreibung so vieler Gattungen und Arten in der Bestimmungstabelle in *Berl. Ent. Zeit.* 1891 ein ferneres Arbeiten an Passaliden ohne die Veröffentlichung des ausführlichen Manuscripts sehr erschwert sein würde.

Wir übergeben hiermit die Kuwert'sche Arbeit der Wissenschaft und bemerken, dass wir keinerlei Verantwortung für den Inhalt der Arbeit übernehmen, dass wir uns jeder Kritik enthalten und auch die sachlichen und nomenclatorischen Irrthümer nicht berichtigen. Dagegen haben wir uns erlaubt, einige ganz unnöthige Sätze des recht umfangreichen Manuscripts zu streichen, wie z. B. eine längere Entschuldigung wegen des Fehlens lateinischer Diagnosen und eine Liste (mit Angabe der Lebensstellung, u.s.w.) von Personen, nach denen Passalus-Arten benannt sind, und haben ferner einen der monographischen Bearbeitung beigegebenen Katalog der Passaliden nicht als Anhang gedruckt, sondern die Synonymie und die Citate in den Text gesetzt.

Dr. K. Jordan.

Die Passaliden sind von Lacordaire zu den Lucaniden gestellt. Doch bilden sie, wie die äusserlich im Kieferbau ihnen ziemlich gleichenden Heteroceriden eine eigene Familie und haben mit den Lucaniden wenig anderes gemein, als dass die letzten Fühlerglieder gelappt und die Fühler hinter dem ersten Gliede geknickt sind. Der tiefe Ausschnitt in der Unterlippe, welcher dieselbe zweilappig erscheinen lässt und ihr jede Aehnlichkeit mit dem Kinn der Lucaniden nimmt, die in dem tiefen Unterlippenausschnitt ganz frei liegende Zunge, der bewegliche Zahn im Oberkiefer, der flache Körper, die Lappen des Prosternums, das grosse, frei liegende Schildchen, welches vorne nicht durch das Halsschild verdeckt wird, die Gleichheit des Kopfbaues bei beiden Geschlechtern—alle diese Eigenschaften trennen diese Thiere, abgesehen von ihrem häufig unsymmetrischen Clypeus und den verschiedenartigen Wülsten, Buckeln und Auswüchsen des Kopfes, von allen ihren Verwandten.

Die Passaliden haben bisher 3 monographische Bearbeiter gefunden (Percheron 1835, Burmeister 1847, Kaup 1871). Bei der Art und Weise jedoch, dass man bisher in den Monographieen zu wenig die unterscheidenden Merkmale der verwandten Arten hervorhob, ist heute kaum Jemand im Stande, nach denselben sein Sammlungsmaterial richtig zu bestimmen; und so steckt in Folge der Unkenntniss der beschriebenen Arten eine sehr grosse Zahl neuer Arten unerkannt in den Sammlungen.

Kaup hätte besser gethan, wenn er auf dem Fundamente, welches ihm Percheron und Burmeister hinterliessen, zu einer systematischen Zusammenstellung der Arten und Gattungen geschritten wäre, ohne seine individuellen Ansichten über die Entwicklungsgeschichte der Thierwelt nach dem Fünfersystem in überspringender Verwandschaft in seine Arbeit hineinzuflechten. (Man lese in Kaup's Arbeit Seite 12 die ersten Zeilen!). Mit mir bedauern gewiss alle Entomologen, dass diese fixe Idee der Fünftheiligkeit Schuld an der Verwirrung und Unverständlichkeit der Kaup'schen Arbeit hatte. Diesem philosophischen Satze zuliebe mussten Genera und Arten, die dicht an einander gehören, von einander getrennt werden, mussten einzelne bereits beschriebene Arten eingehen, konnten ferner auch die Grenzen der Genera, die Unterscheidungsmerkmale der Arten nicht immer genau fixirt werden. Es wäre sonst der künstlich ideale Bau zusammengefallen, nach welchem bei Kaup die Riesen der Proculus-Arten in der Mitte von 5 Proculinen-Gattungen und von 75 Gattungen überhaupt stehen, während zu einer Seite der Proculinen sich zunächst 25 Eriocneminen-Gattungen und dann 5 Aulacocyclinen-Gattungen der östlichen Hemisphäre, auf der andern zunächst 25 Neleinen-Gattungen und dann 5 Passaliden-Gattungen der westlichen Hemisphäre anschliessen, natürlich eine jede dieser nach dem Fünfersystem arrangirten Gattungen mit 5 Arten. Schon in der Gewaltsamkeit dieses künstlichen Aufbaues lag die Nothwendigkeit der Verzerrung und das Abhandenkommens einer wirklich systematischen Uebersichtlichkeit.

Zu der Unmöglichkeit leichten Eindringens in die Kaup'sche Arbeit trägt ferner bei das häufige Zurückgreifen auf den Bau der Kiefer, wo dasselbe nicht einmal nöthig war. Nicht nur, dass der Leser nicht stets in der Lage ist, den Bau der Kiefer an jedem Thiere seiner Sammlung ohne Schädigung desselben ersehen zu können, bietet die grosse Aehnlichkeit im Bau der Kiefer geradezu eine Unmöglichkeit für eine richtige, unterscheidende Beschreibung, geschweige denn für das richtige Verständniss einer unvollkommenen und unsichern Beschreibung und Differenzirung. Ausserdem sind die Kiefer einer überaus grossen Abnutzung durch den Gebrauch im Leben der Thiere unterworfen.

Hiezu kommt, dass wir in Bezug auf die Kopfformationem und anderweitige Merkmale in der Kaup'schen Arbeit Benennungen finden, für welche in der Einleitung keinerlei Aufklärung gegeben sind (Brücke, Augenwand, u.s.w.). Bei andern Erwähnungen, z. B. der Hinterecken, bleibt der Leser im Unklaren, welchen Theil des Käfers diese Hinterecken betreffen, ob das Halsschild, den Kopf, das Prosternum, das Metasternum, und es bedurfte erst wochenlanger eingehender Beschäftigung mit der Kaup'schen Monographie, bis ich zu dem Verständniss kam, dass hiermit, auch wenn vom Halsschilde kurz vorher gesprochen war, immer die Hinterecken des Metasternums gemeint waren.

Ausser den angegebenen Monographieen hat noch Smith einen Catalog der Passaliden und zuletzt Wytsmann einen solchen 1884 in Genf erscheinen lassen. In dem letztem werden 23 neue Arten aufgeführt, von denen 19 von MacLeay, Stoliczka und Harold beschriebene der indo-malaiischen Fauna angehören, während nach 1884 noch Aurivillius und Schaufuss je 3 neue Arten beschrieben, so dass die Summe der bereits veröffentlichen Arten sich auf c. 197 Arten belief, wo dann die Bates'sche Arbeit (*Biologia centrali-americana*, 1886—1890) erschien und die Artenzahl wiederum erhöhte.

Man wird vielleicht in der nachstehenden Arbeit die grosse Zahl der Gattungen zu bemängeln versuchen, doch wurde dieselbe durch die Stabilität der Anordnungen in den Formationen der Erhöhungen und Wülste des Kopfes und

durch anderer Merkmale bedingt. Auch erleichtert diese grössern Gattungenzahl das Erkennen der untereinander sehr ähnlichen Arten ganz bedeutend.

Bei der grossen Schwierigkeit der Determination habe ich ferner, abweichend von den bisher üblichen Monographieen, die Differenzirung der Gattungen und Arten auf dem Prinzip der Bejahung und Verneinung der Merkmale aufgebaut, so dass Irrthümer bei richtiger Beobachtung kaum möglich sind.

Allerdings hatte diese jetzt mit Recht beliebte stets zur unbedingt sichern Erkenntniss hinführende Art der Beschreibung den Erfolg, dass wie erwähnt mehr Arten und Gattungen geschaffen werden mussten, als ich noch in der im ersten Heft der *Deutschen Entomol. Zeitschrift* 1891 von mir im Auszuge veröffentlichten Uebersicht der Passaliden annehmen durfte. Es bleibt hierbei der Forschung späterer Autoren überlassen, ob sie vielleicht ein oder das andere Genus als Subgenus auffassen, eine oder die andere Art nur als Variation gelten lassen wollen. Besonders schwierig war die Differenzirung der Genera um *Pertinax* und *Neleides* herum, wo es ganze Reihen bisher nicht erkannter Thiere gab, und es mir erst später nach der Veröffentlichung der Uebersicht in der *Deutsch. Ent. Zeitung* 1891 gelang, die Trennung zu bewerkstelligen. Ferner war es bei den bisherigen, sehr unvollkommenen und ohne Differenzirung der Arten von einander abgegebenen Beschreibungen meistens unmöglich zu ersehen, welche Thiere die Autoren beschreiben wollten. So blieb in manchem Genus, welches sich besonders reichhaltig an neuen Arten erwies, da die Typen nicht zu beschaffen waren, nichts übrig, als mehr nach der Muthmassung und nach dem Vaterlande, als nach der Beschreibung der Autoren die vorhandenen Namen auf bestimmte Arten zu deuten, um nicht immer neue Namen zu geben, so z. B. bei *Veturius*, *Ninus* und *Neleus*.

Bei den von MacLeay beschriebenen australischen Arten, deren Beschreibung ich nicht zu erlangen im Stande war, musste in gleicher Weise die Vertheilung der Namen ohne Prüfung nach der Kaup'schen Arbeit erfolgen.

Man erhält über die Schwierigkeit der Zuerkennung der Namen schon beschriebener Arten vielleicht ein Verständniss, wenn man die Zahl der Arten der nachfolgenden Arbeit (c. 600) der Zahl der früher beschriebenen Arten (c. 200) gegenüberstellt, und noch mehr, wenn man in manchen Gattungen das Wachsthum von c. 5 Arten der Kaup'scher Arbeit auf 20 und darüber (bei *Leptaulax* sind es einige 40) in Erwägung zieht.

Die Genera *Ninus* und *Neleus* der westlichen, *Leptaulax* und *Acerajus* der östlichen Halbkugel befinden sich sichtlich in einem Stadium der Artenbildung im Sinne Darwins. Darauf weist die grosse Mannigfaltigkeit der Abweichungen hin, welche in den meisten Fällen bereits derart constant geworden sind, dass sich zu der Beschreibung eines einzelnen Stückes immer mehrere gleiche Stücke, oft ganze Reihen, finden liessen. Fast immer sind es die Kopfformationen, welche zur neuen Artenbildung das Fundament geben, und dieser Umstand bestätigt die Richtigkeit, dass der systematische Aufbau einer Passaliden-Monographie hauptsächlich nach der Kopfbildung zu geschehen habe.

Sehr auffällig ist die Erscheinung, dass die absonderliche Unterlippenbildung mit dem tiefen Ausschnitte und der ganz freiliegenden Zunge sich kaum bei einem Käfergenus findet. Man kann bei dieser Formation der Unterlippe den Namen Kinn für den Theil der Unterlippe ohne die Zunge, wie derselbe in der Entomologie gebräuchlich geworden ist, kaum in Anwendung bringen, und es hat Kaup in seiner Monographie überall nur von der Unterlippe gesprochen, worin ich ihm in der nachstehenden Arbeit gefolgt bin.

Vergebens sucht man bei den Passaliden nach Uebergängen zu andern Familien. In dem Lucanidengenus *Figulus* von der östlichen Halbkugel und dem Tenebrionidengenus *Phrenopates* aus Guatemala scheint bei oberflächlicher Betrachtung eine Uebergangsform sich zu zeigen, doch sind bei näherer Besichtigung dieselben nicht mit der abnormalen Unterlippe der Passaliden versehen, ebensowenig als die Vertreter der Lucanidengattung *Sinodendron*. Allen aber fehlt der bewegliche Zahn der Oberkiefer.

Die Gattungen mit verwachsenen Flügeldecken zu einer Gruppe zusammenzuziehen, wie ich dies im 1ten Hefte der *Deutsch. Ent. Zeitschrift* (Berlin, 1891) gethan hatte, erwies sich bei tieferm Eindringen und sich mehrendem Material als ganz unzulässig. Es mussten desshalb diese Gattungen in die übrigen ihren Kopfformationen nach eingereiht werden. Ebenso mussten, wie schon erwähnt, die Neleïnen und Pertinacinen bei zunehmender Erkenntniss in Folge neuer Gattungsbildungen einer vollständigen Umarbeitung unterzogen werden. *Es ist in Folge dessen in der nachstehenden Arbeit nur in Anbetracht der Nomenclatur der Arten auf die Veröffentlichung in der Deutsch. Ent. Zeitung von* 1891, *nicht in Anbetracht der Klassificirung der Gattungen und Arten Bezug genommen.*

Sehr interessant ist die Erscheinung, dass die grossen ungeflügelten Gattungen den Mittelpunkt zweier Centren für das Vorkommen der Passaliden zu bilden scheinen, eines für die westliche Hemisphäre in Guatemala und St. Salvador, eines für die östliche auf den Philippinen. Wenn die Flügellosigkeit auf den ungestörten Besitz dieser Wohnorte zurückzuführen sein durfte, so würde dies einen Schluss auf die Geschichte der Erdformationen im geologischen Sinne ermöglichen.

Eigene Formen besitzen auf der östlichen Halbkugel Madagascar, Neuholland, Neuguinea und Afrika, welche nur sehr wenige Arten mit den nächst gelegenen Ländern gemein haben, die wohl durch irgend welche Einflüsse ihre Verbreitung dorthin fanden. Die weit verbreiteten *Leptaulax*-Arten der östlichen Halbkugel fehlen in Afrika und werden hier durch die *Didimus*- und *Pentalobus*-Arten ersetzt.

Ob die afrikanische Fauna die ihr von einigen Museen und Privaten zugewiesenen *Passalus*- und *Neleus*-Arten wirklich besitzt, scheint mehr als zweifelhaft, da diese Arten doch nur der westlichen Halbkugel anzugehören scheinen. Allerdings könnte ich für die *Leptaulax*-Arten der indopolynesischen Fauna und die centralamerikanischen *Stephanocephalus*-Arten bisher auch keine scharf trennende Unterscheidungsmerkmale finden, und es wird die südafrikanische *Calidas*-Art nur durch den Mangel der Schulterbehaarung von den amerikanischen *Neleus*-Arten geschieden.

Eigenthümlich ist die Gleichartigkeit der Kopfbildung bei beiden Geschlechtern, wodurch die Passaliden gänzlich von den Lucaniden abweichen; nur bei *Neleides duponti* konnte ich eine geringe Differenz in der Kopfhornlänge constatiren. Vielleicht ist indess eine oder die andere der von mir aufgestellten *Acerajus*-Arten nur auf Geschlechtsverschiedenheit hinzuführen, was ich nicht festzustellen vermochte.

Bei den beiden Gattungen *Ninus* und *Neleus* war es leider nothwendig zur Differenzirung der Arten auf die Kieferbildung zurückzugreifen, was desshalb bedenklich erscheinen muss, weil ein grosser Theil der zur Untersuchung kommenden Thiere die Kiefer stark abgenutzt hat und nicht in der ursprünglichen Form zeigt. Man entgeht indessen leicht der Täuschung bei genauerer Untersuchung, da die abgenutzten Stellen der Kiefer immer matter erscheinen, als der übrige Theil dieses

Organs. Am leichtesten aber hilft hier eine grössere Reihe einer Art von Thieren über jede Täuschung hinfort.

Aus der Abnutzung der Kiefer geht hervor, dass die Passaliden auch noch in ihrem ausgebildeten Zustande mit dem Zerstörungswerk des Holzes sich zu schaffen machen und ein nicht ganz kurzes, vielleicht mehrjähriges, Leben führen.

Eine Eigenthümlichkeit verdient noch besonderer Erwähnung, dass nehmlich mit dem Verwachsen der Flügeldecken und dem Aufhören des Flugvermögens die Dimensionen des Halsschildes beträchtlich zunehmen.

Die Exploration bisher ganz unbekannter Gegenden wird zweifellos den Entomologen Veranlassung geben, noch eine grosse Menge neuer Arten zu den nachstehend beschriebenen c. 300 Arten hinzuzufügen. Bringt doch auch mir noch eine jede aus Centralamerika anlangende Sendung neue Arten. Wie viele solche mögen noch in den Museen und in Sammlungen engherziger Coleopterologen stecken, welche ich nicht zur Durchsicht erlangen konnte, wie viele unter falschen Benennungen für lange Zeit verborgen bleiben?

Ich sage hiermit Dank den öffentlichen Staatsmuseen in Berlin, Braunschweig, Breslau, Buenos Ayres, Brüssel, Darmstadt, Dresden, Helsingfors, Königsberg, Lübeck, Stockholm, Stuttgart, Wien und Zürich für die Unterstützung, welche sie mir durch Zusendung ihres Materials zu Theil werden liessen, und ebenso den Herrn Entomologen, welche mich in liebenswürdiger Weise mit Sammlungsmaterial und Literatur unterstützten.

1. Oberkiefer.

Dieselben bestehen aus:

a. Dem *Oberzahn:* einem zu den Seiten der Oberlippe aufgerichteten Haken oder Zahn (Fig. I. *a*).

b. Dem *Vorderzahn*, oder Endabschluss der Kiefer, welcher sich in 2, meistens in 3 mehr oder weniger kenntliche Zäckchen theilt (Fig. I. *b*).

c. Dem *Unterzahn*, welcher niemals auf beiden Seiten ganz gleich gebaut ist und rückwärts und unterhalb vom Vorderzahn und dessen Zäckchen gelegen ist (Fig. I. *c*).

d. Dem *beweglichen Zahn*, welcher der Basis am nächsten gelegen ist, eine lang dornartige Beschaffenheit hat und jedenfalls einen den Tastern ähnlichen Zweck zur Zuführung oder Fortführung der losgebissenen Sägespäne nach oder von den Mundtheilen hat (Fig. I. *d*).

2. Fühler:

Die letzten Glieder derselben sind immer seitwärts *lappen*artig verlängert. Diese verlängerten Glieder gemeinschaftlich heissen *die Flagge*, die Glieder der Flagge heissen *Lappen*.

3. Kopf:

a. Das *Kopfhorn*, welches nur bei den Spuriinen fehlt, ist die bald hornartig, bald höckerartig, bald kielartig, bald tuberkelartig geformte Längserhöhung auf der Mitte des Kopfes, welche vorne fast immer ziemlich steil abfällt. Sie behält immer in jeder Form den Namen *Kopfhorn* (Fig. I. *m*).

b. Nebenhöcker heissen die zu den Seiten des Kopfhorns fast immer vorhandenen, bald tuberkelartigen, bald querkieligen, bald spitzen Erhöhungen auf der hintern Mitte resp. dicht hinter der Mitte des Kopfes (Fig. I. *l*).

c. Die *Stirnleisten* (Fig. I. *g*) entspringen fast immer, wenn sie vorhanden sind, von der Spitze oder vom Fuss des Kopfhorns und laufen divergirend nach dem Clypeus zu. Sie umfassen zwischen sich—

d. Die *Stirn* oder das *Stirnfeld*, unter welchem mithin der zwischen den Stirnleisten eingeschlossene Theil verstanden wird (Fig. I. *i*).

e. Die *Knötchen* sind die kleinen höckenartigen Auftreibungen der Stirnleisten zwischen dem Kopfhorn und dem Clypeus (Fig. I. *h*).

f. Die *Augenwände* liegen an den innern Seiten der Augen, sind meistens erhabene kielartige Leisten, welche auf ihrer Krone durch eine mehr oder weniger furchenartige Vertiefung in eine äussere (Fig. I. *p*) und eine innere Augenwand (Fig. I. *q*) getheilt werden.

g. Der *Augenkiel* erstreckt sich in der Richtung des Clypeus bis auf die Mitte des Auges (Fig. I. *r*).

h. Der *Clypeus* selbst ist der Vorderrand des Kopfschildes und der verschiedensten Bildungen fähig, gerandet, gezähnt (Fig. I. *e* und *f*), gefurcht, u.s.w.

i. *Brücken* sind die sattel- oder bergartigen Erhöhungen, welche die einzelnen Erhabenheiten des Kopfes mit einander verbinden. *Brücke* im allgemeinen heisst der schräge, die vordere Augenwand mit dem Clypeus oder den Stirnleisten verbindende Wulst (Fig. I. *s*).

k. Die *Unterlippe* trägt fast immer in den Hinterecken hinter den 2 langen und breiten Lappen die *Narbe*, eine Vertiefung, welche meistens punktirt und behaart ist. Zwischen den beiden Lappen findet sich bei den Thieren der östlichen Hemisphäre häufig ein durch eine Furche begrenztes Schild, unabhängig von den Narben der Unterlippe, das *Lippenschild*.

4. Das Halsschild:

a. *Bucht* heisst die meistens rückwärts etwas ausgebogene Erweiterung der Vorderrandsfurche hinter den Augen.

b. *Narbe* heisst die Einsenkung oder Vertiefung an der Seite des Halsschildes vor den Hinterecken.

5. Metasternum:

a. *Metasternalplatte* heisst die mehr oder weniger abgeplattete untere Fläche des Metasternums.

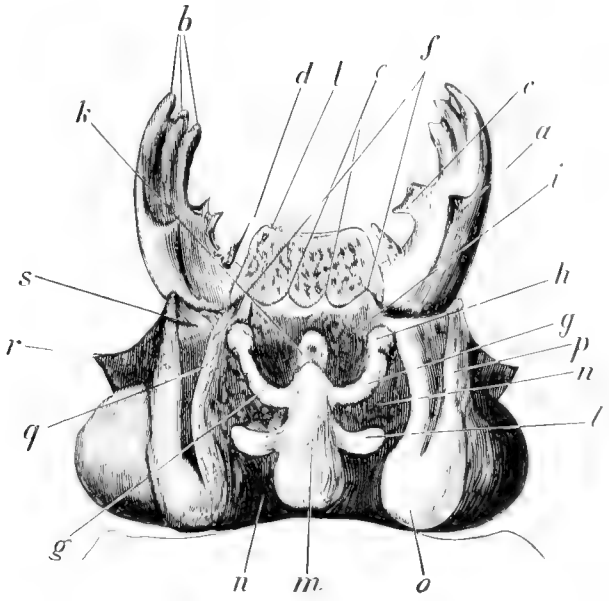
b. *Metasternalhinterecken* die die Hinterecken seitlich der Platte begrenzenden, vor den Hinterhüften gelegenen Winkel oder Ecken des Metasternums.

c. *Metasternalseitenfurchen*, *Episternen* oder *Seitenrinnen* die längs der Epipleuren der Flügeldecken gelegenen, meistens mehr oder weniger concaven, langen Seitenstücke der Hinterbrust.

6. Prosternum. Dasselbe läuft vor den Vorderhüften in einen *Vorderlappen*, hinter denselben in einen *Hinterlappen* aus.

7. Taillenlatz heisst das untere Mittelstück des Mesosternums. Dasselbe ist von hinten nach vorne verschmälert und hat meistens nach vorne zu in der Nähe der Nähte jederseitig einen unebene Vertiefung, die *Narbe* oder schlechtweg *Taillennarbe*.

8. Schildchen heisst das obere Mittelstück des Mesonotums. Dasselbe ist von vorne nach hinten verschmälert und reicht mit seiner Spitze zwischen den Beginn der Flügeldecken.



Figur I.

Oberkiefer:

a. Oberzahn.
b. Vorderzahn mit 3 Zäckchen, oder Kieferende.
c. Unterzahn, zweizackig.
d. Beweglicher Zahn.

Clypeus und Stirn:

e. Binnenzähne } des Clypeus.
f. Aussenzähne }
g. Stirnleisten.
h. Stirnleistenknötchen.
i. Stirnfeld.
k. Stirnwirbelwarze (hohl).

Kopfhorn und Kopfthäler.

l. Nebenhöcker.
m. Kopfhorn.
n. n. Kopfthäler.
o. Hinterer Augenwulst.
p. Äussere Augenwand.
q. Innere Augenwand.
r. Augenkiel.
s. Brücke von Augenwand zum Clypeusvorsprung.
t. Oberlippe.

UEBERSICHT DER GRUPPEN.

1 (1*a*). Ohne Kiel des Prosternums zwischen den Vorderhüften. Unterlippe immer ohne furchenbegrenztes Schild. Vorderrand des Halsschilds fast immer ganz gerandet. Clypeus fast immer mit ganz gerandetem oder gewulstetem Vorderrande. Fühlerflagge immer dreilappig.—1. Gruppe: *Aulacocyclinae.*

1*a*. Immer mit Kiel des Prosternums zwischen den Vorderhüften.

2 (2*a*). Clypeusvorderrand mit ganzer Randfurche, oder bandartiger Erhöhung, oder begrenzter, bandartiger, glatter Fläche.

3 (3*a*). Immer mit vorhandenem Kopfhorne.

4 (4*a*). Immer mit weit freiem Kopfhorne. Clypeus bisweilen mit einem Mittelzahn.—2. Gruppe: *Passalinae.*

4*a*. Das Kopfhorn immer mit ganz unfreier oder kaum freier Spitze.

5 (5*a*). Vorderrand des Clypeus gerade, ohne Bogen, ohne Mittel- oder Binnenzähne.

6 (6*a*). Flügeldecken verwachsen an der Naht. Clypeus mit Randleiste.—3. Gruppe: *Proculejinae*.

6*a*. Flügeldecken nicht verwachsen an der Naht.

7 (7*a*). Clypeusvorderrand bandartig erhöht, an den Enden zu einem Zähnchen aufgebogen.—4. Gruppe: *Popiliinae*.

7*a*. Clypeusrandung nur durch Wulstung entstanden, am Ende nicht zahnartig aufgebogen. Clypeus häufig mit Längsleiste nach der Stirnmitte.—5. Gruppe: *Sertoriinae*.

5*a*. Vorderrand des Clypeus aus 3 nach vorne convexen Bogen gebildet, oder mit starken Zähnen zwischen concaven Bogen.

8 (8*a*). Vorderrand des Clypeus aus 3 nach vorne convexen Bogen gebildet.—6. Gruppe: *Unduliferinae*.

8*a*. Vorderrand des Clypeus durch 2 nach vorne concave Bogen gebildet, in der Mitte mit 2 dicht aneinander stossenden Zähnen. Hieher würden *Valerius*, *Phoronaeus* und *Phoronaeosomus* gehören, die jedoch richtiger in die 19te Gruppe gestellt werden.

3*a*. Ohne Kopfhorn, doch mit Nebenhöckern. Vorderrand des Clypeus gerade.—7. Gruppe: *Spuriinae*.

2*a*. Clypeus höchstens mit theilweiser Randfurche zwischen vorspringenden Zähnen, oder ganz ohne Randfurche.

9 (9*a*). Die Randfurche des Clypeus ist nur zwischen den vorspringenden Zähnen vorhanden.

10 (10*a*). Kopfhorn lang und frei. Flügeldecken mit verwachsener Naht.—8. Gruppe: *Pseudacanthinae*.

10*a*. Kopfhorn fast oder ganz unfrei. Flügeldecken ohne verwachsene Naht. Clypeuszähne stark. Hieher würde *Vindex* gehören, wenn er nicht seinen natürlichen Platz in der 22ten Gruppe hätte.

9*a*. Clypeus immer symmetrisch, ganz ohne Randfurche. Unterlippe (Kinn) immer ohne furchenbegrenztes Schild.

11 (11*a*). Clypeus nur mit 2 Vorsprüngen, je einem zu den Seiten der Oberlippe, oder ganz ohne Vorsprung. Kopfhorn meist ganz unfrei. (Thiere mit sehr weit freiem, langem Kopfhorn gehören zu der Gruppe 20, *Petrejinae*).

12 (12*a*). Fühler mit 3 Flaggenlappen.

13 (13*a*). Clypeus nicht messerartig scharf.

14 (14*a*). Vorderschienen auf der Unterseite mit Längsleiste oder Längsfurche.

15 (15*a*). Stirnleisten innerhalb der Aussenzähne am Clypeusvorderrande steil abfallend, selten über denselben in Binnenzähne auslaufend.—9. Gruppe: *Erionominae*.

15*a*. Stirnleisten immer nach den Aussenzähnen des Clypeus gerichtet.

16 (16*a*). Mittelschienen mehrfach und stark gezähnt.—10. Gruppe: *Rhodacanthopinae*.

16*a*. Mittelschienen nicht stark und nicht mehrfach gezähnt.

17 (17*a*). Die Knötchen bleiben von den Clypeusvorsprüngen entfernt.

18 (18*a*). Taillenlatz mit deutlichen Narben. (Thiere mit behaarten Seitenrippen der Flügeldecken gehören zu *Trichostigmus*).—11. Gruppe: *Neleidinae*.

18*a*. Taillenlatz ohne deutliche Narben.—12. Gruppe: *Pertinacinae*.

17*a*. Die Knötchen sitzen auf den Vorsprüngen des Clypeus auf.—13. Gruppe: *Pleuraninae*.

14*a*. Vorderschienen auf der Unterseite eben oder querrunzlig.—14. Gruppe: *Ptichopinae*.

13*a*. Clypeus messerartig scharf (selten etwas wulstig), an den Seiten nicht zahnartig aufgebogen.

12*a*. Fühler mit 3 Lappen.—15. Gruppe: *Veturiinae*.

19 (19*a*). Fühler mit 4 bis 5 Flaggenlappen. Vaterland Amerika.

20 (20*a*). Flügeldecken an der Naht verwachsen. Clypeus messerscharf. Körper sehr gross.—16. Gruppe: *Proculinae*.

20*a*. Flügeldecken an der Naht nicht verwachsen. Körper klein.—17. Gruppe: *Paxillinae*.

19*a*. Fühler mit 4 bis 6 Flaggenlappen. Vaterland Indo-Australien. Clypeus in der Mitte stark ausgeschnitten, mit ziemlich gleichlangen Vorsprüngen.—18. Gruppe: *Macroliinae*.

11*a*. Clypeus mit mehr als 2 Vorsprüngen oder Zähnen.

21 (21*a*). Clypeus ohne Mittelzahn und ohne Längskiel auf der Mitte.

22 (22*a*). Clypeus mit 4 Zähnen oder Vorsprüngen.

23 (23*a*). Die beiden Binnenzähne des Clypeus nahe aneinanderstehend, vorgeschoben. Fühlerflagge immer dreilappig, nur bei *Tetraracus* vierlappig.

24 (24*a*). Kopfhorn ganz oder fast unfrei.—19. Gruppe: *Phoronaeinae*.

24*a*. Kopfhorn sehr lang, vorne meist weit frei. Clypeus bisweilen ohne die Binnenzähne.

25 (25*a*). Stirnfeld und Clypeus vorne nicht plattenförmig gerundet vorgezogen.—20. Gruppe: *Petrejinae*.

25*a*. Stirnfeld mit dem Clypeus plattenförmig vorgezogen; dieser immer stumpf vierzähnig.—21. Gruppe: *Vatininae*.

23*a*. Die Binnenzähne des Clypeus etwa so weit oder weiter von einander, als von den äussere Zähnen, und falls enger aneinander, nicht zusammen vorgeschoben. Das Kopfhorn fast immer fast oder ganz unfrei.

26 (26*a*). Mit 3 Flaggenlappen der Fühler.

27 (27*a*). Immer sind Stirnleisten vorhanden.

28 (28*a*). Die Stirnleisten ziehen in der Richtung gegen die Binnenzähne des Clypeus.

29 (29*a*). Die Binnenzähne des Clypeus weit vorgeschoben. Zwischen ihnen und den Aussenzähnen noch ein kleiner, leicht zu übersehendes Zähnchen. Madagassische Thiere, zur Gruppe der Ciceroniinen gehörend.

29*a*. Die Binnenzähne ziemlich gleichlang mit den Aussenzähnen des Clypeus.

30 (30*a*). Clypeus auf der Mitte mit winzigem, meist auf einem Zahne stehendem Ausschnitt. Afrikanische Thiere zur Gruppe des Mitrorhinen oder der Erionominen gehörig.

30*a*. Clypeus auf seiner Mitte ohne Einschnitt, wenn auch zwischen den Binnenzähnen tief ausgeschnitten. Afrikanische Thiere.—22. Gruppe: *Vindicinae*.

28*a*. Die Stirnleisten ziehen in der Richtung gegen die Aussenzähne des Clypeus. Stirnfeld und Clypeus bilden keine grosse tischartige Platte (wie bei Vatininen). Amerikanische Thiere.—23. Gruppe: *Neleïnae*.

27*a*. Ohne Stirnleisten. Die Binnenzähne weit voneinander. Afrikanische Thiere.—24. Gruppe: *Semicyclinae*.

26*a*. Mit 5 oder 6 Flaggenlappen.

31 (31*a*). Mit 5 Flaggenlappen. Diese Thiere gehören ihrer Bildung nach zur Gruppe der Mitrorhinen.

31*a*. Mit 6 Flaggenlappen. Aus Neu-Guinea.—25. Gruppe: *Tarquiniinae*.

22*a*. Clypeus mit 6 oder 8 Clypeusvorsprüngen, doch immer ohne einfachen oder gespaltenen Mittelzahn.

32 (32*a*). Die von einem langen Stiele vor dem Kopfhorn entspringenden Stirnleisten ziehen zu den Binnendorne des Clypeus.—26. Gruppe: *Ciceroniinae*.

32*a*. Die Stirnleisten ziehen zu den Aussendornen des Clypeus und entspringen vom Kopfhorne selbst.

33 (33*a*). Halsschildvorderrand ganz gerandet. Clypeuszähne scharf.—27. Gruppe: *Solenocyclinae*.

33*a*. Halsschildvorderrand auf seiner Mitte weit umrandet. Clypeuszähne sehr kurz, unscheinbar und stumpf.—28. Gruppe: *Flaminiinae*.

21*a*. Clypeus immer mit einem, bisweilen gespaltenen, Mittelzahne, also mit 3, 5 oder 7 Vorsprüngen, von denen häufig der kleine mittlere fast nur durch Längskielung des Clypeus angedeutet wird. Die Spaltung des Mittelzahnes bisweilen zu einem kleinen Ausschnitt erweitert, dann anscheinend mit 2 Mittelzähnchen.

34 (34*a*). Die Episternen (Seitenrinnen) der Hinterbrust schmal, ziemlich parallelseitig. Fühlerflagge immer dreilappig.—29. Gruppe: *Leptaulacinae*.

34*a*. Die Episternen der Hinterbrust nach hinten stark verbreitert. Fühlerflagge bisweilen vier bis fünflappig.—30. Gruppe: *Mitrorhinae*.

9 (9*a*). Clypeus fast immer unsymmetrisch; wenn symmetrisch, dann ist die Unterlippe mit furchenbegrenztem Schilde. Fühlerflagge immer mit 5 bis 6 Lappen.

35 (35*a*). Unterlippe mit furchenbegrenztem Schilde oder W-förmigen Eindruck.

36 (36*a*). Unterlippe mit einem W-förmigen Eindruck, oder halbkreisförmigem Schilde, dann aber mit stufenartig nach dem Clypeus abgesetzten Kopfflächen. Clypeus unsymmetrisch.—31. Gruppe: *Gonatinae*.

36*a*. Unterlippe mit furchenbegrenztem Schildchen.

37*a*. Das Schildchen durchsetzt hinten die ganze Unterlippe und ist walzen- oder trapezförmig gestaltet.

38 (38*a*). Clypeus immer unsymmetrisch.

39 (39*a*). Immer die linke Clypeusseite stärker entwickelt.

40 (40*a*). Ohne Grube zwischen linkem Clypeusdorn und Augenwand.—32. Gruppe: *Vellejinae*.

40*a*. Mit Grube zwischen linkem Clypeusdorn und Augenwand.—33. Gruppe: *Pelopinae*.

39*a*. Immer die rechte Clypeusseite stärker entwickelt, oder beide Seiten mit Convolut von übereinander und nebeneinanderstehenden Zähnen.—34. Gruppe: *Eriocneminae*.

38*a*. Clypeus symmetrisch.

41 (41*a*). Beide Clypeusseiten mit Convolut von Zähnen. Zur Gruppe der Eriocneminen gehörig.

41*a*. Der in der Mitte breit angeschnittene Clypeus jeseitig mit einem Vorsprunge.—35. Gruppe: *Aureliinae*.

37*a*. Das Schildchen durchsetzt nicht die ganze Unterlippe.

42 (42*a*). Das Schildchen ist halbmondförmig und bisweilen hinten nicht geschlossen.—36. Gruppe: *Pharochilinae*.

42*a*. Das Schildchen ist sehr klein, fast punktförmig, auf der Vorderrandsmitte der Unterlippe gelegen.—37. Gruppe: *Lachinae*.

35*a*. Unterlippe ohne furchenbegrenztes Schildchen. Clypeus sehr unsymmetrisch, auf der linken Seite sehr stark entwickelt.—38. Gruppe: *Acerajinae*.

BESTIMMUNGSTAFEL DER GATTUNGEN.

1. Gruppe: AULACOCYCLINAE.

1 (1*a*). Das Kopfhorn von der Länge des ganzen Kopfes, nach vorne etwas ansteigend und sich über den Clypeus hinaus erstreckend, auf der Hinterseite

granulirt und zweileistig, den Clypeus beinahe absorbirend. Oberkiefer mit sehr langem, vorwärts gerichtetem, hornartigem Oberzahne.

Thibet. *Ceracupes* Kaup (Taf. V., fig. 3).

1*a*. Kopfhorn nicht so gebaut. Oberkiefer ohne solchen langen Zahn.

2 (2*a*). Die Augenwände bilden hinter dem Kopfhorn an ihrer Vereinigungsstelle einen nach vorne gerichteten, spitzen Zahn. Das Kopfhorn lang, knollig, nach unten geneigt.

Sidney. *Caulifer* Kaup.

2*a*. Die Augenwände bilden, falls sie sich vereinigen, hinter dem Kopfhorn niemals einen nach vorne gerichteten Zahn.

3 (3*a*). Kopfhorn mit zweizähniger Spitze und meistens einer Furche auf der Oberseite.

4 (4*a*). Kopfhorn mit 2 hinten hufeisenförmig verbundenen Leisten, mehr nach vorne gelegen. Halsschild mit grossen, punktirten, sich nach vorne verästelnden Narben.

Assam, Malacca, Borneo. *Taeniocerus* Kaup (Taf. V., fig. 4).

4*a*. Kopfhorn ohne hufeisenförmig nach hinten verbundene Leisten.

Indo-Australien. *Aulacocyclus* Kaup (Taf. V., fig. 5).

3*a*. Kopfhorn nicht mit zweizähniger Spitze, seitlich comprimirt, oder oben mit Längsfurche versehen, welche vor der nach unten oder vorne gerichteten Spitze des Kopfhornes aufhörend 2 von der Spitze entfernte Zähne bildet.

5 (5*a*). Schildchen, Taillenlatz und Vorderkopf unpunktirt, glänzend.

Neucaledonien. *Tristorthus* Kuw.

5*a*. Schildchen oder Taillenlatz oder beide grob und sehr tief punktirt. Vorderkopf punktirt und behaart. Kinn auf der Mitte mit Längskiel.

Philippinen, Sumatra, Borneo, Pedang. *Comacupes* Kaup.

2. Gruppe: PASSALINAE.

1 (1*a*). Ohne Stirnleisten.

2 (2*a*). Flügeldecken an der Naht nicht mit einander verwachsen.

3 (3*a*). Taillenlatz an den Seiten unpunktirt und unbehaart, glatt.

4 (4*a*). Kopfhorn zuerst mehr oder weniger senkrecht, dann nach vorne übergelegt, an der Wurzel nicht halbkuglig.

Amerika (? Centralafrika). *Passalus* F. (Taf. V., fig. 6).

4*a*. Kopfhorn halbkuglig, entsendet nach vorne eine horizontale Zunge.

Centralamerika, Mexico. *Rimor* Kaup (Taf. V., fig. 7).

3*a*. Taillenlatz an den Seiten punktirt und behaart.

Mexico. *Rimoricus* Kuw. (*Rimor* Kaup pars).

2*a*. Flügeldecken an der Naht verwachsen. Halsschild gross.

Mexico. *Oileus* Kaup.

1*a*. Mit Stirnleisten.

5 (5*a*). Mit langer Stirn und tiefer Furche des Clypeusrandes.

6 (6*a*). Clypeus auf der Mitte ohne nach vorne vorspringenden Zahn. Kopfhorn nicht ganz auf die Stirne herabgedrückt.

Centralamerika, Mexico. *Passalotaenius* Kuw.

6*a*. Clypeus auf der Mitte mit nach vorne vorspringendem Zahne.

Odontotaenius Kuw. (Taf. V., fig. 8).

5*a*. Mit kurzer Stirn und meist auf diese herabgedrücktem Kopfhorn. Die Furche hinter dem schmalen Clypeusrande oft flach und schmal. Petrejus ähnlich.

Costarica. *Petrejoïdes* Kuw.

3. Gruppe: PROCULEJINAE.

1 (1*a*). Clypeusrandung durch starke Wulstung entstanden. Schulterecken unbehaart.

Mexico. *Ogyges* Kaup (Taf. V., fig. 9).

1*a*. Clypeus mit sicherer Randfurche.

2 (2*a*). Schulterecken unbehaart.

Guatemala. *Proculejoïdes* Kuw. (*Proculejus* Kaup pars).

2*a*. Schulterecken behaart und punktirt.

Mexico, Guatemala. *Proculejus* Kaup (Taf. V., fig. 10).

4. Gruppe: POPILIINAE.

1 (1*a*). Clypeusrand immer deutlich abgesetzt, oft als breites, vorne messerscharfes Band erscheinend. Immer ohne dichte Körnung des Stirnfeldes hinter dem Clypeus.

2 (2*a*). Die Stirnleisten entspringen nicht aus einer vom Kopfhorn sich herabsenkenden Leiste, sondern von ihm selbst oder dicht vor ihm ohne leistenartigen Stiel.

Central und nördliches Südamerika. *Soranus* Kaup (Taf. V., fig. 11).

2*a*. Die Stirnleisten entspringen von einer einfachen oder doppelten Leiste, die sich vorne vom Kopfhorn herabsenkt, aber reichen mit ihren Schenkeln niemals bis an den Fuss oder an die Spitze des Kopfhornes.

Centralamerika, Nordbrasilien. *Popilius* Kaup (Taf. V., fig. 12).

1*a*. Clypeusrand als breites glänzendes Band erscheinend, hinter welchem das Stirnfeld dicht gekörnt ist, ohne von diesem durch deutliche Furche getrennt zu sein.

Centralamerika. *Chondrocephalus* Kuw.

5. Gruppe: SERTORIINAE.

Nur ein Genus, ohne Taillennarben.

St. Salvador, Centralamerika. *Sertorius* Kaup (Taf. V., fig. 13).

6. Gruppe: UNDULIFERINAE.

Nur ein Genus. Metasternum punktirt und behaart, hierdurch allein schon kenntlich.

St. Salvador, Mexico. *Undulifer* Kaup (Taf. V., fig. 14).

7. Gruppe: SPURIINAE.

Nur zwei Genera, durch das fehlende Kopfhorn der Mitte allein schon kenntlich.

1 (1*a*). Käfer stark gewölbt, einem *Synodendron* ähnlich. Die Nebenhöcker zu Kopfhörnern entwickelt, lang. Der Clypeus an jeder Seite etwas vorgezogen, mit starker Randfurche.

China. *Cylindrocaulus* Fairm.

1*a*. Käfer flacher. Die Nebenhöcker nur Knötchen. Die Randfurche des Clypeus flach, durch Verstärkung des Randes gebildet.

Mexico. *Spurius* Kaup.

8. Gruppe: PSEUDACANTHINAE.

1 (1*a*). Mit Stirnleisten und ziemlich langem Stirnfeld. Clypeusfurche tief. Seiten der Flügeldecken unbehaart.

Mexico, Guatemala. *Pseudacanthus* Kaup.

1*a*. Ohne Stirnleisten, mit kürzerm Stirnfelde. Binnenzähne des Clypeus sehr weit auseinanderstehend, zwischen ihnen eine feine Furche ganz nahe dem Clypeusrande. Kopfhorn lang, niedergedrückt, frei.

2 (2*a*). Mit Behaarung der Seitenrippen der Flügeldecken.

Centralamerika. *Eriopterus* Kuw. (Taf. V., fig. 15).

2*a*. Ohne Behaarung der Seitenrippen der Flügeldecken.

Centralamerika. *Triaenurgus* Bates.

9. Gruppe: ERIONOMINAE.

1 (1*a*). Taille an den Seiten behaart. Stirn stark längsrunzlig; Prosternalkiel behaart. Sternalplatte ohne scharf Begrenzung.

2 (2*a*). Clypeus zwischen den selten etwas vorgeschobenen Stirnleisten nicht oder kaum zweizähnig.

Centralafrika, Gabun. *Erionomus* Kaup (Taf. V., fig. 16).

2*a*. Clypeus zwischen den Stirnleisten stark zweizähnig, auch die Stirnleisten selbst zahnartig vorgezogen.

Centralafrika. Subgen. *Eriosternus* Kuw.

1*a*. Taille auf der Mitte punktirt, seitlich stark behaart. Metasternum an den Hinterecken ohne Punkte. (Das Genus ist mir fremd geblieben und fällt vielleicht mit einem der vorigen zusammen. Alles nach Kaup).

Centralafrika. *Pleurostylus* Kaup.

10. Gruppe: RHODACANTHOPINAE.

Von den Neleidinen durch die starke Bedornung der Mittelschienen getrennt. (Nur ein Genus; das eventuell auch zur nächsten Gruppe zu ziehen wäre).

Centralamerika. *Rhodacanthopus* Kaup (Taf. V., fig. 17).

11. Gruppe: NELIDINAE.

1 (1*a*). Schulterecken der Flügeldecken mit starker Haarquaste; ihre Seitenfurchen mit breiter Stäbchenbildung. Knötchen weit von den Clypeusvorsprüngen.

Amazonengebiet. *Neleuops* Kuw. (Taf. V., fig. 18).

1*a*. Schulterecken der Flügeldecken ohne starke Haarquaste.

2 (2*a*). Mit punktirtem und in frischem Zustande behaartem Umschlagrand (Epipleuren) der Flügeldecken, wenigstens auf der vordere Längshälfte.

Centralamerika, Columbia. *Trichopleurus* Kuw.

2*a*. Epipleuren immer unbehaart.

3 (3*a*). Kopfleisten kammartig hoch, vor und zu den Seiten des niedrigen Kopfhornes vorragend.

Columbia. *Lophocephalus* Kuw. (Taf. V., fig. 19).

3*a*. Kopfleisten niemals höher, als die Kopfhornspitze.

4 (4*a*). Halsschild in gewöhnlicher Grösse.

5 (5*a*). Flügeldecken in den Seitenfurchen nur punktirt. Knötchen immer unweit der Clypeusvorsprünge.

Centralamerika, Brasilien. *Nelcides* Kaup.

5*a*. Flügeldecken mit deutlicher Stäbchenbildung in den Schulter- oder Seitenfurchen Knötchen immer hart an den Clypeusvorsprüngen.

Centralamerika. Subgen. *Aponelides* Kuw.

4*a*. Halsschild sehr klein. Hinterleib lang.

Columbia. Subgen. *Microthorax* Kuw.

12. Gruppe: PERTINACINAE.

1 (1*a*). Kopfhorn und Nebenhöcker zu einem conischen Hügel verschmolzen. Kleinere Formen mit glattem Kopfe.

Brasilien. *Parapertinax* Kuw.

1*a*. Kopfhorn und Nebenhöcker niemals zu einem Hügel verschmolzen.

2 (2*a*). Kopfhorn nicht knollenartig.

3 (3*a*). Entweder der Vorderrand der Brücke zwischen Augenwand und Clypeusvorsprung mit Leiste oder hoher Kante versehen, oder, wenn dies nicht deutlich der Fall ist, die matte Andeutung der Taillennarbe fehlend, oder beides ist der Fall. Stirnleisten immer bei $\frac{1}{2}$ bis $\frac{2}{3}$ ihrer Länge das Knötchen tragend, oft mit ihm endigend. Unterer Halsschildseitenrand schwächer behaart.

Centralamerika, Peru, Brasilien. *Morosophus* Kuw. (Taf. V., fig. 20).

3*a*. Brücke zwischen Augenwand und Clypeusvorsprung flach, nicht aufstehend gekantet. Taillennarben ohne matte, verdunkelte Andeutung.

4 (4*a*). Käfer mit dichter, vorstehender Haarbürste am untern Halsschildseitenrande. Flügeldecken nicht verwachsen.

Central und Südamerika. *Pertinax* Kaup.

4*a*. Käfer ohne dichte, vorstehende Haarbürste auf dem untere Halsschildseitenrande. Flügeldecken verwachsen. Stirne und Clypeus mit Längsrinne.

Mexico, Peru. *Prosoelitus* Bates (Taf. V., fig. 21).

2*a*. Kopfhorn knollenartig, etwa in Form eines oben zugerundeten Säulenfragments oder einer Warze, immer weit nach hinten gelegen. Nebenhöcker klein.

5 (5*a*). Die Stirnleisten, vom Fusse des Kopfhorns entspringend, umschliessen ein grosses, ebenes Stirnfeld.

Brasilien, Columbia. *Manlius* Kuw. (Taf. V., fig. 22).

5*a*. Die Stirnleisten halbkreisförmig, hoch, weit vor dem Kopfhorn gelegen, umschliessen ein kleines, vertieftes Stirnfeld. Das Kopfhorn als eingesenkte Warze erscheinend.

Centralamerika. *Severus* Kuw. (Taf. V., fig. 23).

13. Gruppe: PLEURARIINAE.

1 (1*a*). Unterlippe (Kinn) rauh, grubig, ohne Narben, auf der Mitte des Vorderrandes etwas eingebogen. Innere Augenwand auf der Mitte mit einem Zähnchen. (Nach Kaup, mir fremd).

Ostindien. *Pleurarius* Kaup.

1*a*. Unterlippe (Kinn) immer mit Narben, auf der Vorderrandsmitte meistens etwas vorgezogen und höchstens auf dem Vorsprung etwas eingebogen.

2 (2*a*). Flügeldecken mit Haarquasten auf den Schulterecken. Grosse Käfer.

3 (3*a*). Clypeus und Stirn runzlig. Rechte Stirnleiste uneben.

Antillen. *Ninoides* Kuw.

3*a*. Clypeus sehr dicht punktirt. Mit Taillennarben.

Antillen, Brasilien. *Pertinacides* Kuw. (Taf. V., fig. 24).

2*a*. Flügeldecken ohne Haarquaste. Ohne Taillennarben.

Cuba. *Epipertinax* Kuw.

14. Gruppe: PTICHOPINAE.

Nur ein Genus. Thiere an den mangelnden Leisten der Vordertibienunterseite sofort kenntlich.

Mexico. *Ptichopus* Kaup (Taf. V., fig. 25).

15. Gruppe: VETURIINAE.

1 (1*a*). Flügeldecken verwachsen, ohne Behaarung.

Columbia. *Publius* Kaup.

1*a*. Flügeldecken nicht verwachsen.

2 (2*a*). Oberlippe vorne gerade oder wenig ausgeschnitten. Clypeus nicht steil, sondern flach auf dieselbe gelegt, an ihren Seiten meist vorgezogen. Taillenlatz ohne Narben. Nebenhöcker fast immer unbedeutend oder fehlend. Zahlreich an Arten.

Mittel- und Südamerika. *Veturius*, Kaup (Taf. V., fig. 26).

2*a*. Oberlippe immer tiefer ausgeschnitten, oder eingekerbt; Clypeus zwar scharf, aber weniger steil auf dieselbe fallend, an ihrem Seitenrande eckig vorgezogen oder mit einem auf die Oberlippe drückenden Zahne.

3 (3*a*). Nebenhöcker in gleicher Höhe mit dem Kopfhorn, mit ihm zusammen einen hohen Wulst bildend. Oberlippe gerundet oder eckig ausgeschnitten.

Mittel- und Südamerika. *Verres* Kaup (Taf. V., fig. 27).

3*a*. Nebenhöcker schwach, wie bei Veturius, oder fehlend. Oberlippe durch einen sehr tiefen Ausschnitt zweilappig.

Brasilien. *Verroides* Kuw. (Taf. V., fig. 28).

16. Gruppe: PROCULINAE.

1 (1*a*). Seitenlappen der Unterlippe ohne Auftreibung.

Guatemala, Centralamerika. *Proculus* Kaup (Taf. V., fig. 29).

1*a*. Seitenlappen mit beulenartiger, grosser Auftreibung.

Guatemala, Honduras, Columbia. *Cyphoproculus* Kuw. (Taf. V., fig. 30).

17. Gruppe: PAXILLINAE.

1 (1*a*). Käfer sehr flach. Clypeus gerade, in der Mitte nicht oder kaum ausgeschnitten. Schulterecken der Flügeldecken dicht punktirt und behaart.

2 (2*a*). Mit 5 Flaggenlappen der Fühler.

3 (3*a*). Die Stirnleisten setzen sich als Dorne über den Clypeusrand fort und fallen keineswegs dicht hinter diesem steil ab. Brücke zwischen Augenwand und Stirnleisten breiter.

Mittel- und Südamerika. *Paxillus* Kaup (Taf. V., fig. 31).

3*a*. Stirnleisten, am Clypeusrande steil abfallend, ragen nicht über denselben hinaus. Brücke zwischen Augenwand und Stirnleiste schmäler.

Südamerika. Subgen. *Paxilloïdes* Kuw. (Taf. V., fig. 32).

2*a*. Mit 4 längern, 2 sehr kurzen Flaggenlappen. Paxilloïdes ähnelnd.

Südamerika. Subgen. *Paxillosomus* Kuw. (Taf. VI., fig. 33).

1*a*. Käfer etwas gewölbter. Stirnleistenknötchen nicht mit dem Clypeus verbunden. Schulterecken unbehaart.

Brasilien. *Spacalus* Kaup.

18. Gruppe: MACROLINAE.

1 (1*a*). Stirnleistenknötchen nicht durch eine Leiste verbunden.

Ostindien, Australien. *Macrolinus* Kaup (Taf. VI., fig. 34).

1*a*. Stirnleistenknötchen durch eine Leiste hinter dem Clypeusausschnitt mit einander verbunden.

2 (2*a*). Kopfhorn nicht flach gedrückt, nicht durch eine Furche von den Nebenhöckern getrennt. Käfer gewölbter.

Ostindien, Südafrika. *Tiberius* Kuw. (Taf. VI., fig. 35).

2*a*. Das flache Kopfhorn durch eine Furche von den Nebenhöckern getrennt. Käfer flacher.

Australien. *Episphenus* Kaup (Taf. VI., fig. 36).

19. Gruppe: PHORONAEINAE.

1 (1*a*). Fühlerflagge dreilappig.

2 (2*a*). Stirnleisten etwa in halber Länge zwischen Kopfhorn und Aussenzähnen des Clypeus mit oder ohne Knötchen endigend. Schulterecken der Flügeldecken ohne Haarquaste.

3 (3*a*). Stirn ohne theilenden Längskiel.

4 (4*a*). Kopfhornspitze immer unfrei. Mittel- und Hinterschienen mit mehrfacher starker Dornbildung. Im Stirnwinkel eine Warze.

Centralamerika. *Polyacanthopus* Kuw. (Taf. VI., fig. 37).

4*a*. Kopfhornspitze meist mehr oder weniger frei. Im Stirnwinkel ohne Warze. Ohne wesentliche stark Dornbildung an den Schienen.

Centralamerika, Brasilien. *Phoronaeus* Kaup (Taf. VI., fig. 38).

3*a*. Stirn mit theilendem Längskiel. Clypeus vorne mit deutlichem Wulst gerandet.

Centralamerika. *Valerius* Kuw. (Taf. VI., fig. 39).

2*a*. Stirnleisten entweder in die äussern Clypeusvorsprünge übergehend oder vor denselben als Knötchen endigend. Kopfhorn meist ohne freie Spitze.

5 (5*a*). Hinter dem Ausschnitt des Clypeus mit concaver Längsrinne auf der Mitte.

Brasilien. *Phoronaeosomus* Kuw. (Taf. VI., fig. 40).

5*a*. Ohne Längsrinne auf der Mitte des Clypeus.

6 (6*a*). Stirnleisten gerundet bogenförmig zu den Clypeusvorsprüngen ziehend, dicht vor diesen im Knötchen endigend. Schulterecken mit Haarquaste.

Caraccas. *Toxeutotaenius* Kuw. (Taf. VI., fig. 41).

6*a*. Stirnleisten rechtwinklig oder geradlinig auseinandergehend, mit dem Knötchen dicht vor den Clypeusvorsprüngen endend. Schulterecken ohne Haarquaste. Stirn oft querrunzlig.

Centralamerika, Brasilien. *Epiphanus* Kaup (Taf. VI., fig. 42).

1*a*. Auch das viertletzte oder viert- und fünftletzte Fühlerglied zur halben oder ganzen Lappenlänge verlängert. Kopfhorn oben in seiner ganzen Länge scharfkielig.

Guyana, Amazonengebiet. *Tetraraeds* Kuw. (Taf. VI., fig. 43).

20. Gruppe: PETREJINAE.

1 (1*a*). Das sehr lange Kopfhorn ist bis zum Verlassen des Clypeusvorderrandes unfrei und ragt nur mit freier Spitze über diesen hinaus, welcher dadurch dreizähnig erscheint.

Peru (Chinchaswälder). *Cassius* Kuw. (Taf. VI., fig. 44).

1*a*. Das lange nach vorne gerichtete Kopfhorn ist frei. Clypeus mit 2 Binnenzähnen, welche sehr nahe aneinander stehen, oder ohne Binnenzähne.

2 (2*a*). Das lange, freie Kopfhorn ist an der Spitze gespalten und über den Clypeus hinausreichend. Dieser mit 2 feinen Zähnchen auf der Mitte. (Nach Kaup. Mir fremd).

Guyana. *Rhagonocerus* Kaup.

2*a*. Das lange Kopfhorn mit ungespaltener Spitze.

3 (3*a*). Taillenlatz an den Seiten punktirt und behaart.

4 (4*a*). Kopfhorn rund, ohne Furche. Clypeus mit 2 Zähnen. Neleus-artige Thiere.

Brasilien, Guadaloupe. *Lucilius* Kaup (Taf. VI., fig. 45).

4*a*. Kopfhorn mit Furche. Clypeus ohne oder mit undeutlichen Binnenzähnen.

Guyana, Ecuador, Columbia. *Synesius* Kuw. (Taf. VI., fig. 46).

3*a*. Taillenlatz unpunktirt und unbehaart.

5 (5*a*). Kopfhorn gefurcht, wagerecht, vorne mit herabgedrückt vortretender Spitze unter den zurückbleibenden Seitenleisten der Rückenfurche; dadurch fast dreizähnig erscheinend. Schulterecken mit Haarquaste.

Centralamerika. *Thryptocerus* Kuw. (Taf. VI., fig. 47).

5*a*. Kopfhorn nur niedergebogen. Clypeus mit oder ohne Binnenzähne. Schulterecken mit oder ohne Haarquaste.

Centralamerika, Brasilien. *Petrejus* Kaup (Taf. VI., fig. 48).

21. Gruppe: VATINIINAE.

1 (1*a*). Kopfhorn plump, vorne frei. Schulterecken immer behaart.

Brasilien, Columbia. *Vatinius* Kaup.

1*a*. Kopfhorn klein, ganz unfrei. Schulterecken unbehaart.

Brasilien. *Phanocles* Kuw. (Taf. VI., fig. 49).

22. Gruppe: VINDICINAE.

Nur ein Genus.
Madagascar, Bagamoyo. *Vindex* Kaup (Taf. VI., fig. 50).

23. Gruppe: NELEINAE.

1 (1*a*). Immer mit Episternen (Seitenfurchen) des Metasternums.
2 (2*a*). Schulterecken der Flügeldecken ohne Haarbusch.
(Mexico? Brasilien?). *Oeneus* Kuw. (Taf. VI., fig. 51).
2*a*. Immer mit Haarbusch der Schulterecken an den Flügeldecken.
3 (3*a*). Kopfhorn fast oder ganz unfrei.
4 (4*a*). Stirnleisten ziemlich rechtwinklig gegen einander gestellt, geradlinig auf die Clypeusdorne ziehend. Stirn flacher. Taillenlatz unpunktirt, unbehaart.
Mittel- und Südamerika. *Ninus* Kaup (Taf. VI., fig. 52).
4*a*. Stirnwinkel im stumpfen Winkel, geschwungen oder gebogen auseinandergehend. Stirne steiler abfallend.
5 (5*a*). Taillenlatz ohne Punktirung und Behaarung an den Seiten.
Tropisches Amerika. *Neleus* Kaup.
5*a*. Taillenlatz an den Seiten punktirt und behaart.
Tropisches Amerika. Subgen. *Ptychotrichus* Kuw. (Taf. VI., fig. 53).
3*a*. Kopfhorn lang, mit weit freier Spitze.
Tropisches Amerika. Subgen. *Flavius* Kuw.
1*a*. Metasternum ohne Episternalfurchen zunächst der Flügeldecken. Schulterecken der Flügeldecken fast ohne Haarbusch.
Südafrika. *Calidas* Kuw. (Taf. VI., fig. 54).

24. Gruppe: SEMICYCLINAE.

Nur ein Genus.
Madagascar, Afrika centr. *Semicyclus* Kaup (Taf. VI., fig. 55).

25. Gruppe: TARQUINIINAE.

Nur ein Genus.
Neu Guinea. *Tarquinius* Kuw. (Taf. VI., fig. 56).

26. Gruppe: CICERONIINAE.

Nur ein Genus.
Madagascar, Bagamoyo. *Ciceronius* Kaup. (Taf. VI., fig. 57).

27. Gruppe: SOLENOCYCLINAE.

Nur ein Genus.
Madagascar. *Solenocyclus* Kaup (Taf. VI., fig. 58).

28. Gruppe: FLAMINIINAE.

Nur ein Genus.
Madagascar. *Flaminius* Kuw. (Taf. VI., fig. 59)

29. Gruppe: LEPTAULACINAE.

1 (1*a*). Mit behaarten Seitenrippen der Flügeldecken und bisweilen behaarter Halsschildnarbe. Mittelzahn des Clypeus schwach, oft fehlend und nur durch die Längskielung des Clypeus angedeutet.

Ostindien, Philippinen. *Trichostigmus* Kaup (Taf. VI., fig. 60).

1*a*. Mit unbehaarten Seitenrippen der Flügeldecken.

2 (2*a*). Zwischen den Binnendornen der Rand des Clypeus nur *unregelmässig gekerbt*, entweder ohne deutlichen Zahn zu bilden, mit Längskiel auf der Mitte, oder mit Zahn.

Mexico, Brasilien. *Stephanocephalus* Kaup (Taf. VI., fig. 61).

2*a*. Zwischen den Binnendornen immer ein deutlichen Zahn, oder es ist die Mittellinie des Clypeus gekielt.

3 (3*a*). Clypeus fünfzähnig.

Indo-Australien. *Leptaulax* Kaup.

3*a*. Clypeus dreizähnig. Die Aussenzähne werden durch die vortretende Augenwand gebildet. Der Mittelzahn stark, ohne Kiel hinter demselben.

Mexico, Columbia. *Eumelus* Kaup.

30. Gruppe: MITRORHINAE.

1 (1*a*). Mit 3 Flaggenlappen.

2 (2*a*). Niemals ist zwischen den Binnen- und Aussenzähnen noch ein Zähnchen vorhanden. Die innere Augenwandleiste bildet aber einen Zahn nach vorne, so dass der Clypeus ausser dem Mittelzahne immer 4 Zähne besitzt.

3 (3*a*). Immer ein deutlicher, nicht durch einen Einschnitt gespaltener Mittelzahn vorhanden.

4 (4*a*). Die Zähne vor der Augenwandleiste gleichlang mit den Binnenzähnen. Zunge vorne gerade.

Amerika centr. *Mitrorhinus* Kaup.

4*a*. Die Zähne der Augenwandleiste treten gegen die Binnenzähne zurück, d. h. stehen weiter nach hinten. Zunge vorne ausgerandet.

Afrika, Madagascar. *Eumelosomus* Kuw.

3*a*. Der Mittelzahn immer durch einen kleinen Einschnitt gespalten, oder 2 kleine Zähnchen zu den Seiten eines winzigen Ausschnittes daselbst.

5 (5*a*). Clypeus und Kopfflächen tragen Punkte. Episternalfurchen unpunktirt, unbehaart. Die Metasternalplatte tritt scharfkantig gegen die Achselhöhle der Mittelhüften.

Afrika. *Didimus* Kaup (Taf. VI., fig. 62).

5*a*. Clypeus und Kopfflächen längsrunzlig oder matt. Episternalfurchen flach punktirt und schwach behaart. Die Metasternalplatte wölbt sich nach den Achselhöhlen der Mittelhüften mehr oder weniger ab.

Kamerun. *Didimoïdes* Kuw.

2*a*. Clypeus ausser dem Mittelzahne noch mit 6 Zähnen, indem sich einwärts von dem Augenwandzahne noch jeseitig ein stumpfes Zahnchen am Clypeus findet.

Madagascar. *Vitellinus* Kuw. (Taf. VI., fig. 63).

1*a*. Mit 4 bis 5 Flaggenlappen.

6 (6*a*). Der immer vorhandene Mittelzahn immer getheilt oder gespalten. Clypeus vier bis sechszähnig.

Mittelafrika, Kamerun. *Pentalobus* Kaup (Taf. VI., fig. 64).

6*a*. Ohne Mittelzahn. Clypeus vierzähnig, auf der Mitte gerade, ohne Einschnitt.

Mittelafrika. Subgen. *Epeus* Kuw.

31. Gruppe: GONATINAE.

1 (1*a*). Unterlippe mit kleinem, Omegaförmigem Eindruck, mit abgerundeten Hinterecken des Eindrucks.

Amboina, Ceram, Neu Guinea, Aru. *Omegarius* Kuw. (Taf. VI., fig. 65).

1 (1*a*). Eindruck der Unterlippe anders geformt.

2 (2*a*). Unterlippe mit dem Eindruck eines scharfkantigen, lateinischen, grossen W. Der linke Oberkiefer länger, als der rechte.

Neu Guinea, Neuholland, Aru, Ceram. *Gonatas* Kaup (Taf. VI., fig. 66).

2*a*. Unterlippe mit halbmondförmigem Eindruck.

Aru. *Tatius* Kuw. (Taf. VII., fig. 67).

32. Gruppe: VELLEJINAE.

1 (1*a*). Linker Clypeusvorsprung breit abgeschnitten, wenig kürzer als der breit zugespitzte rechte. Flagge mit 4 langen Lappen. Halsschildnarbe behaart. Grosse Thiere.

Aru, Neu Guinea. *Labienus* Kaup (Taf. VII., fig. 69).

1*a*. Beide Clypeusvorsprünge ziemlich zugespitzt, der linke breiter, als der rechte. Halsschildnarbe unbehaart, sein Seitenrand unten mit Bürste. Flagge fünf- bis sechslappig.

Neu Guinea, Philippinen, Salomons Inseln. *Vellejus* Kaup (Taf. VII., fig. 68).

33. Gruppe: PELOPINAE.

1 (1*a*). Der linke Clypeusvorsprung viel länger als der rechte. Von dem Knötchen der linken Stirnleiste eine Leiste ziemlich gegen die Mitte der innern Augenwand; davor die Grube.

Aru, Neu Guinea. *Pelops* Kaup (Taf. VII., fig. 70).

1*a*. Der linke Clypeusvorsprung nur breiter als der rechte, nicht oder wenig länger. Wenn eine zur innern Augenwand von den Knötchen aus ziehende Leiste vorhanden, so zieht sie nach dem Vorderrande der Augenwand.

Mindanao. Subgen. *Pelopides* Kuw. (Taf. VII., fig. 71).

34. Gruppe: ERIOCNEMINAE.

1 (1*a*). Die beiden Clypeusvorsprünge sind ungleich. Der linke Oberkiefer länger als der rechte.

2 (2*a*). Der rechte Clypeusvorsprung aus einem Convolut von 3 oder 4 Zähnen, welche zum Theil über einander liegen, bestehend. Oberlippe vorne tief ausgerandet, meist mit Zähnchen auf der Vorderrandsmitte. Mit Grube zwischen linkem Clypeusvorsprung und Augenwand.

Borneo, Sumatra, Java. *Eriocnemis* Kaup (Taf. VII., fig. 72).

2*a*. Der rechte Clypeuslappen als abgestutzter Lappen nicht oder wenig länger, als der linke. Knötchen der Stirnleisten sich zu Dörnchen erhebend. Halsschildnarbe meist behaart.

Neuholland, Macassar. *Plesthenus* Kaup (Taf. VII., fig. 73).

1*a*. Beide Clypeusvorsprünge aus einem Conglomerat von je c. 4 Zähnen bestehend. Oberlippe mit einem Zahne auf der Mitte. Beide Oberkiefer gleichlang.
Sumatra. *Phraortes* Kuw. (Taf. VII., fig. 74).

35. Gruppe: AURELIINAE.

Nur ein Genus, durch das Lippenschild und die sechslappige Flagge von *Veturius* geschieden.
Neu Guinea. *Aurelius* Kuw. (Taf. VII., fig. 75).

36. Gruppe: PHAROCHILINAE.

1 (1*a*). Ein querfurchenartiger, auf der Mitte meist unterbrochener Eindruck hinter der Vorderrandsmitte der Unterlippe vorhanden.
Neuholland. *Episphenoïdes* Kuw. (Taf. VII., fig. 76).
1*a*. Ein halbmondförmiges, durch eine Furche begrenztes Lippenschild vorhanden.
2 (2*a*). Schulterecken der Flügeldecken unbehaart.
3 (3*a*). Linker Clypeusvorsprung viel stärker entwickelt als der rechte (ähnlich den Acerajusarten). Unterlippe mit Narben.
Australasien. *Cetejus* Kaup (Taf. VII., fig. 77).
3*a*. Beide Clypeusvorsprünge fast oder ganz gleichmässig, nicht besonders stark vorgezogen. Clypeus vorne gerundet ausgeschnitten.
Neuholland. *Pharochilus* Burm. (Taf. VII., fig. 78).
2*a*. Schulterecken der Flügeldecken auf starker, dichter Punktirung mit Haarquaste. Clypeusvorsprünge sehr ungleich.
Nias, Borneo. *Heterochilus* Kuw. (Taf. VII., fig. 79).

37. Gruppe: LACHINAE.

1 (1*a*). Flacher, wie *Pharochilus*, mit 6 Flaggenlappen. Unterlippe etwas länger.
Neuholland. *Mastolichus* Kaup (Taf. VII., fig. 80).
1*a*. Gewölbter. Kinn sehr kurz.
2 (2*a*). Lippenschild als ein vertieftliegendes Körnchen zwischen der Unterlippe und der Zunge erscheinend.
Indo-Australien. *Analaches* Kuw. (Taf. VII., fig. 81).
2*a*. Lippenschild nicht vertieft.
3 (3*a*). Lippenschild auf einer Randung des Lippenvorderandes stehend.
Indo-Australien. *Epilaches* Kuw. (Taf. VII., fig. 82).
3*a*. Lippenschild nicht auf solcher Randung stehend, isolirt, innerhalb des Kinns von einer Furche umgeben.
Indo-Australien. *Laches* Kaup (Taf. VII., fig. 83).

38. Gruppe: ACERAJINAE.

1. Schulterecken der Flügeldecken nicht mit Haarquaste besetzt.
Ostindien, Borneo, Java. *Basilianus* Kaup (Taf. VII., fig. 84).
2. Schulterecken der Flügeldecken dicht punktirt und mit Haarquaste.
Ostindien. *Acerajus* Kaup (Taf. VII., fig. 85).

(*Fortsetzung folgt*).

A NEW FORM OF SWIFT FROM MADAGASCAR.

By ERNST HARTERT.

THE Rev. James Wills sent to the Tring Museum, together with some other birds (among them a specimen of the rather rare *Caprimulgus enarratus* Gray), a skin of a swift which I cannot refer to any known form. It is a form of *Micropus melba*, or rather of its subspecies *M. melba africanus*, but *very much smaller*. It is of the usual dark sooty blackish brown above, on the under wing-coverts, anal region and under tail-coverts, across the jugulum, and along the sides of the body and sides of head; forehead a little paler; chin, throat, and middle of breast and abdomen white; flank-feathers with whitish edges. The white on breast and abdomen much more restricted than in *M. melba*, and also the white on the throat not reaching so far towards the sides as in *M. melba*. Total length about 175 mm.; wing 190; tail 70; tarsus 14; culmen 10.

I name this form

Micropus willsi sp. nov.,

in honour of its discoverer. The single specimen was obtained at East Imerina, in Eastern Madagascar, on February 1st, 1896. Its sex has not been ascertained.

SOME UNDESCRIBED LEPIDOPTERA.

By THE HON. WALTER ROTHSCHILD.

PAPILIONIDAE.

1. **Papilio canopus sumbanus** Rothsch. subsp. nov.

Comes close to *alorensis* Rothsch., Nov. Zool. I. p. 686 (1894), and H. t. VIII. f. 4 (1895), but differs as follows:—

Paler brown. Forewing with three creamy white (♂) or white (♀) patches in apical region between upper discoidal and third subcostal veins; the two first patches have a length of about 6 mm., while the third is much smaller; at anal angle two or three small spots; no spots between median nervules.

Hindwing with the discal band very narrow, the spots composing it being scarcely more than 1 mm. broad, or almost entirely obliterated; submarginal spots absent or showing through from the underside.

Underside paler than upperside. Forewing as above. Hindwing with submarginal lunules distinct; discal macular band as above, or faintly broader.

Hab. Patadala, Sumba; 1 ♂, 1 ♀.

SPHINGIDAE.

2. **Cephanodes unicolor** Rothsch. sp. nov.

Similar to *H. simplex* Rothsch., but differs in the uniform apple-green of the head, thorax, and abdomen. Anal tuft apple-green, with orange and black margins.

Underside: palpi white; thorax and legs buffy yellow; abdomen brownish buff; anal tuft black and orange.

Hab. Coomooboolaroo, near Duaringa, N. Queensland (Pannard *leg.*); 2 ♂, 1 ♀.

COSSIDAE.

3. **Xyleutes boisduvali** Rothsch. sp. nov.

This insect is found in collections under a manuscript name of Boisduval's, but has never been described.

Forewings: uniform silvery grey, densely powdered with brownish scales, giving it an ash-grey tinge. On the disc of the wing and between the median nervules are some ill-defined dark brown blotches, varying much in size and shape in individual specimens.

Hindwings: costal margin whitish silvery grey; rest of wing black-brown, powdered with grey between the submedian and first median nervures.

Head, shoulders, and thorax silver-grey; centre of thorax black, powdered slightly with grey; first segment and anal segment of abdomen whitish grey; rest of abdomen black, each segment bordered with greyish white.

Underside: all four wings blackish brown, powdered with grey and broadly bordered all round with grey. Coxae, thorax, head, and abdomen greyish white; legs banded grey and black.

Expanse: ♂ forewing AM 68 mm.; EM 28 mm.; PM 50 mm.
„ ♀ „ „ 85 „ ; „ 37 „ ; „ 59 „
„ ♂ hindwing „ 47 „ ; „ 40 „ ; „ 22 „
„ ♀ „ „ 59 „ ; „ 51 „ ; „ 32 „

Hab. Burdekin River, Queensland; 5 ♂, 6 ♀.

4. **Xyleutes magnifica** Rothsch. sp. nov.

Forewings: uniform pale grey in the ♀, one of my two specimens showing some indistinct dark patches between the median nervules; in my two ♂♂ these spots are distinct.

Hindwings: costal margin white; rest of wings chestnut-red.

Head and thorax grey; abdomen of ♀ chestnut-red, with anal segment grey; in ♂ chestnut-red, with dorsal stripe and two last segments grey.

Expanse: ♂ forewing AM 64 mm.; EM 21 mm.; PM 38 mm.
„ ♀ „ „ 101 „ ; „ 43 „ ; „ 70 „
„ ♂ hindwing „ 36 „ ; „ 27 „ ; „ 18 „
„ ♀ „ „ 70 „ ; „ 65 „ ; „ 36 „

Hab. Brisbane district, Queensland; 2 ♂, 2 ♀.

5. **Xyleutes pulchra** Rothsch. sp. nov.

FEMALE.—*Forewings:* pale grey, spotted with black dots along costa and outer margin; from apex to the second median nervule there is an oblique black streak. On the disc is a group of six large black patches. Between the submedian vein and the inner margin the forewings are clouded with black.

Hindwings: blackish grey; fringe white, with black dots at apices of veins.

Head, middle of thorax, and upperside of abdomen black, the latter grey at bases of segments; apical segment grey. Tarsi with black and white rings.

Expanse: forewing AM 39 mm.; EM 17 mm.; PM 26 mm.
„ hindwing „ 27 „ ; „ 22 „ ; „ 12 „

Hab. Toowoomba, Brisbane district, Queensland; 1 ♀.

NOVITATES ZOOLOGICAE.

Vol. III. SEPTEMBER, 1896. No. 3.

CONTRIBUTIONS TO THE ORNITHOLOGY OF THE PAPUAN ISLANDS.

By THE HON. WALTER ROTHSCHILD and ERNST HARTERT.

(The work of these "contributions" is so divided that Walter Rothschild works out the families *Paradiseidae*, *Ptilonorhynchidae*, and *Rallidae*, while E. Hartert is responsible for the rest.)

IV.*

LIST OF A COLLECTION MADE BY ALBERT S. MEEK ON FERGUSSON, TROBRIAND, EGUM, AND WOODLARK ISLANDS.

MR. ALBERT S. MEEK, an energetic young collector, spent some time on the above-named islands, where, besides collecting insects and other natural history specimens, he brought together a most interesting collection of birds, which are specially valuable because many of them are accompanied by their nests and eggs. Though the bird collections are evidently not exhaustive for any of these islands, they greatly enlarge our knowledge of these imperfectly explored regions.

The bulk of the ornis of Fergusson Island is the same as that of South-Eastern New Guinea, but some very fine species, such as *Paradisea decora*, *Phonygama hunsteini*, *Cyclopsittacus virago*, perhaps also *Anthreptes meeki* and others, are evidently restricted to the D'Entrecasteaux group, while some peculiar species they have in common with other islands east of New Guinea. The ornis of the Trobriands and of Egum and Woodlark differs on the whole probably not very much from that of Fergusson.

In the southern part of Fergusson, where Mr. Meek collected, the mountains rise steeply close to the coast. The spurs are or have been cultivated up to a height of about 1500 feet, but higher up no villages were met with. The island is thickly populated in parts, especially towards a place named Dobu, but a great quantity of large timber stands in the forests wherever the ground has not been cultivated. The natives are very honest, but they are frightened at even the idea of ascending the higher mountains of their island.

Kirvirai, Kiriwina, or Kiriwini, the largest island of the Trobriands, is, like the smaller islets of that group, a coral island and quite flat. Meek tells us that it is very thickly populated, the estimated number of natives being 30,000. They are a fine-built race and all under one chief, every village again under a sub-chief. The whole island has at one time or another been cultivated, with exception of some extremely rough places on the coast. Where the natives plant gardens they pile the coral into heaps and plant between them. The gardens look much like an English

* For Nos. I., II., III. see *antea*, pp. 8-20.

hop-garden, only very much larger, some of them extending for over a mile in length. Where the island is not just now under cultivation it is thickly covered with short vegetation, very difficult to get through. The only large timber extends in a narrow belt around the coast, or is scattered in small groups to protect the villages.

Yanarba Island, Egum group, is one of some small islets between the D'Entrecasteaux Islands and Woodlark. It was not visited by Meek himself, but some of his native collectors spent a few days there. Egum group consists only of small coralline islands.

Woodlark Island, or Mayu, consists chiefly of corals, but some mountains seem to have pierced the coralline capping and occupy about one-fourth of the island. It is very little cultivated, the natives living on sago a great deal. Owing to the scarcity of thick undergrowth it is, as on Fergusson, easy to get about, and in that way very different from the Trobriands. The southern part is least populated, but on the north coast are two or three large villages. The natives all know a few words of English, and some speak it very fairly. Skin disease (probably *ichthyosis*) is very common among them.

1. **Corvus orru** Bp.

Fergusson Island. Like specimens from other localities, with a purplish gloss, and not at all like the *Corvus* spec. described by Salvadori in *Orn. Papuasia* with a greenish gloss.

A nest with four eggs was found on January 22nd. They are exactly like the eggs of other species of crows, and if mixed with eggs of *Corvus corone*, or *C. cornix* especially, would hardly be found again, though the shell seems rather thick. They measure 40·5 : 29, 42 : 28, 41 : 28·5 mm. E. H.

2. **Gymnocorax senex** (Less.).

Fergusson Island. "Iris light blue."

3. **Manucodia comrii** Scl.

Evidently not rare in Fergusson and Kiriwina. The iris is described on the labels as "red" and "light hazel." Nests, containing two eggs each, were found in March on Fergusson Island, one clutch being fresh, the other very hard-set. The nest hangs in the fork of a branch, the upper margin being in equal height with the branch, just as an oriole's nest hangs. It is fastened with thin twigs of a convolvulus-like plant and other twigs. It is lined inside with these convolvulus-like twigs. The bottom is very thick, and outside ornamented with large thick leaves, and in the middle of the bottom layer are a good many pieces of rotten wood.

The eggs are of a pale buffy salmon-colour, one clutch with a more greyish tint, shaped like crows' eggs, marked with underlying pale cinereous and pale purplish brown patches, and with dark brown or rufous brown blotches. They measure 29 : 43 and 30·5 : 45·5 mm.

The *female* is much smaller than the *male*. Specimens from the different islands do not differ.

Mr. Basil H. Thomson (*Ibis*, 1889, p. 554) states that *M. comrii* is "confined exclusively" to the D'Entrecasteaux group. This statement was somewhat unwarranted, since the surrounding countries were not yet explored. We know now that it is not only found on the islands of the D'Entrecasteaux group, as Meek found it on the Trobriands and the type came from the Huon Gulf in New Guinea. W. R.

4. **Phonygama hunsteini** Sharpe (= **Manucodia thomsoni** Tristr.).

Fergusson. Tristram (*Ibis*, 1889, p. 554) was the first to publish the proper locality for this rare bird, but Sharpe's short description has precedence. The tail is strongly hen-tail-shaped in the old *male*, less so in the *female*, and hardly perceptibly in very young birds. The webs of the central rectrices in the fully adult *male* stand nearly perpendicular at the tip, but they are not twisted so far as to open again, as they are in *Manucodia comrii*, which Sharpe placed in a special genus by itself, calling it *Eucorax*. "The iris is red." The *female* does not perceptibly differ in colour, but is a little smaller than the *male*; wing in the *female* 180, in the *male* 186 mm. The young birds are all over black, with a steel-blue gloss, but without any green or purple, the head being uniform with the rest of the upper surface.

Mr. Meek met with this species in the hills, but seldom below 1500 feet.

W. R.

5. **Paradisea decora** Salv. & Godm.

From Fergusson Island. "Iris yellow in both sexes." Mr. Basil H. Thomson (*Ibis*, 1889) says that this species only inhabits Mount Maybole, in the north of Fergusson Island; but Meek never was there. He found it not rare, though by no means very numerous, on the hills of South Fergusson, from about 1500 feet upwards. W. R.

6. **Calornis metallica** (Temm.).

Fergusson Island. "Iris red." Like specimens from New Guinea.

Some eggs, said to belong to this species, were found on Kiriwina, Trobriands; but no skin was sent with them. As, however, Mr. Meek is well acquainted with this species from his collecting in Queensland, Fergusson Island, and other places, and as the eggs agree with eggs of this species from other places, there can be little doubt about their identity. E. H.

7. **Cracticus cassicus** (Bodd.).

Fergusson and Trobriands. The extent of black and white on the back varies very much, *females* and young birds having the back nearly quite black, old *males* white with a black patch in the middle. Nests, containing clutches of two and three eggs, were found from September to January. The eggs are ovate, some more pointed than others, and vary much in colour. They are pale olive, brownish olive, bluish olive-green, marked with faint patches of dark olive-brown or brown and some small blackish brown spots, mostly more numerous near the broader end. They measure 32·5 to 33 : 24 to 26 mm. E. H.

8. **Pachycephala dubia** Rams.

Fergusson Island. "Iris blackish."

9. **Pachycephala fortis** Gadow.

Gadow, *Cat. B.* VIII. p. 369 (Addenda).

Both sexes, nests, and eggs from Fergusson Island. Iris dark hazel. I have compared our specimens with the type of *P. fortis* in the British Museum, and found no differences. This is the more to be wondered at as the birds from the little Trobriand group differ from those from Fergusson. Hereafter I shall describe the differences between the two forms. Two nests are quite alike. They consist of dry

grasses, fibres, and twiglets, and are outside covered with dry leaves of different sorts. The cup is somewhat shallow, being about 30 to 40 mm. deep, the whole nest being outside about 90 to 100 mm. broad, 50 to 60 high, while the cup measures 65 across on the top. The eggs, of four clutches, are two in each nest. They are elliptical ovate, and resemble very much some eggs of the genus *Lanius*, especially those of some of the larger grey shrikes. The ground-colour is whitish or cream-colour, the blotches dark brown and pale grey, generally more numerous on the thicker end. They measure 27 : 20, 25·6 : 18, 27·5 : 19, 27·5 : 19·1, 26·1 : 18, 25·9 : 17·7, 27·8 : 19, 28·5 : 19·3 mm.

Eggs were found in October, November, and December. E. H.

10. **Pachycephala fortis trobriandi** subsp. nov.

Two skins, ♂ and ♀, from Kiriwina, Trobriands, differ from *P. fortis* of Fergusson in the following points:—

1. The bill is longer. The culmen of the *male* is 26, that of the *female* 25 mm. long, while the culmen of the *males* from Fergusson is 22 and 23 mm. long, that of the *females* from that island 22 and 21 mm.

2. The wing is longer: ♂ 100, ♀ 96 mm. *Females* from Fergusson: wing, 88 and 90; *males*, 90 and 95.

Coinciding with these differences, which are so slight that I regard them, with due reserve, as of merely subspecific value for the present time, are obvious differences in the structure of the nest and in the eggs.

The nest is much larger outside, the cup decidedly deeper. The eggs (two in number in each clutch) were found in March and June. The eggs are white, with a faint creamy tinge, marked with a few very large blotches of deep rufous brown or very deep brown, and some deeper-lying light-grey patches. They measure 25·3 : 21, 26·5 : 20·6, 26·1 : 20 mm., and look much more rounded than the majority of *P. fortis* from Fergusson.

All these differences of nests and eggs may not be quite constant, but in any case they are worth recording.

It is remarkable that even the collector seems to have noticed differences in life between the two forms, for on the labels of the nests and on the chip-boxes containing the eggs different names are given, the Fergusson birds being called "Little Brown Thrush," the Trobriand birds "Brown Thrush," and he believes them to be different forms. E. H.

11. **Chibia carbonaria** (S. Müll.).

Fergusson Island. "Iris red."

Canon Tristram has (*Ibis*, 1889, p. 556) described as a new species the *Chibia* from Fergusson Island, and called it *Ch. propinqua*. His diagnosis is: "*C. chibiae laemostictae* (Scl.) propinqua, sed differt maculis nitentibus colli antici imi et pectoris summi valde angustioribus, et elongatis, neque, sicut in *C. carbonaria*, rotundatis. Statura sicut in *C. laemosticta*," and he adds: "The distinctions in this species are more easily seen by comparison than recognised by description." I am sorry to say that the skins collected by Mr. Meek on Fergusson Island do not agree with Canon Tristram's statement. They are, in my opinion, indistinguishable from *C. carbonaria*, of which I have a large series from Dutch, German, and British New Guinea for comparison in the Tring Museum. The spots on the upper breast are in no way more longitudinal or narrower than in a great many specimens of *Chibia carbonaria*, but

they vary a great deal in the latter and are by no means always round. In fact, there are specimens of *Ch. carbonaria* before me in which they are narrower and longer than in the specimens from Fergusson Island. Therefore I have no hesitation in considering *Ch. propinqua* merely a synonym of *Ch. carbonaria*. This latter is fairly distinct from *Ch. atrocaerulea* from the Moluccas, and must, I think, stand as a species, *not* merely a subspecies. On the other hand it seems sometimes very difficult to distinguish *Ch. laemosticta* Scl. from New Britain and New Ireland, and I am inclined to think that the latter should stand as a subspecies of *Ch. carbonaria*.

I feel uneasy about the genus under which to classify these species. They have often been included in *Dicrurus*, but Sharpe unites them with *Chibia* and Salvadori calls them *Dicruropsis*. I do not see much of generic characters in either of these supposed genera.

Nests, with three eggs each, were found in October and December. The eggs are of two principal sorts of varieties. One has the shell pure white, without gloss, covered with small deep purplish brown and pale purplish grey spots and dots. These measure 29·6 : 21·3, 30 : 21, and 29·8 : 21·6 mm. The other is of a creamy ground-colour, and spotted with larger patches of a kind of brownish brick-red and the same pale purplish grey patches, but mostly larger. They are a little shorter, measuring 29 : 22, 29 : 21·5, and 29·1 : 22 mm. E. H.

12. **Melilestes fergussonis** sp. nov.

Melilestes speciebus *M. iliolophus* et *M. affinis* dictis similis, sed multo major. Al. ♂ 71—72 mm., ♀ 63—64; culm. ♂ 25, ♀ 21 mm.

Hab. Fergusson Island.

This species closely resembles in colour *M. iliolophus* and *M. affinis*, if the two are more than subspecies of one species, and is probably only subspecifically distinct. The differences in size, especially in the length of the bill, and the separate locality whence we have received it, however, are remarkable. The iris is dark hazel; bill black; about basal half of mandible whitish.

The sexes differ in size, as they also do in *M. iliolophus* and *M. affinis*, but it seems that this was not noticed before.

Gadow, *Cat. B.* IX., has placed the above-named species in the genus *Arachnothera*, together with *M. novaeguineae*, while he allowed *M. megarhynchus* to remain among the *Meliphagidae* and put it in the genus *Ptilotis*. Without wishing to enter into a discussion on the genera of the *Meliphagidae*, which, I believe, are on the whole divided very reasonably in the *Catalogue of Birds*, I cannot agree to that, as I believe that *M. megarhynchus*, *M. novaeguineae*, *M. iliolophus*, and allies are all congeneric, and differ widely from *Arachnothera* in the form of the bill and nostrils. On the other hand they differ from true *Ptilotis*, and one might for the present accept without hesitation Salvadori's generic name *Melilestes*, with *M. megarhynchus* as the "type," and including *M. novaeguineae*, *iliolophus*, *affinis*, *fergussonis*, *poliopterus*, and probably also *Melilestes celebensis* and subspecies (see *antea*, p. 153), which latter is certainly *not* an *Arachnothera*. It differs also from the Papuan *Melilestes* in its short tarsus and toes, its naked ring round the eye, and a narrower bill. Another question which I have often asked myself and which I cannot answer to my own satisfaction is whether *Arachnothera* is in its right place among the *Nectariniidae*, and whether it is not a Honey-Eater. Oates has already allowed it the rank of a subfamily.

A nest was found in December. It is fastened to some leaves and a thin twig,

I should say spun on to it, and outside covered with half-decayed dry leaves. It is rather small for the bird, and consists chiefly of dry grass, but is inside thickly lined with very soft snow-white vegetable silk. It had one egg, which is creamy white, with some pale reddish spots all over, and with a close ring of pale brownish red spots and dots near the broader end, as well as with a few deep brown hair-lines encircling the egg above the middle. It measures 20 : 14·3 mm. E. H.

13. **Ptilotis spilogaster** Grant (*Ibis*, 1896, p. 251).

Fergusson Island. ♂ ♀. "Iris hazel." Mr. Ogilvie Grant has kindly compared the two specimens with the type of the species in the British Museum and found them to be perfectly alike. E. H.

14. **Ptilotis analoga** Rchb.

Fergusson Island. Iris dark hazel or "black." Bill and feet dark grey. Nests were found in November and December. The nest hangs in the fork of a branch, is a deep cup, much narrower at the bottom, wide on top, and consists of small grassy rootlets and leaves. It is outside about 75 mm. high, the cup about 60 deep, above about 50 to 75 mm. across. The two eggs are pure white and resemble those of our nuthatch, being somewhat sparsely speckled with rufous brown and brownish red, measuring 21·5 : 16 and 22 : 16 mm. E. H.

15. **Philemon novaeguineae subtuberosus** subsp. nov.

Four perfectly adult specimens of both sexes from Fergusson Island, some taken from the nest, differ from a series of skins from different parts of New Guinea, Batanta, and Salwatti in having the hump at the base of the culmen distinctly smaller and in the pale tips to the rectrices being much less developed, and in fact hardly or not at all perceptible. The iris is "hazel."

This subspecies is certainly much more distinct than the form described as "*Tropidorhynchus aruensis*" by Dr. A. B. Meyer, *Zeitschr. ges. Ornith.* I. p. 216. This latter form is stated to differ from *Philemon novaeguineae* Müll. in its longer and higher bill with a higher hump, a more feathered forehead, and paler colour of the body. Four specimens from Wokan, Lutor, and Giaba-Lengar, all Aru Islands, do not show a sign of any of these differences, except that the bill is slightly longer than in the majority of New Guinea specimens, and that the hump in one, from Wokan, is decidedly higher than in any I was able to compare from New Guinea. The feathering of the forehead is not at all different from those from New Guinea, nor is there any difference in colour. Therefore the Aru form cannot possibly be anything more than a subspecies of *P. novaeguineae*, but the majority of ornithologists will no doubt follow Salvadori, who (*Aggiunte Orn. Pap.* II. p. 129) places *P. aruensis* as a synonym under *P. novaeguineae*. Why Dr. Meyer in his original description compared his *T. aruensis* with *P. timoriensis* rather than with *P. novaeguineae* I cannot understand, for in size, colour, and hump it stands undoubtedly nearest to *P. novaeguineae*. Nor can I understand how one can place *P. jobiensis* Meyer and *P. novaeguineae* into different genera, as Salvadori does in his *Orn. Papuasia*. I should rather agree with Dr. Gadow, who recognises *P. jobiensis* only as a subspecies of *P. novaeguineae*, for there *is* a small hump on the base of the bill, but the somewhat different forehead, which is not feathered, but covered with scanty stiff black hairs, justifies its specific position. In any case Dr. Meyer's view must be upheld that it is congeneric with *P. novaeguineae*, though I

fully agree with Dr. Gadow in uniting *Philemon* and *Tropidorhynchus* under the former name, as such forms as *P. jobiensis* and *P. novaeguineae subtuberosus* form distinct bridges from the humped to the unhumped members of the group.

In comparing any of these birds it must be borne in mind that the *females* have as a rule slightly smaller humps, and that they are much less developed in young birds; therefore only adult birds of the same sex should be compared if the size of the hump is discussed.

Nests of *Philemon novaeguineae subtuberosus* were found from October to December on Fergusson Island. They were large open structures, and contained two or three eggs each. The latter are very pale salmon-colour, and have many vinaceous rufous patches and a few deeper-lying purplish grey ones. They measure 32·5 : 23, 32·7 : 22·8, 33·7 : 23·5 mm. and about these measurements. Other clutches are of a deeper salmon-colour, washed nearly all over with pale vinaceous rufous patches and with a few black dots. Size about the same. E. H.

16. **Myzomela forbesi** Rams.

Ramsay, *Proc. Linn. Soc. N. S. Wales*, IV. p. 469 (1880); Gadow, *Cat. B. Brit. Mus.* IX. p. 135.

The species has been described from Woodlark Island, but Mr. Meek sent a fine series of both sexes from Fergusson Island only. The wing of the *males* is 2·3 to 2·4 inches (about 60 mm.), not 2·25 inches as given by Gadow. "Iris hazel." "Bill and feet black." The *female* is greenish olive above; forehead, crown, and throat dull red; underside pale olive, very pale in the middle of the abdomen. "Iris black." Wing 52—53 mm. Altogether smaller than the *male*. E. H.

17. **Dicaeum rubrocoronatum** Sharpe.

Fergusson Island. Three eggs were found on December 2nd, 1894. They are pure white, and measure 13·3 : 11, 14 : 11, 15·2 : 10·9 mm. E. H.

18. **Anthreptes meeki** sp. nov.

♂ ♀. *Anthreptes* minimus, capite colloque supra, tectricibus alarum minoribus griseis, dorso, rectricum et secundariarum marginibus exterioribus, alarum tectricibus majoribus viridibus, griseo lavatis. Subtus griseo-albidus, corporis lateribus, fasciculis plumarum pectoris lateribus pallide sulfureis, alarum tectricibus inferioribus albis. Al. 50 mm., caud. 25—28, culm. 14, tars. 12 mm.

Hab. Ins. Fergusson dicta.

This is perhaps the most interesting of Mr. Meek's discoveries on Fergusson Island, and therefore it is appropriate that it should bear his name. Remarkable it is on account of its very simple coloration, *the* MALE *having no trace of metallic colours in its plumage and differing in no way from the* FEMALE! It is therefore with some hesitation that I call it an *Anthreptes*, but it belongs to no other genus known to me, and I cannot find any structural characters to separate it from that genus. Perhaps Mr. Büttikofer or Count Salvadori would separate it generically, if I understand their point of view, judging from the former gentleman's recent, and most valuable, articles on some groups of Passerine birds, and from the latter ornithologist's keys to the genera in his monograph of the *Anatidae*; but in my opinion coloration alone cannot constitute genera, and generic characters must be structural, so as to enable us to class all ages, sexes, and even varieties, such as albinoes, in their proper genera. Besides

the aberrant colour of this new species, it inhabits the most eastern locality of any *Anthreptes* hitherto known.

Adult.—Head and neck above grey, nearest to "olive-grey" (Ridgw., *Nomencl. Col.* pl. ii. fig. 14). Ear-coverts paler, small spot in front of the eye greyish white. Lesser wing-coverts grey. Back, rump, and upper tail-coverts green, slightly washed with grey. Primaries deep brown, outer webs narrowly margined with olive-grey. Secondaries and rectrices deep brown, outer webs margined with green. Throat, breast, and middle of abdomen greyish white; sides of body pale sulphur-yellow; pectoral tufts sulphur-yellow. Under wing-coverts white, washed with yellow. Iris deep brown; legs blackish; bill black; base of mandible whitish.

Measurements: see above.

Evidently not rare on Fergusson Island, from where a small but fine series was sent.

Nests were found in September and December. The nest is a characteristic sunbird's nest, being constructed of grass and other fine dry materials. The entrance, at the side, is overhung by a small porch. It is firmly attached to a branch, from which it suspends. The two eggs resemble those of other sunbirds, being of a brownish creamy ground-colour, covered all over with a dark brown, like chocolate with milk, and a few deeper brown, almost black, lines and dots. They measure 18 : 12·3 and 17·3 : 12·3 mm. E. H.

19. **Cinnyris christianae** Tristr.

Fergusson and Kiriwina Islands.

This species has been described from St. Aignan's Island by Canon Tristram in the *Ibis*, 1889, p. 555. The description suits our specimens very well, except that I cannot find that the bill is so remarkably larger than that of other allied species. The type, now in the Liverpool Museum, has most kindly been sent me by the Director, Mr. Forbes, for comparison. It agrees entirely with our specimens, except that the wing is slightly longer. It measures 66 mm. in the type, while it measures 63—65 in eight *males* from Fergusson Island before me. That, of course, cannot be considered an important difference, nor can any weight be attached to a slightly more greenish tint of the upper wing-coverts in the Fergusson *males*. The *female* and the young *male*, of which there are skins from Fergusson and Kiriwina, have the head above and nape deep grey with pale grey edges to the feathers, so that they look somewhat scaly, the rest of the upper parts dull yellowish green, throat and upper breast pale ashy grey, abdomen pale yellow, under wing-coverts white with a yellow wash. Wing 57—60; culm. 23. Culmen of *males* 23—25 mm. Iris deep brown.

Nests were found on Fergusson and Kiriwina from October to March. The nests resemble those of other sunbirds.

The eggs, two or three in number, are of a brownish white ground-colour, which is more or less covered with spots and patches of chocolate-colour or a similar brown colour. Some are entirely and equally covered with the dark colour, so that scarcely anything is visible of the ground-colour, but most of them have a more or less well-defined ring near the broader end, and the smaller end is often very pale, showing much of the ground-colour, which in some is rather whitish. The measurements are 20 : 13, 17·9 : 13, 17·8 : 12·3, 18·3 : 12·1, 17·8 : 12, and so on. E. H.

20. **Cinnyris frenata** (Müll.).

Fergusson Island.

21. (?) **Pseudogerygone conspicillata** (Gray).

Three specimens of a *Pseudogerygone* from Fergusson Island agree best, of all the species represented in the British Museum at present, with *P. conspicillata*, from which they seem hardly separable at all, though the flanks are a little more washed with rufous olive. They are above olive-brown, below whitish with an olive-brown or rufous olive wash, strongest on the breast and sides of body. Nasal plumes whitish, feathers in front of the eye dusky. Under wing-coverts white. Wing of *females* 52—53 mm., of *male* 55 mm. Rectrices with blackish subterminal spots and with rather indistinct whitish spots on the tips of the inner webs of the outer rectrices. Feathering of the eyelid white above and below. "Iris red." These birds also resemble very much a specimen of *P. brunneipectus* in the British Museum, but the colour is not exactly the same. In the Tring Museum is also a skin shot near Cedar Bay in North Queensland by Mr. Meek on January 16th, 1894. It is marked *male*. Except a slightly paler general colour, which may be due to its being in a somewhat worn plumage, and more distinct whitish spots on the inner webs of the outer four pairs of rectrices, I cannot see any differences. If the sex is right the wing, measuring only 51 mm., would also be shorter. This should be *P. magnirostris* Gould, but it has also white feathers round the eye, and Sharpe's supposition that they are absent in *P. magnirostris* (see his "Key") seems to be wrong.

I repeat that my specimens agree best with *P. conspicillata*, but I am somewhat doubtful whether *P. conspicillata*, *brunneipectus*, and *magnirostris* are specifically separable.

Nests were found in January. They are hanging from a twig, like sunbirds' nests, and have a lateral entrance nearer the top. The eggs, three in number, are without gloss, reddish white with small brownish red spots, many of them of very minute size, but one is pure white with only a few red spots. The reddish ones measure 16·7 : 13, 17·3 : 12·6, the white one 17·4 : 12·9 mm.

Nests of the bird from Cedar Bay are much like the one from Fergusson Island, but more pointed at the bottom, the eggs more reddish and more plentifully marked with rufous little spots. They measure from 17 : 12 to 18 : 12·3 and 17·5 : 12·5 mm.

E. H.

22. **Rhipidura setosa** (Quoy & Gaim.).

Fergusson Island. "Iris black." A nest found on December 29th is an unmistakable *Rhipidura* nest, viz. a well-built pad, resting on the top of a branch, quite round, measuring 60 mm. across. The two eggs are also at once recognised as *Rhipidura* eggs by any one who knows eggs. They are brownish white with a broad ring of dark brown, paler brown, and deeper-lying grey spots and patches. They measure 19·5 : 14·3 and 19 : 14·3 mm. E. H.

23. **Monarcha melanopsis** (Vieill.).

Fergusson Island. "Iris black; bill bluish grey; legs and feet bluish grey."

24. **Monarcha inornatus** (Garn.).

Trobriand Islands. ♀. "Iris black."

25. **Monarcha guttula** (Garn.).

Fergusson Island. Iris dark hazel. The sexes alike. The young bird agrees with Salvadori's description (*Orn. Papuas.* II. p. 22), but the breast is washed with pale cinnamon. The wing-coverts are without any white spots, which only appear as the birds get older. Nests were found in December. They are firmly fixed in a corner formed of three or four twigs, and are deep cups, built entirely of green moss, but lined inside with black rootlets and human hair. Outside height about 100 mm.; width across on top 70—80. The two eggs are of a dark cream-colour, thickly spotted and speckled with pale and dark rufous and with some deeper-lying greyish spots. They measure 22·5 : 16·1 and 22 : 15·9 mm. E. H.

26. **Monarcha chalybeocephalus** (Garn.).

Fergusson, Trobriand, and Woodlark Islands. "Iris black; feet brownish black; beak slate-colour." One *female* from the Trobriands has the chin metallic greenish black, while another from the same place has no sign of a dark chin.

Nests were found on Fergusson Island from October to December. They are either built of moss lined inside with dark rootlets, much like that of *M. guttula*, and outside ornamented with white pieces of a very tough and close cobweb, or without moss, of rootlets, twigs, etc., ornamented outside with lichens, greenish or grey bark, cobwebs, etc. They are mostly fixed firmly in a fork of a branch, or riding on some twigs.

The eggs have no similarity whatever with those of *M. guttula*, being greenish white and with a loose ring of brown and grey spots near the thicker end, altogether much resembling small eggs of the corresponding variety of *Lanius collurio*. The clutches consist of three eggs each. They measure 21·1 : 15, 21·5 : 16, 21 : 15·3, 21 : 15·6, 21·9 : 15·3 mm. E. H.

27. **Monarcha aruensis** Salvad.

Fergusson. These birds agree entirely with skins from Nicura and Mailu in British New Guinea. They are easily distinguishable from *M. melanonota* from Dutch New Guinea by their smaller bill, and are also well distinguishable from *M. chrysomelas* of New Ireland, while *M. kordensis* Meyer is quite a different bird. E. H.

28. **Edoliosoma mülleri** Salvad.

Two *males* and a *female* from Fergusson Island. The iris in both sexes "hazel."

The *male* of this species hardly differs from that of *E. tenuirostre* except in the greater massiveness of the bill. The *female* differs more, according to Salvadori. E. H.

29. **Lalage karu** (Less.).

Fergusson Island. Iris in both sexes "hazel."

30. **Pitta finschi** Rams. (?).

A third skin from Fergusson Island agrees perfectly with the two described Nov Zool. II. p. 61. I have nothing to add about the birds to what I said there.

Two eggs were found on October 16th, 1894.

They are creamy white, heavily blotched and spotted with purplish brown and bluish grey.

Measurements: 31·9 : 24·5 mm. E. H.

31. **Collocalia fuciphaga** (Thunb.).

Fergusson and Kiriwina, Trobriands. Wings 116—117 mm. E. H.

32. **Collocalia esculenta** (L.).

Kiriwina and Woodlark. Wings in specimens from the former island 95—100 mm., in those from the latter 101—103 mm. E. H.

33. **Podargus intermedius** Hartert.

In the December meeting of the Brit. Orn. Club I described this interesting new form, of which Mr. Meek sent a small series from Fergusson and Kiriwina, Trobriand group. These birds are represented in grey and rufous phases, the latter being sexed as *females*, the former as *males*. The iris is described on the various labels as "brick-red," dull red, and hazel. Nests with one egg each were found in November and December on Fergusson Island, and a young bird was found there in January. The nests are curiously tiny structures, resting on the branches. They are of a somewhat triangular form, measuring only about 4 to 5½ inches across. They are composed of only a few pieces of vines, twigs, and grass, loosely put together, and one can easily read through them if held over a book. They are much less of a nest than that of a turtle-dove. The eggs are dead white, equally rounded on both ends, rather thin and fragile, and measure 39·4 : 27·6 and 40·3 : 28·6 mm. When held against the light they shine through greenish yellow. Both sexes seem to breed, as both were shot from the nests. The nestling was evidently not hatched long before it was found, but the rectrices, wing-feathers, and scapulars, as well as some feathers of the spinal and pectoral tracts, begin already to show. The little thing is *sparsely* covered with whitish downy feathers, the back, sides of body, and abdomen being very thinly covered. The nostrils stand out rather tubular. The stomach is full of insect-remains. E. H.

34. **Eurystomus australis** Sw. and 35. **E. crassirostris** Scl.

Both these rollers were shot on Fergusson Island. The iris of both species is described as "hazel."

36. **Scythrops novaehollandiae** Lath.

Both sexes, Kiriwina, Trobriand Islands. "Iris red." One of the two sent is marked ♂, the other ♀. In the latter the bill is more than 1 cm. longer than in the one marked ♂, and the wing is 3 cm. longer as well! E. H.

37. **Cacomantis insperatus** (Gould).

Fergusson Island. "Iris hazel."

38. **Centropus nigricans** Salvad.

Fergusson Island. "Iris red."

39. **Ceyx solitaria** (Temm.).

♂. Fergusson Island. "Iris black."

40. **Alcedo ispidoides** Less.

♀. Fergusson Island.

41. **Alcyone lessoni** Cass.

Fergusson Island. "Iris black."

Nests were found in September and October. The eggs, of the usual form and colour of kingfishers' eggs, measure 23 : 19·3, 22·3 : 19·6 mm., and thereabouts.

E. H.

42. **Halcyon sanctus** (Vig. & Horsf.).

Fergusson, Kiriwina in the Trobriand group, and Woodlark Islands. "Iris hazel."

43. **Halcyon saurophagus** (Gould).

Yanarba Island, Egum group. "Iris black."

44. **Syma torotoro** Less.

♂ ♀. Fergusson Island. "Iris hazel." The under parts of the four specimens before me are rather darker cinnamon-rufous than usual. As Sharpe (*Cat. B.* XVII. p. 197) justly says, the throat and abdomen are paler in *S. torotoro*; in those from Fergusson Island, however, I find the throat but very little paler, and the abdomen not at all so. Among seventeen skins before me from New Guinea and Waigiou I find the abdomen only as dark in *one single* specimen. I suspect, therefore, that the Fergusson Island birds are subspecifically different, but I cannot find any other differences.

E. H.

45. **Halcyon macleayi** Jard. & Selby.

A *female*, Kiriwina, Trobriands. "Iris dark hazel."

46. **Halcyon sordidus colonus** subsp. nov.

Halcyon formae *H. sordidus typicus* dictae affinis, sed multo minor. Culm. 46 (nec 60) mm., al. 89—93 (nec 112) mm.

Hab. "Egum group" (subspeciei typus), "Louisiade Islands."

Two skins, a *male* and a *female*, from Egum Island differ widely from *H. sordidus* from Northern Australia and the Aru Islands, in being decidedly smaller and apparently also darker, especially on the head, though this may be due to the freshness of the skins. The loral spot is not white, but pale buff; the concealed spot on the nape very distinct and pale buff; the collar on the hind-neck rather broad; above and behind the eye an indication of an eyebrow. Tail 70 mm.

This very distinct form might stand as a species; but the differences being of a nature suggesting the occurrence of local variation in a similar direction, and, except the size, not being striking, it is perhaps safer to at once regard them as of subspecific importance only. The skin "n" in the British Museum (cf. Sharpe, *Cat. B.* XVII. p. 279) belongs also to this form, which will doubtless be found on many more islands. The iris is given by Mr. Meek as "hazel."

Cabanis & Heine, *Mus. Hein.* II. p. 159, named the Aru birds *Sauropatis grayi* (descr. nulla!); but from glancing at them in the British Museum I could not see any differences from Australian specimens. E. H.

47. **Lorius hypoenochrous** G. R. Gray.

Fergusson, Trobriands, and Woodlark. "Iris red." Sexes quite alike.

48. **Cyclopsittacus virago** Hartert.

Fergusson Island only. See Nov. Zool. II. p. 61.

49. **Loriculus aurantiifrons meeki** Hartert.

Fergusson Island only. See Nov. Zool. II. p. 62.

50. (?) **Nasiterna pusio** Scl.

Fergusson Island. Two *males* and some nestlings from Fergusson Island are rather small, have a bluish tinge on the breast, hardly any yellow on the under parts, and the forehead and sides of the head not so orange, but rather browner. They differ, however, from each other a little, and I am therefore in doubt whether they belong to a distinct local form, or whether they are merely immature specimens. I am not at all sure that the specimens from the Duke of York group and from "S.E. New Guinea" are fully the same. The type has been described from the "Solomon Islands," which was evidently wrong. E. H.

51. **Geoffroyus aruensis** (Gray).

Evidently not rare in Fergusson Island. Iris in both sexes very pale yellow, sometimes nearly white; feet and legs dark grey. E. H.

52. **Eclectus pectoralis** (P. L. S. Müll).

Evidently common on Fergusson and Kiriwina, Trobriands. The (green) *males* have the iris mostly marked "red," some "yellow." The (red) *females* also have these two colours marked on the labels as those of their irides. E. H.

53. **Cacatua triton trobriandi** (?).

A *female* from Fergusson Island has the wing only 263 mm. (= 10·4 in.), which is decidedly less than the length of the wing of *C. triton*. Salvadori (*Cat. B.* XX. p. 119) says: "The specimens from the Western Papuan Islands, and especially from the Aru Islands, are generally smaller than those from the mainland, and have even been separated specifically as *C. macrolopha* Rosenb.; but I do not think that we are justified in accepting this view, especially when we consider the great range of individual variation." Dr. Finsch, in his interesting book *Samoafahrten*, p. 208, says that the natives in the Trobriand Islands brought to him "lebende Exemplare einer eigenen kleinen Kakaduart mit gelber Haube, *Cacatua trobriandi* Finsch." This name he considered afterwards (Salvadori, *l.c.*) as a synonym of *C. triton*.

No description of "*Cacatua trobriandi* Finsch" has ever appeared. Most likely the Fergusson Island cockatoo belongs to the same form as that from Trobriand. It is still smaller than those from the Western Papuan Islands, Salwatti, Mysol, etc., the

wing measuring only 267 mm., while Mysol specimens have the wing 280 mm. long, and the wings of those from Dutch New Guinea in Mr. Rothschild's Museum measure 320 to 330 mm. The bills differ in proportion. It seems to me, and I have no doubt that a large series with exact localities stated will prove beyond doubt, that the birds from the Western Papuan Islands form a well-marked subspecies, *C. triton macrolopha* Rosenb., and that the birds from Fergusson, Normanby, and Trobriand Islands are separable as another subspecies, to which the name *trobriandi* might be attached. E. H.

54. **Ninox goldiei** Gurney.

Fergusson. "Iris and feet yellow."

N. goldiei has been described from "S.E. New Guinea." Unfortunately many of Goldie's skins had no exact locality, though most of them were collected by Hunstein. The locality "S.E. New Guinea" may have been erroneous, as in the case of *Phonygama hunsteini* (vide supra). Mr. Meek has now sent a number of skins of this owl from Fergusson. Two of them I sent to Mr. J. H. Gurney, who kindly compared them with the three in the Norwich Museum, and who wrote: "I compared your two skins with the three at our Museum, with which they are clearly identical, but your pair are on the whole a trifle smaller than ours, and they certainly are a shade darker on the back." After measuring all Meek's specimens it is evident that they are *not* smaller than the types, one having the wings even longer than the types. The wings vary from 208 to 223 mm., the *males* being smaller. The shade of colour on the back differs in darkness. Mr. Sharpe has suggested that *N. terricolor* Rams. is identical with *N. goldiei*, but there is hardly a character in Ramsay's description (*Proc. Linn. Soc. N.S.W.* IV. p. 466) that is found in *N. goldiei*, which is also very much larger. Some of our birds have white spots on the wing-coverts, others not. The breast is more or less mixed with white, and of a more or less deep rufous colour. E. H.

55. **Astur etorques** (Salvad.).

Mr. Meek has most diligently collected a series of extremely interesting hawks on the several islands, and we must be very thankful for that, but the study of these specimens has proved to be very difficult, and took a long time. There are before me three *females* and one *male*, all adult, from Kiriwina, Trobriand Islands, which are all, undoubtedly, the same species; further one, probably adult, *male* and a young *female* in first plumage from Fergusson Island, and one not quite adult *female* from Woodlark Island. These latter I believe to belong to the same form, and I am of opinion that all these birds are *Astur etorques* (Salvad.). (See *Orn. Papuas.* I. p. 49, Addenda III. p. 508, etc.)

All the specimens from the Trobriands are evidently adult birds, two shot from their nests. All, except one, show indications of, or even well perceptible, though faint, cross-barrings on the abdomen, and a greyish wash on the chest.

The *females* have the wings 268, 270, and 251 mm., the latter evidently younger, being more barred and of a darker rufous colour below. All these *females* have distinctly barred under wing-coverts, one of them having the latter washed with a bluish grey, a kind of "bloom" of the latter colour being perceptible everywhere below. The *male* has only very faint indications of bars below, and hardly any on the under wing-coverts. Its wing measures 220 mm. The ground-colour of the under parts of all these is vinous rufous in different shades, some being darker, some paler

and more vinous. The throat in all is rather greyish vinous. The *male* from Fergusson differs from all these in being much paler below, perceptibly barred. Its wings are 215 mm. The young *female* from Fergusson is totally different. It is brown above, whitish below, cross-barred with brown, but longitudinally marked on throat and chest. Wing 260 mm. The *female* from Woodlark resembles those from Trobriand, but the ground-colour below is of a deeper rufous, the bars more distinct, the throat also with cross-markings. Wing 268 mm. The iris of all these specimens is described as yellow. The clutch is three eggs. They are of the form and structure of eggs of other species of *Astur* and *Circus*. They are of a bluish white, like goshawks' eggs, and unspotted. If held against the light they shine through dark bluish green. They measure 45·5 : 35·5, 45·5 : 35, 44 : 33·6, 45 : 35·5, 33 : 35 mm.

Specimens of *A. etorques* from New Guinea agree with the specimens above described.

Gurney separated a form of this bird from New Britain and New Ireland as *Urospizias dampieri* (cf. *Ibis*, 1882, pp. 126, 453). I have before me in the Tring Museum an unsexed bird, evidently a *male*, from New Ireland, and a young bird, perhaps a *female*. The *male* has the wing 201 mm. In colour it agrees with our specimens of *A. etorques*, except that the under wing-coverts are very light-coloured, and the inner wing-lining is not greyish, but of a pale whitish cinnamon. This pale cinnamon inner wing-lining is also obvious in the young bird. From these two specimens I should say that the New Ireland form, which would be *A. dampieri*, is very closely allied to *A. etorques*, but not the same. Perhaps it may be subspecifically distinct. (See A. B. Meyer, *Abh. und Ber. Mus. Dresden*, 1890-91, No. 4, p. 2; 1892-93, No. 3, p. 6.)

Astur griseigularis Gray from the Moluccas is very much like *A. etorques*, but the throat is pure cinereous grey, sharply separated from the vinous breast, etc., and there is a broad, though not sharply limited, band of vinous across the hind-neck.

I am not convinced as to the value of the genus *Urospizias*, but I hope that before long we shall be enlightened about the genera of the hawks—a difficult and, I am afraid, not very satisfactory chapter. E. H.

56. **Astur poliocephalus** (Gray).

Fergusson Island. "Iris hazel."

57. **Baza reinwardti** (Müll. & Schleg.).

Fergusson Island. "Iris yellow."

58. **Pandion haliaetus leucocephalus** Gould.

♂ ♀ shot from nest on Egum, July 25th. These two birds, shot from the nest, differ in the colour of the head, the ♀ having the top of the head quite white, the ♂ having a number of broad longitudinal deep brown spots, especially on the forehead. The wing of the ♂ is 41 cm., that of the ♀ 43·5. (See *antè*, p. 178.) The nest contained two eggs. They are similar to the less-spotted varieties of the European osprey, but one has a few hair-lines, which are extremely seldom seen in European osprey eggs. They are not large, measuring 60 : 43 and 58 : 43 mm. E. H.

59. **Haliastur indus girrenera** (Vieill.).

Fergusson Island. "Iris hazel." Typical *girrenera*, with pure white head. E. H.

60. **Milvus migrans affinis** (Gould).

Fergusson Island.

61. **Falco ernesti** Sharpe.

A large and very dark *female* was shot in Woodlark Island on August 3rd, 1895. "Iris dark hazel." (See *antea*, p. 18.) E. H.

62. **Carpophaga vanwycki** Cass.

Egum Islands. "Iris red." Wing 218—233 mm. E. H.

63. **Carpophaga salvadorii** Tristr.

Fergusson Island. (See Nov. Zool. II. p. 63.) E. H.

64. **Carpophaga zoeae** (Less.).

Fergusson Island. "Iris white; feet and legs red." The specimens from Fergusson are quite like specimens from Dutch New Guinea, Jobi, German New Guinea, and several places in British New Guinea. The metallic green line between the vinous hind-neck and the deep chestnut back is more or less distinct. Dr. A. B. Meyer (*Abh. und Ber. Mus. Dresden*, 1891, No. 2, p. 13) has separated a form from Kaiser-Wilhelmsland as *C. zoeae orientalis*, but I cannot see any differences between our birds from Kaiser-Wilhelmsland and those from the other parts mentioned above. The metallic green on the back is more or less developed in all; the chin is not more white in any of my Kaiser-Wilhelmsland specimens; some metallic greenish gloss is often visible on the breast-band, and not confined to skins from German New Guinea. Therefore the validity of Dr. Meyer's subspecies seems very improbable to me. E. H.

65. **Reinwardtoenas reinwardti griseotincta** Hartert.

♂. Fergusson Island. "Iris hazel." In coloration similar to skins from German and British New Guinea. Wing not measurable, because moulting. E. H.

66. **Caloenas nicobarica** (Linn.).

The Nicobar pigeon was found in the Trobriand and Egum Islands. "Iris bluish white."

67. **Ptilopus zonurus** Salvad.

Fergusson Island. "Iris light red." The sexes do not differ.

68. **Ptilopus strophium** Gould.

One ♂ from Egum, agreeing with specimens from S.E. New Guinea, but with the bill about 3 mm. longer. "Iris red." Salvadori, *Cat. B.* XXI. p. 135, gives the iris as "yellow" on the authority of "Ingham." E. H.

69. **Ptilopus superbus** (Temm.).

Kiriwina, Trobriands. "Iris yellow."

70. **Ptilopus lewisi vicinus** Hartert.

See Nov. Zool. II. pp. 62, 63, where I described this subspecies from Fergusson Island. In a later collection we received it also from Kiriwina, Trobriands.

E. H.

71. **Macropygia doreya cinereiceps** Tristr.

1 ♂ and 2 ♀ from Fergusson Island are termed as above with some hesitation. The *females* seem not to differ from the *females* of the allied forms, but the *male* is less distinctly barred on the breast than two *males* of *M. doreya* from Hatam, Arfak, and there is a little more grey on the crown and nape; but we have a *male*, evidently quite adult, from Ansus, May 6th, 1875, which has on its label, in Salvadori's handwriting, "*b. Macropygia doreya* var. *griseinucha* Salvad. *Typus. Bruijn.*" This bird does not differ from our Fergusson *male* except in a slightly more purplish hind-neck, a character which is changeable individually, and in having the breast slightly more distinctly barred, but nobody would think of describing this slight difference if they came from the same locality. This Ansus specimen is evidently specimen x. of Salvadori's list in *Orn. Papuasia* III. p. 155, where it is said that it belongs to *M. doreya*, not to *M. griseinucha*, which is said to be confined to Miosnom, though this "typus" is from Ansus! If this Ansus bird is true *M. doreya*, then my Trobriand bird is certainly scarcely even a subspecies of it. I strongly suspect that *M. cinereiceps*, *M. griseinucha*, and probably also *M. goldiei* will have to be classified as subspecies under *M. doreya*, if that.

E. H.

72. **Chalcophaps stephani** Rchb.

Fergusson Island. See Nov. Zool. II. p. 64.

73. **Chalcophaps chrysochlora** Gould.

Fergusson and Kiriwina, Trobriands. "Iris hazel." March 10th and April 18th, nests with two eggs each. In one clutch one egg is much more yellowish and measures 28·5 : 20·5 mm., while the other, whiter one, measures 29·3 : 21·6.

E. H.

74. **Porphyrio melanopterus** Bp.

Kiriwina, Trobriands, and Woodlark Island. "Iris red, hazel in young birds."

Sharpe, *Cat. B.* XXIII. p. 203, calls this species *Porph. smaragdinus* Temm., but this is, in my opinion, wrong. Temm., *Pl. Col.* 421, figures a bird with the thighs of a lighter blue than the abdomen, while in the species under discussion they are of a deeper colour. Temminck's bird has a deep bluish green back, and he describes it as having "le dos, les ailes et la queue, d'un bleu noirâtre à légère nuance verdâtre," but our bird has a black back. Moreover Temminck states that his species has been diagnosed by Horsfield under the name of *P. indicus*, and that it inhabits the lakes of the islands of Java and Banda. Now our bird does not live in Java, nor is it, as far as I can make out, recorded with certainty from Banda. It is said by Sharpe to live "throughout the Moluccas," and though this is probable, there are many of those islands where it has not yet been found. Therefore the name

P. smaragdinus cannot be used for our bird. The next oldest name in Sharpe's synonymy is *P. vitiensis* Peale. This applies to the Fiji form, and as that seems to differ, at least subspecifically, from our birds, it cannot be strictly applied to them, so that *P. melanopterus* Bp.,* or more likely *P. vitiensis melanopterus*, will in future be the proper nomenclature of this form. W. R.

75. **Esacus magnirostris** Geoff.

Woodlark Island.

76. **Squatarola helvetica** (L.).

Fergusson Island.

77. **Totanus hypoleucus** (L.).

Fergusson and Trobriands.

78. **Demiegretta sacra** (Gm.).

Kiriwina, Trobriand Islands, Woodlark Island. "Iris pale yellow."

79. **Tadorna radjah** (Garn.).

Fergusson Island. "Iris hazel."

80. **Megapodius macgillivrayi** Gray.

Kiriwina, Trobriand Islands, where these birds were common. "The iris is hazel." The pullus is brown below; throat and abdomen lighter, and tinged with rusty rufous. Dark brown above; interscapular region tinged with slaty olive, rump with deep rufous; secondaries, wing-coverts, and scapulars barred with light rusty brown.

The eggs vary somewhat in colour, some being more rufous, some paler, some more brownish, but pure white when the coloured upper surface is rubbed off or comes off through decay. Some regular ones and two smaller varieties measure 84 : 56, 93 : 55, 87·5 : 55, 95 : 55, 83 : 54·5, 89·6 : 51 mm. E. H.

81. **Micranous leucocapillus** (Gould).

Egum and Woodlark Islands.

82. **Sterna bergii** Licht.

Woodlark Island. Wing 350 mm.

83. **Sterna dougalli** Mont.

♂ ad. Woodlark Island, August 3rd. Wing 216 mm.

It may be useful for persons working with Mr. Saunders' key to the species of the genus *Sterna* (*Cat. B.* XXV. p. 41) to state that there must be a mistake in the line "*a'*. Size larger; wing never less than 9·5 in." In the description of *Sterna dougalli*, p. 73, the wing is given 9·25, though this species falls under *a'* in the key. In fact the wing of *Sterna dougalli* is not merely 9·25, as given (evidently from one skin) in the description, but about 8·3 to 9·5 in. It is a custom very convenient to the writer, and very much in use among the best ornithologists, to describe and measure one typical specimen; but this practice is most inconvenient for the student using their books. E. H.

We append lists of the species sent from each island. Forms described as new

* Temm. is not the author.

from Mr. Meek's collection are marked with an asterisk. Some in brackets and without numbers have been first discovered on the islands where they are now enumerated, but not sent from there by Mr. Meek.

FERGUSSON.

1. Corvus orru.
2. Gymnocorax senex.
3. Manucodia comrii.
4. Phonygama hunsteini.
5. Paradisea decora.
6. Calornis metallica.
7. Cracticus cassicus.
8. Pachycephala dubia.
9. P. fortis.
10. Chibia carbonaria.
11. Melilestes fergussonis (*).
12. Ptilotis spilogaster.
13. P. analoga.
14. Philemon novaeguineae subtuberosus (*).
15. Myzomela forbesi.
16. Dicaeum rubrocoronatum.
17. Anthreptes meeki (*).
18. Cinnyris christianae.
19. C. frenata.
20. Pseudogerygone conspicill.
21. Rhipidura setosa.
22. Monarcha melanopsis.
23. M. guttula.
24. M. chalybeocephalus.
25. M. aruensis.
26. Edoliosoma mülleri.
27. Lalage karu.
28. Pitta finschi (?).
29. Collocalia fuciphaga.
30. Podargus intermedius (*).
31. Eurystomus australis.
32. E. crassirostris.
33. Cacomantis insperatus.
34. Centropus nigricans.
35. Ceyx solitaria.
36. Alcedo ispidoides.
37. Alcyone lessoni.
38. Halcyon sanctus.
39. Syma torotoro.
40. Lorius hypoenochrous.
41. Cyclopsittacus virago (*).
42. Loriculus aurantiifrons meeki (*).
43. Nasiterna pusio (?).
44. Geoffroyus aruensis.
45. Eclectus pectoralis.
46. Cacatua triton trobriandi (?).
47. Ninox goldiei.
48. Astur etorques.
49. A. poliocephalus.
50. Baza reinwardti.
51. Haliastur indus girrenera.
52. Milvus migrans affinis.
53. Carpophaga salvadorii.
54. C. zoeae.
55. Reinwardtoenas reinwardti griseotincta.
56. Ptilopus zonurus.
57. P. lewisi vicinus (*).
58. Macropygia doreya cinereiceps.
59. Chalcophaps stephani.
60. Ch. chrysochlora.
61. Squatarola helvetica.
62. Totanus hypoleucus.
63. Tadorna radjah.

TROBRIANDS.

1. Manucodia comrii.
2. Calornis metallica.
3. Cracticus cassicus.
4. Pachyc. fortis trobriandi (*).
5. Cinnyris christianae.
6. Monarcha inornatus.
7. M. chalybeocephalus.
8. Collocalia fuciphaga.
9. C. esculenta.
10. Podargus intermedius.
11. Scythrops novaeholl.
12. Halcyon sanctus.
13. H. macleayi.
14. Lorius hypoenochrous.
15. Eclectus pectoralis. (Cacatua triton trobriandi.)
16. Astur etorques.
17. Caloenas nicobarica.
18. Ptilopus superbus.
19. P. lewisi vicinus.
20. Chalcophaps chrysochlora.
21. Porphyrio melanopterus.
22. Totanus hypoleucus.
23. Demiegretta sacra.
24. Megapodius macgillivrayi.

WOODLARK.

(Myzomela forbesi.)
1. M. chalybeocephalus.
2. Collocalia esculenta.
3. Lorius hypoenochrous.
4. Astur etorques.
5. Falco ernesti.
6. Porphyrio melanopterus.
7. Esacus magnirostris.
8. Demiegretta sacra.
9. Micranous leucocapillus.
10. Sterna bergii.
11. St. dougalli.

EGUM.

1. Halcyon saurophagus.
2. H. sordidus colonus (*).
3. Pandion haliaetus leucocephalus.
4. Carpophaga vanwycki.
5. Caloenas nicobarica.
6. Ptilopus strophium.
7. Micranous leucocapillus.

V.

ON SOME SPECIES IN A SMALL COLLECTION MADE ON THE OWEN STANLEY MOUNTAINS IN THE KAIARI AND ORIORI DISTRICTS BETWEEN MOUNTS ALEXANDER AND NISBET IN JANUARY 1896.

1. **Manucodia orientalis** Salvad.

I have received several *Manucodia* from S.E. New Guinea, which belong undoubtedly to *M. orientalis*. This form has recently (*Ann. Mus. Civ.* XXXVI. p. 103, 1896) been separated from *M. chalybeata*; but Dr. A. B. Meyer had already, on two occasions, noticed some differences between North-Western and South-Eastern *M. chalybeata*.

I am sorry to say I have no material of the true *M. chalybeata* worth speaking of, but have no doubt that *M. orientalis* is merely a subspecies of it. W. R.

2. **Astrarchia stephaniae** Finsch.

"Eye dark brown; bill deep brown; feet dark grey." Some shot 6000 feet high. "Live on fruits and insects." W. R.

3. **Epimachus meyeri** Finsch.

6500 and 6000 feet high. "Iris bright blue in both sexes; bill black; feet very dark grey." Native name "Dadai." In moult in January. W. R.

4. **Drepanornis albertisii cervinicauda** Scl.

In moult.

5. **Parotia lawesi** Rams.

Both sexes, some in moult. "Eye yellow, blue-black ball; feet and beak black." W. R.

6. **Phonygama purpureoviolacea** Meyer.

Partly moulting in January. The iris is described as "pink," and on another label as "dark yellow." W. R.

7. **Loria loriae** Salvad.

A magnificent *male* was procured on the "Sakeytanumu range, Kaiari district," 6900 feet high, on January 1st, 1896. The native name is given as "Kunukupaiva," the iris as brown, feet as dark green, bill as black. "Lives on fruit." This *male* agrees very well with De Vis' description, but less with the figure in the *Ibis*, which does not show the brilliant colours.

There is no doubt, I think now, that *L. loriae* and *Cnemophilus mariae* are identical. As Salvadori's name was published first, his name must stand. I also agree with him that Sclater's note in the *Ibis*, saying that the *females* of some allied species were very similar, was not justified, since, on the contrary, in several instances, we find the *females* to differ more obviously than the *males*.

As mentioned before (see *antea*, p. 13), I have a skin of this bird which came with other trade-skins, and, to judge from the preparation, must have come from some part of North-Western New Guinea. It has the wing slightly more greenish than the type (which Mr. Hartert examined when it was in England for being drawn for the *Ibis*), but it does not differ at all from the bird now received from the mountains of S.E. New Guinea. W. R.

8. **Amblyornis subalaris** Sharpe.

In moult. "Eye brown, black ball."

9. **Pomareopsis bruijni** (Salvad.).

We have now also received *females* of this rare bird, while formerly we had only *males*.

Antea, p. 14, I omitted to give my reasons for adopting the generic name *Pomareopsis*. It was done because I was not convinced that this bird is a true *Grallina*. The tarsus, which is very strongly scutellated in the Australian *Grallina*, is covered by one lamina, only showing some more or less indistinct divisions at the lower end. The wing is distinctly more pointed in *Grallina*. The feathering on the rump is fuller and richer in *Pomareopsis*. The sexes differ remarkably in the colour of the under parts. E. H.

10. **Peltops blainvillei** (Less. & Garn.).

A pair from Oriori. Mr. de Vis, in a "Report on Ornithological Collections" written in June 1894 (date of *publication* not exactly known to me), "proposes" to separate some birds he received from British New Guinea as *P. minor*. Salvadori, in an article in the *Ann. Mus. Civ. Genova*, Vol. XVI., of which he most kindly sent separate copies to his friends, says that he thinks specimens from S.E. New Guinea cannot be separated. The question is, whether De Vis' specimens belong to the same form as those of Salvadori? In reading De Vis' remarks it seems to me that he had immature birds, which he tried to separate from old ones, but that he did not compare birds from S.E. New Guinea with those from other parts of New Guinea. A curious fact is that De Vis says his birds are smaller than usual, while Salvadori's were larger! In fact our birds (we have several more from S.E. New Guinea) are also averaging a little *larger* than those from Dutch New Guinea, but some of the latter are just as large. De Vis' measurement of the wings is 92 mm., while our above-named old S.E. New Guinea specimens have the wing in the *male* 112, in the *female* 107 mm. The iris Anthony describes as "rose-colour"; bill and feet black. De Vis speaks of the "crimson of the back" being "more or less mixed with black-centred, white-edged feathers"; but the back in *P. blainvillei* is never crimson, but black, the rump and upper tail-coverts only being red above. Probably De Vis' expression was incorrect, for if his birds really had crimson *backs* he would have emphasised that fact, I should say. E. H.

11. **Microeca flavovirescens** Gray.

Oriori. In no way distinguishable from one collected by Guillemard in Jobi Island. E. H.

12. **Poecilodryas albifacies** Sharpe.

Oriori. ♀. "Iris dark grey; feet bright yellow." De Vis' *Monachella viridis* is undoubtedly this species. E. H.

13. **Monarcha periophthalmicus** Sharpe.

Oriori. The young bird, as already mentioned by Meyer, *Zeitschr. f. ges. Orn.* III. p. 15, has the occiput and nape longitudinally spotted with black. E. H.

14. **Arses henkei** A. B. Meyer.

Both sexes from Mount Victoria, Sogere, and Oriori. These birds are distinct enough from *A. teleoscophthalmus*, but I have none from Aru to compare, with which Sharpe and Salvadori formerly united the S.E. New Guinea bird that Meyer named *A. henkei*. (*Zeitschr. f. ges. Orn.* III. p. 16, pl. iii.) E. H.

15. **Ptilotis polygramma** (Gray).

Oriori district. Dr. A. B. Meyer, *Zeitschr. f. ges. Orn.* III. p. 24, speaks of some apparent differences of South-Eastern specimens from such of North-Western New Guinea. Salvadori declares he cannot find differences. I have no material for comparison at present. E. H.

16. **Ptilotis visi** Hartert.

Two from Oriori, confirming the notes of myself (*antea*, p. 75) and of Mr. Grant in the *Ibis*, 1896, p. 251. E. H.

17. **Lorius erythrothorax** Salvad.

One skin only, shot on January 16th in the Oriori district. It is marked ♀, and I believe it to be immature. The hind-neck is more green than blue, the feathers being green with deep blue edges; the feathers of the interscapulium are green with broad dark blood-red borders. A purplish blue band across the crop-region (often indicated in *L. erythrothorax*); the abdomen mixed purplish blue and green, the basal parts of the feathers being green. The under wing-coverts red, mixed with green and with a little blue. The tail, seen from above, is *green at base*, then red, the tip purplish blue; between the purplish blue tip and the red band is a green area, often confined to the inner webs. In Professor Mivart's wonderfully illustrated *Monograph of the Lories*, p. 52, the tail is described wrong, as he evidently forgot to look under the upper tail-coverts.

Dr. A. B. Meyer described a *L. salvadorii* from Astrolabe Bay, German New Guinea, which differs from *L. erythrothorax* in its blue under wing-coverts. I have one before me from Simbang, German New Guinea, collected by Capts. Webster and Cotton, which has the under wing-coverts blue, slightly intermixed with red! Another skin from the same place is a typical *L. erythrothorax*, but there are a few blue tips to the red under wing-coverts, a character also visible in a supposed skin of *L. erythrothorax* from an uncertain locality in the Tring Museum.

I have no doubt that *L. salvadorii*, and perhaps also *L. rubiensis*, will be no more than subspecies when more material has come to hand. E. H.

18. **Cyclopsitta suavissima** Scl.

"Iris dark brown."

19. **Trichoglossus massena** Bp.

"Iris yellow."

20. **Eos fuscata** Blyth.

A *male* and a *female*, February. The *male* is very red, the *female* in a transition from the yellow to the red phase. "Iris of both sexes yellow." Dr. A. B. Meyer has, in the *Zeitschr. f. d. ges. Orn.*, 1886, p. 6, separated the S.E. New Guinea form from

that inhabiting North-Western New Guinea, naming it *Eos incondita*. Salvadori, in the *Cat. B.*, has not recognised that form as distinct, and it seems to me impossible to maintain it, there being a great deal of variation in this species, even among individuals from the same countries. E. H.

21. **Psittacella madaraszi** Meyer.

One *male*, January, Oriori district, 3000 feet. "Iris pink." Wing 94 mm.

22. **Psittacella brehmi pallida** Meyer.

A *female* from Oriori is like *females* of *Ps. brehmi typica* from Arfak, but the throat and the sides of the head are paler and more greenish. (See *antea*, p. 18.) E. H.

23. **Microdynamis parva** (Salvad.).

An adult *male*, Oriori, January 20th, 1896. "Iris dark brown; feet dark grey; bill black." This is, I believe, the first adult *male* of this rare bird which reached England. E. H.

A FEW ADDITIONS TO FORMER NOTES.

By ERNST HARTERT.

1.

BY an unfortunate mistake I left out of the list of birds collected by Mr. Everett in South Celebes a most interesting species:—

Malia grata Schleg.

A series of this bird was collected on Bonthain Peak at elevations of about 6000 feet. However, it is not only that a new locality is added for this rare species, but I think that our specimens prove that *Malia recondita* Mey. & Wiglesw., described *Abh. und Ber. Mus. Dresden*, 1894-95, No. 4, p. 1, is no species. It was described without comparing the only known specimen from South Celebes, merely judging from the descriptions of Schlegel (*Not. Leyden Mus.* II. p. 165 and VI. p. 175). No doubt, I think, Schlegel had a moulting or somewhat imperfect specimen, or his description, and specially his measurements, are incorrect, for our South Celebes specimens agree exactly with the one described by Meyer & Wiglesworth as *M. recondita*.

The principal differences of *M. recondita* are said to be:—

(1) Tarsus shorter (46 mm.), with seven scutellae in front, while there are eleven scutellae in the type of *M. grata*. Our Bonthain specimens have from eight to only four or five distinct scutellae, the upper ones being entirely fused in some. I know several instances where the young bird has more scutellae than the old one, as they fuse with age. Therefore this is not a good character. My tarsus-measurements give me 42 to 46.

(2) Sixth primary longest, fifth and seventh equal and one millimetre shorter

than sixth, while in *M. grata* the fifth is longest, the sixth nearly as long as the fifth, the seventh 4·5 mm. shorter. In my specimens the fifth and sixth are equal, the seventh hardly 1 mm. shorter. A little aberration would soon alter this proportion.

(3) Bill 1 mm. longer from the forehead. My birds vary for 1 mm. in the length of their bills, besides that the bill-measurements of different ornithologists often vary for a millimetre, more so those from the angle of the mouth.

(4) Wing 3½ mm. longer. My wings measure 138 to 141 mm.

(5) Some slight differences in colour, which, taken from the comparison of the description of one *M. grata* and one specimen of the supposed *M. recondita*, I do not consider important.

I am glad to say Dr. A. B. Meyer has kindly informed me, *in litt.*, that he does not consider *M. recondita* different any more, and that we thus agree on this point.

The sexes do not differ, except very slightly in size. I cannot give the exact measurements, as my *females* have abraded wings and tails. Tarsus of *female* 3 to 4 mm. shorter.

2.

Of *Dicaeum splendidum* (see p. 167) specimens were also collected in Saleyer. The occurrence in Celebes is therefore much more probable. The list of Saleyer birds thus reaches No. 41.

3.

Ante, p. 18, a specimen of *Falco severus* Horsf. was mentioned without alluding to the fact that Meyer & Wiglesworth had separated the New Guinea form as *Falco severus papuanus* in *Abh. und Ber. Mus. Dresden*, 1892-93, No. 3, p. 6.

I have now, since I found that description, compared our New Guinea specimen with skins from Darjiling, Java, Mindoro, and one from Lotta in North Celebes (the latter in poor condition), and the only difference I can see is the more uniform and blacker colour of the central rectrices above in the New Guinea skin.

Those from Ceylon (one) and from Darjiling (one) are a little paler on the back and rump than the one from New Guinea, but the two from Mindoro and the one from Celebes are, except on the tail, equally black above. The one from Celebes has no central rectrices. A critical and detailed article on the local forms of *Falco severus* is promised by Dr. Meyer.

DESCRIPTION OF A NEW FINCH FROM THE WEST INDIES.

By ERNST HARTERT.

Melopyrrha taylori sp. nov.

Speciei *M. nigra* dictae similis sed major, ♂ nitore metallico minuto. Long. tot. cr. 145; al. 70—72 (*M. nigra*, 64—66); caud. 65—68 (*M. nigra*, 53—54); culm. 14—15 (*M. nigra*, 12); tars. 17—18 mm.

Hab. Grand Cayman.

This species resembles *M. nigra* of Cuba, but is decidedly larger, and has much less of the metallic bluish green steel-gloss of *M. nigra*. A fine series was collected on Grand Cayman by Mr. C. B. Taylor of Jamaica, to whom I dedicate this species. Cory and others have already recorded this bird from Cayman, and it is to be wondered that they did not separate it from the Cuba form, as they described some species from Cayman which are hardly more distinct than this, and as our American friends cannot, as a rule, be blamed with "lumping." The adult *female* is strongly washed with brownish grey and without gloss. Young birds of both sexes are ashy brown. I do not think the genus *Melopyrrha* can be upheld, but I use it for the present, without being able to go critically into the question.

DESCRIPTION OF A NEW *CYANOPS* FROM NORTH CACHAR.

By E. C. STUART BAKER, F.Z.S.

MANY years ago, when writing an article on certain of the barbets to the Bengal sporting paper the *Asian*, I drew attention to the fact that certain birds of this genus in North Cachar were coloured very remarkably. At that time I considered these birds to be merely abnormally coloured specimens of *C. asiatica*, but a further study of the subject and a better knowledge of their distribution have convinced me that these birds belong to a separate species. I propose to name this barbet **Cyanops rubescens**, its principal characteristic being the predominance of red tints in its plumage.

Description of the type-specimen: Nasal feathers black; forehead crimson, a narrow vertical line dull golden yellow, succeeded by another line of black, which extends on either side down the sides of the occiput, gradually widening as it reaches the nape; whole nape and hind crown crimson, *changing gradually into the colour of the back*; supercilium, lores, ear-coverts, chin, and throat blue, as in *C. asiatica*; a small crimson speck at the gape; upper back, scapulars, and inner secondaries grass-green, broadly margined with dark bright maroon-red; remainder of wing coloured like that of *C. asiatica*; lower back and rump brighter grass-green; upper tail-

coverts the same, bordered with maroon; tail, upper surface green, lower aspect blue. A large crimson patch below the blue of the throat, not clearly defined but encroaching on the breast; remainder of lower surface bright yellowish grass-green—far more tinged with yellow and of a much brighter tint than are the same parts in *C. asiatica*—much smeared and splashed with brilliant scarlet crimson, particularly so on the breast and under tail-coverts. Bill greenish yellow, base of maxilla and basal half of culmen almost black; gonys darker green; irides dark brown; orbital skin dull orange; legs dull dirty green, claws almost black.

Length about 8.″5; wing 3.″75—3.″85; tail 2.″5; bill from gape 1.″24. In addition to the differences in coloration, this bird seems to be decidedly smaller than *C. asiatica*, with a proportionately longer bill.

I give comparative measurements of my proposed *C. rubescens* and four *C. asiatica* taken from the same district :—

	C. rubescens.	*C. asiatica.*				Average.
		1.	2.	3.	4.	
Culmen along curve .	1.″1	0.″90	0.″96	0.″95	0.″91	0.″93
Ditto straight . .	0.″95	0.″79	0.″88	0.″86	0.″8	0.″84
Commissure from gape	1.″27	1.″16	1.″16	1.″27	1.″19	1.″21
Wing	3.″78	4.″2	4.″2	4.″15	4.″	4.″14
Tail	2.″5	2.″87	3.″26	2.″96	2.″86	2.″99

This species seems to be confined to the very highest ranges in the east of the Cachar hills, not descending below 3500 feet, below which it is replaced by *C. asiatica*.

In the *Asian* I mentioned the fact that I had obtained specimens intermediate between *C. asiatica* and *C. rubescens*, but further investigation has shown me that such are merely young birds of the latter species, and I have no *fully* adult birds which are not easily assignable to the one or the other. Moreover the habitat of the species is different. *C. asiatica* does not ascend above 4000 feet, and is not often found much over 3000; whereas *C. rubescens* is a bird of lofty elevation, seldom occurring below 4000, and never, I believe, below 3500 feet.

Blanford (*Fauna of B. I. Birds*, Vol. III.) says: "Males from the Cachar hills are said to have the mantle-feathers and upper tail-coverts tipped with maroon, and the under tail-coverts splashed with vermilion." I wrote to him about this, and in the answer which he kindly sent to me he says that his remark was made on the strength of what I wrote in my article in the *Asian* above referred to.

The type-specimen of this species is now in the Hon. W. Rothschild's Museum at Tring.

DESCRIPTION D'UNE NOUVELLE ESPÈCE DE LA FAMILLE DES *TROCHILIDAE*.

Par E. SIMON.

Thalurania balzani sp. nov.

A *T. nigrofasciata* Gould, cui valde affinis et subsimilis est, tantum differt magnitudine minore, capite supra obscure cupreo-viridi minus nigricanti, corpore subtus parte viridi haud nigro-cincta, parte cyanea distinctius violaceo-tincta et imprimis *subcaudalibus omnino albis*.

Le *Thalurania balzani* E. Sim., très voisin du *T. nigrofasciata* Gould, s'en distingue à première vue, comme de tous les autres *Thalurania*, par ses sous-caudales entièrement blanches.

Le dessous du corps est analogue à celui de *T. nigrofasciata*, si ce n' est que la partie verte, arrondie en arrière, est un peu moins prolongée sur la poitrine et non entourée d'une bande noire et que la partie bleue est plus fortement teintée de violet quelle ne l'est généralement (mais non toujours) dans l'autre espèce.

En dessus les plumes de la tête sont d'un vert cuivreux sombre, moins noirâtre. Le dessus du corps et la queue sont semblables dans les deux espèces; les rectrices externes de *T. balzani* sont peut-être un peu plus étroites que celles de *T. nigrofasciata*; le bec est relativement un peu plus long et la taille de l'oiseau un peu plus faible.

Trois specimens (deux dans ma collection, le troisième dans celle de Mr. Rothschild à Tring) m'ont été envoyés des Yungas de Bolivie, par M. le Dr. Balzan, professeur à l'université d' Asuncion.

J'ai pensé un instant que ce *Thalurania* pouvait être le *T. jelskii* Tacz., découvert à Soriano (Pérou) par Jelski, mais la description de Taczanowski indique plusieurs différences: on y lit en effet,* "gorge jusqu'à l'épigastre squamuleuse d'un vert clair sans reflet jaunâtre propre à l'oiseau précédent" (*T. nigrofasciata*); et plus loin, "sous-caudales d'un noir bleuâtre bordées de blanc"; tandis que chez *T. balzani* le vert de la gorge est le même que celui de *T. nigrofasciata* et que les sous-caudales sont entièrement blanches.

D' autre part Elliot, qui à pu étudier le type du *T. jelskii* Tacz., dit que cet oiseau ne diffère absolument de *T. nigrofasciata* que par la taille un peu moindre,† sans tenir compte du caractère des sous-caudales indiqué par Taczanowski.‡

* *Ornithologie du Pérou*, p. 295.

† Voici au reste ce qu'en dit Elliot dans son *Synopsis*, p. 101: "This (*T. jelskii*) is a diminutive of the *T. nigrofasciata*; and there is absolutely no difference between the two except in size. I compared the type with specimens of *nigrofasciata*, and could distinguish no difference, save that the *T. jelskii* was a little smaller."

‡ D'après Taczanowski le *T. jelskii* differerait surtout du *nigrofasciata* par ses sous-caudales noires et frangées de blanc, tandis que dans l'autre espèce elles sont entièrement noires.

ON THE EXTINCT BIRDS OF THE CHATHAM ISLANDS.

Part II.—THE OSTEOLOGY OF *PALAEOLIMNAS CHATHAMENSIS* AND *NESOLIMNAS* (Gen. Nov.) *DIEFFENBACHII*.

By C. W. ANDREWS, F.G.S.

(Plates IX. and X.)

SINCE the publication of the first part of this paper (*antea*, pp. 73-84), dealing with the osteology of *Diaphorapteryx hawkinsi*, there has appeared a memoir by Professor A. Milne-Edwards,* containing descriptions both of that bird and also of *Palaeolimnas* (*Fulica*) *chathamensis* Forbes, a large extinct coot. As the title implies, questions of geographical distribution are largely dealt with, but the structure and affinities of the two species just named are also considered in some detail, and numerous figures of various portions of their skeletons are given. Unfortunately the material at the author's command was far from perfect, and in one instance a serious error has resulted, the pelvis figured (Pl. XI., fig. 7, and Pl. XII., figs. 1, 2) as that of *Diaphorapteryx* being quite unlike it, but, judging from the figures, belonging to some Anserine bird. The actual pelvis of *Diaphorapteryx* is shown in figs. 1, 2, and 3 of Pl. IX. of the present paper.

On the question of the geographical distribution of these flightless birds Professor Milne-Edwards arrives at different conclusions from those expressed in Part I. He apparently regards such forms as capable of supplying evidence as to the former distribution of land and water as valuable as that derivable from mammals and batrachians, and considers that the presence of similar types of such birds on two land-areas remote from one another implies a former land-connection between them. From this point of view, however, it seems that a sharp distinction should be drawn between birds which, except for the reduction of their wings and sternum, are true *Carinatae*, and are easily referable to their systematic position in that group, such as *Didus* and *Cnemiornis*, and those flightless forms included in the *Ratitae*, which, leaving entirely out of account their wing-reduction, present numerous primitive characters which render it, at least, highly probable that they reached their present degenerate condition a very long while ago. Only the latter of these two divisions appears to be of value in questions of ancient geography, since, as already pointed out, the presence of members of the former class on islands is capable of explanation without the aid of land-connections. Thus, if any close affinity is proved to exist between the *Aepyornithidae*, *Casuariidae*, and *Dinornithidae*, it might be regarded as strong evidence that the lands they now inhabit were once united; while, on the other hand, in the case of the existence of such similar forms as *Aphanapteryx* and *Diaphorapteryx*, in Mauritius and the Chatham Islands respectively, we are probably dealing with parallel modifications of recent date.

* "Sur les Ressemblances qui existent entre la Faune des Îles Mascareignes et celle de certaines Îles de l'Ocean Pacifique Australe," *Annales des Sciences Naturelles* (Zoology), Ser. VIII., Tom. II. (1896), p. 117, Pls. XI.—XV.

EXPLANATION OF PLATES IX. AND X.

Plate IX.

Diaphorapteryx hawkinsi.

Figure 1. Pelvis from side.
„ 2. „ „ below.
„ 3. „ „ above.

Palaeolimnas chathamensis.

Figure 4. Skull from above.
„ 5. „ and mandible from side.
6. „ from above (specimen in which the supra-orbital depressions are only slightly marked).
7. Pelvis from above.
„ 8. „ from side.
„ 9. Coracoid anterior surface.
„ 10. „ posterior surface.
(All the figures three-fourths natural size.)

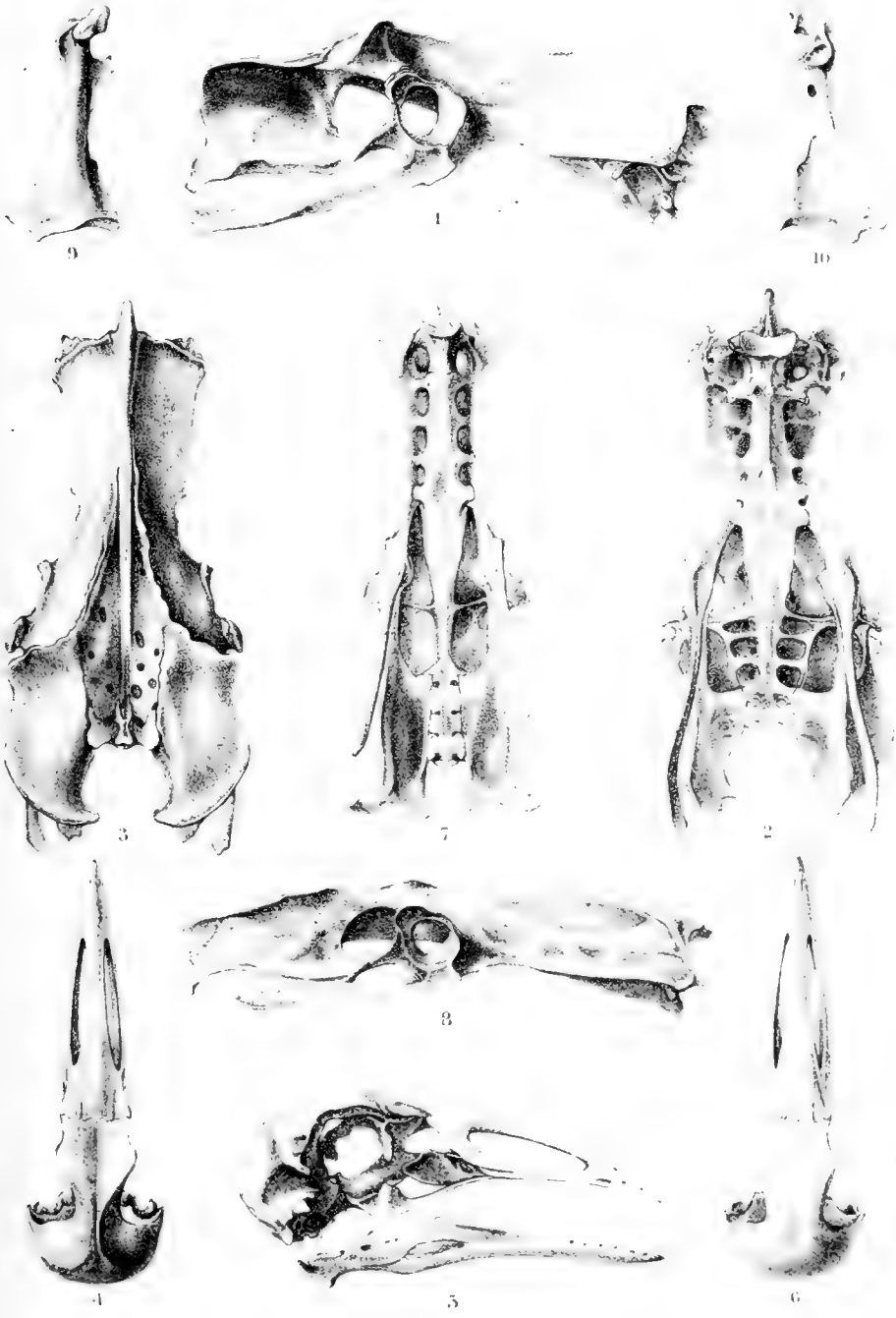
Plate X.

Palaeolimnas chathamensis.

Figure 1. Sternum from side.
„ 2. „ from below.
(Three-fourths natural size.)

Nesolimnas dieffenbachii.

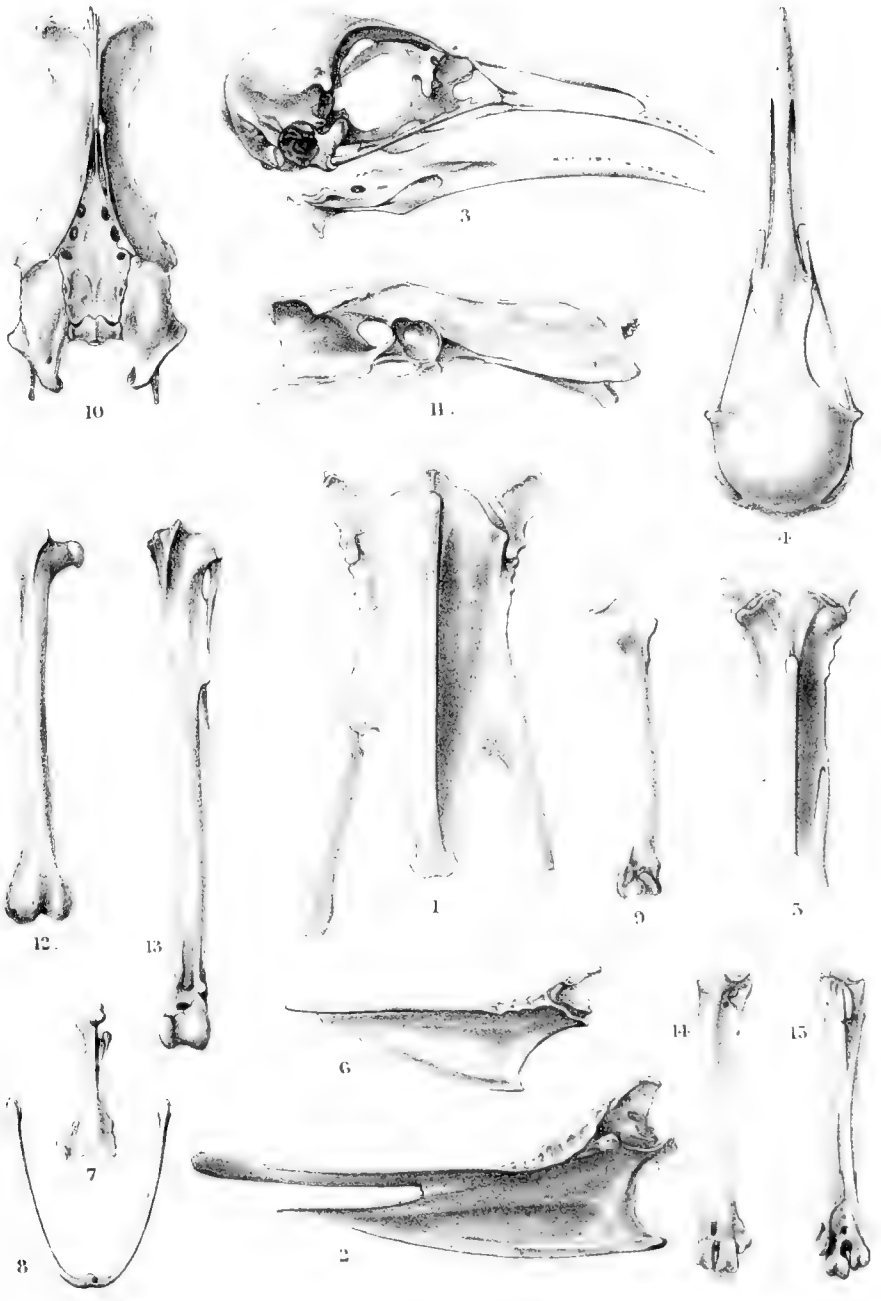
Figure 3. Skull from side.
„ 4. „ from above.
„ 5. Sternum from below.
„ 6. „ from side.
„ 7. Coracoid from front.
„ 8. Furculum.
„ 9. Humerus.
„ 10. Pelvis from above.
„ 11. „ from side.
„ 12. Femur from front.
„ 13. Tibio-tarsus from front.
„ 14. Tarso-metatarsus from front.
„ 15. „ „ from behind.
(Natural size.)



J.Green del et lith.

Figs. 1–3. DIAPHOLAPTES [illegible]

Figs. 4–10. SALAEOLINNA [illegible]



J. Green del et lith.

Figs. 1-2. PALAEOLIMNAS CHATHAMENSIS. ½ Natural Size.
Figs. 3-15. NESOLIMNAS DIEFFENBACHII. Natural Size.

OSTEOLOGY OF *PALAEOLIMNAS CHATHAMENSIS* FORBES.

In the large collection of fossil bird-remains from the Chatham Islands at the Tring Museum bones of a large coot are very numerous. The credit of first drawing attention to this extinct form is due to Dr. H. O. Forbes,* by whom it was regarded as indistinguishable from *Fulica newtoni* of Mauritius. The same author also recorded † the presence in these deposits of a second larger form, to which he gave the name *Fulica chathamensis*. Subsequently he pointed out a number of cranial characters distinguishing these fossils from recent species of *Fulica*, and he therefore established a new genus, *Palaeolimnas*,‡ for their reception. Milne-Edwards, in the memoir above mentioned, accepts this generic separation of the Chatham Island coots, but considers that there is only one species, the differences in size being merely due to individual variation, a conclusion fully confirmed by examination of the very large series of specimens at Tring. The same author has also pointed out a number of characters by which the Chatham Island bird is distinguished from *F. newtoni*, and Forbes' second name, *Palaeolimnas chathamensis*, is therefore adopted.§

Although many portions of the skeleton of this bird have already been figured and described by Milne-Edwards, it does not seem necessary for that reason to omit all account of such an interesting form from the present paper, especially since the opportunity of examining a nearly perfect individual skeleton will enable me to supplement the previous description to a considerable extent.

The skull (Pl. IX., figs. 4, 5, 6).—The skull of *Palaeolimnas* is on the whole extremely similar to that of recent species of *Fulica*, the chief differences pointed out by Forbes and Milne-Edwards being—(1) the great antero-posterior curvature of its upper surface; (2) the large size of the supraorbital impressions; (3) the inflation of the frontal region. Apart from these main differences, there are, however, a number of less obvious ones, some of which may now be referred to. In *Palaeolimnas* the occipital surface is considerably wider, and, owing to the greater development of the lambdoidal ridge, is better defined than in *Fulica atra* or *F. cristata*. Moreover the paroccipital processes are larger, and there is a well-marked supra-foraminal ridge; on the other hand, the occipital crest is less developed than in the recent forms, and the *foramen magnum* is wider in proportion to its height. Looking at the skull from above (fig. 4), it will be seen that the convexities in the parietal region caused by the cerebral hemispheres are considerably less prominent than in *Fulica atra*; but the most remarkable feature is the bevelling away of the orbital margins, apparently caused by the large size of the supraorbital glands. As Milne-Edwards has stated, the two impressions meet in the median line between the orbits like the sides of a roof. In many instances the actual crest of the ridge has a narrow groove running along it and extending to the anterior end of the frontals; this is apparently the remnant of the frontal suture. Although this arrangement seems to be the usual one, there is a very considerable range of variation in the degree of development of the glandular impressions, and if the extremes of the series only were known, the different types of skull might well be referred to distinct

* *Nature*, Vol. XLVI. (1892), p. 252.

† *Loc. cit.*

‡ *Ibis* (1893), p. 544.

§ Remains of a large extinct coot, nearly equal in size to the present species, have been discovered by Hamilton in a fissure in the limestone at Castle Rocks, Southland, New Zealand. This species (*Fulica prisca* Hamilton) is probably identical with, or very similar to the present form.

species. A skull in which the impressions are feebly developed and separated in the middle line by a considerable interval is shown on Pl. IX., fig. 6.

In *Fulica cristata* there is scarcely a trace of these supraorbital impressions, and the interorbital region of the frontals is concave from side to side; in *F. atra*, on the other hand, the margins of the orbits are distinctly bevelled off, and the interorbital portion of the frontals is thereby narrowed. In both these birds the frontals are somewhat inflated and filled with fine diploë, but to the greatest extent in *F. atra*, which, both in this respect and in the bevelling away of the margins of the orbits, comes midway between *F. cristata* and *Palaeolimnas*.

In the view of the skull from the side (fig. 5) it will be seen that the temporal fossa is both larger and more sharply defined than in *Fulica*, and the postorbital processes are also better developed. The curvature and depth of the frontal bones which results from the thickening and lateral compression they have undergone is also well shown. The interorbital septum is precisely like that of *Fulica*.

The beak is identical in structure with that of the recent coots, but seems to have been directed somewhat more downwards; its upper surface near the junction with the frontals is roughened, as if for the attachment of the base of the frontal shield.

Seen from below the skull differs from that of *Fulica* in the form of the basi-temporal platform, which is here slightly concave from side to side, instead of being flat, or even a little convex. In the palate the only differences observable are that the maxillo-palatine plates are relatively rather larger, and for a short distance are in contact below the vomer.

The mandible (fig. 5) closely resembles that of the common coot, but the posterior angular process is a little more prominent, and the upper surface of the internal angular process bears a larger pneumatic foramen.

The dimensions of the skull and mandible are :—

	Palaeolimnas.		*Fulica atra.*	*F. cristata.*
	A.	B.		
Total length of skull *	77	77	65 mm.	62 mm.
Length of beak	51	51	38 ,,	36 ,,
Length of narial opening	25	25	18 ,,	18 ,,
Width at paroccipital processes	23	22	18 ,,	20 ,,
Width at postorbital processes	28	29	24 ,,	25 ,,
Width of interorbital region of frontals	9	11	8 ,,	10 ,,
Total length of mandible	73	—	59 ,,	55 ,,
Length of mandibular symphysis	10	—	10 ,,	8 ,,

Only twelve cervical vertebrae (with fused ribs) are preserved in the skeleton here described, but two, probably the eighth and ninth, seem to be wanting, bringing the total up to fourteen, as in most specimens of *Fulica*; and except that the ridges and processes are better developed in *Palaeolimnas*, there is no important difference to be noted between the vertebrae in the two genera. The dorsal region in the present specimen is also imperfect: probably it consisted of a single cervico-dorsal and seven free dorsals. The length of the centrum in one of the anterior dorsals is 10 mm., in one farther back 12 mm.

The ribs are relatively much thicker than in *Fulica*. The *sternum* (Pl. X., figs. 1 and 2) is on the whole very similar to that of *Fulica atra*, but differs from it in several particulars; for example, the *spina externa* is rather broader and more

* Taken from the occipital condyle to the tip of the beak. Specimen A is that belonging to the complete skeleton, and is figured on Pl. IX., figs. 4 and 5. Specimen B is figured Pl. IX., fig. 6.

prominent, and the antero-lateral processes are relatively larger. Moreover the keel has undergone considerable reduction, its height being to the length of the sternum in the middle line as 15 to 100, while in *F. atra* and *F. cristata* the proportions are as 25 and 23 to 100 respectively. The inferior border of the keel is straighter, and, in some specimens, it dies away somewhat farther in front of the posterior extremity of the sternum than in the recent forms. The xiphoid processes are rather broader and the lateral notches are frequently unsymmetrical.

From the sternum of *F. newtoni* as figured by Newton & Gadow * our specimen differs in (1) its undivided prominent *spina externa* with a sharp ventral ridge (as in *F. atra*); (2) in the greater reduction of the keel. On the other hand, in the straightness of the lower edge of the keel the two resemble one another.

In the specimen figured there are five pairs of articulations for sternal ribs, but in others there are six, the small additional pair being anterior to the others, on the side of the antero-lateral processes. The coracoid grooves are a little more widely separated from one another than in *F. atra*.

In the following table the dimensions (in millimetres) of three sterna of *Palaeolimnas*, together with those of *Fulica atra* and *F. cristata*, are given :—

	Palaeolimnas.			*F. atra.*	*F. cristata.*
	A.	B.	C.		
Width between the ends of the antero-lateral processes	43	41	43	31	31
Width at narrowest point	27	29	27	21	20
Extreme length (from *spina externa* to end of xiphoid process)	93	84 (?)	87 (?)	75	75
Length in middle line (*spina externa* included)	80	77	78	67	65
Height of keel	12	15	13	17	15

Specimen A is the one figured on Pl. X., figs. 1 and 2. It will be seen that although in most of its dimensions it is the largest of the three, its keel is the least developed.

The *coracoid* (Pl. IX., figs. 9, 10) differs from that of *F. atra* in possessing a stouter shaft and a more prominent hyosternal process (*processus lateralis*); the clavicular process also is relatively rather larger. The dimensions of the figured specimen are: length, 48 mm.; width of lower extremity, 22 mm.

The *scapula* is wider in the blade than in *F. atra*, but is otherwise similar. The dimensions of the scapula associated with the figured coracoid are: length, 78 mm.; width of proximal end, 13 mm.; width at the middle of the blade, 6 mm. In a scapula of *F. atra* the corresponding measurements are 60, 11, and 3·5 mm.; and in one of *F. cristata* 64, 11, and 4.

As far as one can judge from the disarticulated bones, the coraco-scapular angle was about the same as in *Fulica*.

The *furculum* is closely similar to that of *F. cristata*, but the arms are somewhat thicker in proportion to their length, a somewhat remarkable point, since reduction in this part of the skeleton usually accompanies a decrease in the power of flight. The extreme length of each clavicle is 49 mm.

The *humerus*, and indeed the whole of the wing-bones, are considerably

* "On Additional Bones of the Dodo and other Extinct Birds of Mauritius," *Trans. Zool. Soc.*, Vol. XIII., p. 292, Pl. XXXV., figs. 5-7.

shorter in proportion to the bulk of the body than in recent coots, although in other respects they closely resemble the corresponding bones of those birds. Professor Milne-Edwards has pointed out that the humerus differs from that of recent species of *Fulica* in possessing a much larger and, especially, wider subtrochanteric fossa, a longer pectoral crest, and a more prominent inner trochanter. It may be added that the shaft of the bone is stouter in proportion to its length, the bicipital surface (*intumescentia processus medialis humeri* of Fürbringer) smaller and less prominent, the median epicondyle larger, and the surface for the *brachialis anticus* deeper than in the humerus of recent coots. To the corresponding bone of *F. newtoni* there seems to be greater likeness; but in that species also, the subtrochanteric fossa, and in fact the whole upper end of the bone, appear to be relatively narrower. The surface for the insertion of the *pectoralis major* is deep and rough, and that muscle must have been a very powerful one.

The *radius* and *ulna* differ from those of *Fulica* merely in being considerably thicker in proportion to their length.

The *metacarpus* is also much stouter than in the recent forms, and the various grooves and tubercles for the passage or insertion of tendons are more strongly marked.

The dimensions of the wing-bones in the skeleton described are :—

	Palaeolimnas.	*F. atra.*	*F. cristata.*
Humerus :			
Length	95 mm.	80 mm.	78 mm.
Width of upper end	20 „	15 „	16 „
„ lower end	14 „	11 „	11 „
„ middle of shaft	7 „	5 „	5 „
Radius :			
Length	74 „	67 „	61 „
Ulna :			
Length	80 „	71 „	66 „
Metacarpus :			
Length	51 „	42 „	42 „
Width of upper end	11 „	8 „	9 „
„ middle of second metacarpal	4·5 „	3·5 „	3 „

The *pelvis* (Pl. IX., figs. 7 and 8) differs from that of *Fulica* in unimportant details only. As in that genus, the pre- and post-acetabular regions are of nearly equal length, and the pre-acetabular portions of the ilia join the crests of the neural spines of the " sacral " vertebrae for a short distance anteriorly and posteriorly only, while in the middle they are narrowed and leave the ileo-neural canal open. According to Milne-Edwards, the anterior iliac fossae are larger than in *Fulica newtoni*. The post-acetabular ilia, together with the sacral vertebrae, form a pelvic escutcheon closely similar to that seen in *F. atra*, but according to Milne-Edwards relatively more extensive than in *F. newtoni*. In the great prominence of the processes overhanging the ischio-femoral surface there is a great likeness to the pelvis of *F. cristata*, but the ilia do not narrow so abruptly behind these processes as in that species. Posteriorly the ilia extend farther beyond the last fused caudal than in *F. atra*; in this region their inner borders are straight and nearly parallel to one another, and the space between them is very narrow. The ischiadic foramen is relatively larger, more oval, and its long axis directed more obliquely downward and backward than in *F. newtoni* and the other species examined. Posteriorly the ischium bears a long outwardly directed process, the distal end of which doubtless touched the pubis, but in all the specimens that element is imperfect. The

pectineal tubercle is short and blunt; immediately anterior to it is a very well marked depression in the ilium.

In the specimen figured the most anterior of the fused vertebrae constituting the sacrum bears a capitular facet for a fused rib. Behind this are four vertebrae which unite with the ilium by their broad parapophyses. Immediately behind the acetabulum is a single pair of sacral ribs, forming a thin buttress-like division between the anterior and posterior renal fossae. The latter, as in other rails, is continued backward as a deep pocket-like depression, floored by the ilia, which are here supported by four caudal vertebrae with very wide transverse processes.

The dimensions of the pelvis in millimetres are :—

	Palaeolimnas.		*F. newtoni.*	*F. cristata.*	*F. atra.*
	A.	B.			
Extreme length of the ilium	109	110	90	78	76
Width at antitrochanters	37	35	29	26	25
Least pre-acetabular width (at middle of iliac fossae)	16	16	13	11	13
Length of sacrum	92	100	84 (?)	71	69

Specimen A is that figured in the present paper, specimen B that figured by Milne-Edwards. The pelvis of *F. cristata*, measured by Milne-Edwards, was somewhat larger than the specimen of which the dimensions are now given, its length being 84 mm.

The *femur* is very like those of the recent coots, and perhaps most nearly resembles that of *Fulica cristata*. From the corresponding bone of *F. newtoni* it differs, as far as one can judge from the figure, in the smaller size of the trochanter, which rises less above the head. Moreover its shaft seems to be somewhat stouter in proportion to its length.

The *tibio-tarsus* differs from that of *F. newtoni* in size and also in the greater stoutness of its shaft, but in general structure it is very similar both to it and to the tibiae of recent coots.

The *tarso-metatarsus* is also typically Fulicine, and when compared with those of *F. atra* and *F. cristata* is found to differ only in unimportant details, *e.g.* its shaft is rather thicker in proportion to its length, and the depression in the upper portion of its anterior face is somewhat deeper and extends farther down the shaft; in *F. newtoni* this bone is considerably more slender. The intermuscular ridges and the grooves for tendons are strongly marked, and in all the specimens I have examined the articular impression for the hind-toe is distinct, and although, as the measurements given below show, this digit is rather shorter than in the recent coots, it is by no means rudimentary. The other digits, as in *Fulica*, are very long and slender.

The dimensions of the bones of the hind-limb are :—

	Palaeolimnas.	*F. atra.*	*F. cristata.*
Femur :			
Length	85 mm.	59 mm.	63 mm.
Width of upper end	20 „	12 „	13 „
„ lower end	19 „	11·5 „	13 „
„ middle of shaft	8 „	5 „	5·5 „
Tibio-tarsus :			
Length	164 „	108 „	111 „
Width of upper end	17 „	10 „	11 „
„ lower end	16 „	10 „	11 „
„ shaft	9 „	5 „	6 „

	Palaeolimnas.	*F. atra.*	*F. cristata.*
Metatarsus:			
Length	96 mm.	62 mm.	67 mm.
Width of upper end	16 „	10 „	12 „
„ lower end	17 „	11 „	12 „
„ shaft	8 „	4·5 „	5 „
Length of hallux	50 „	38·5 „	40 „
„ 2nd digit	100 „	68 „	72 „
„ 3rd „	130 „	87 „	95 „
„ 4th „	110 „	74 „	77 „

In the case of *Palaeolimnas* all these measurements are taken from the nearly complete skeleton. Examination of a number of isolated bones shows that a considerable range of variation in size occurs. In the case of the femur the average length of twelve specimens was 84, the maximum being 91, the minimum 80; the average of twelve tibiae 162, maximum 169, minimum 155; average of thirty metatarsi 91·3 mm., maximum 99, minimum 85. If the length of the tibiae be taken as 100, the lengths of the femur and metatarsus will be approximately represented by 52 and 58·5 respectively.

The hallux, as already mentioned, is somewhat reduced; the degree to which this reduction has taken place may be roughly estimated by taking the length of the metatarsus as 100, and representing the length of the hallux as a percentage of it. If this is done, the hind-toe of *Palaeolimnas* will be 52, that of *F. atra* 62, and that of *F. cristata* 60 nearly.

If the sum of the lengths of the bones of the leg be taken as 100, then the sum of the lengths of the humerus, radius, and metacarpus will be about 64. In *F. atra* the wing is very considerably longer in proportion to the leg, being represented by 82. Of course these proportions cannot be taken as giving any exact measure of the flying power, since the length of the leg may have increased without a proportionate addition to the bulk of the body, and indeed, taking into account the considerable size of the sternal keel and the deep impression of the insertion of the *pectoralis major* on the crest of the humerus, it seems probable that *Palaeolimnas* may still have been capable of heavy flight for short distances.

OSTEOLOGY OF *NESOLIMNAS* (GEN. NOV.) *DIEFFENBACHII* (GRAY).

During a visit to the Chatham Islands about 1840 Dr. Dieffenbach obtained a single specimen of a flightless rail, which was afterwards described by J. E. Gray* under the name *Rallus dieffenbachii*. The same writer afterwards referred this bird to the genus *Ocydromus*, and by Bonaparte it was included in *Hypotaenidia*, a position which Gray himself subsequently adopted for it.

In 1872 Hutton† gave an account of another flightless rail of smaller size, also peculiar to the Chatham Islands. This he first called *Rallus modestus*, but afterwards‡ established a new genus, *Cabalus*, for its reception. This species has been regarded by some writers as the young of Dieffenbach's bird; but, as Hutton showed in the paper cited below, this could not be the case. His opinion having been endorsed by several writers, including Salvadori, Forbes, and Murie, this view has now been abandoned. This being the case, it becomes necessary to consider the

* Dieffenbach's *Travels in New Zealand*, II. Appendix, p. 197 (1843).
† *Ibis*, p. 247 (1872).
‡ *Trans. N. Z. Instit.* Vol. VI. p. 108 (1872).

systematic position of *Rallus dieffenbachii*. In the first place, it is clear that it can only be referred to *Rallus* in the wide Linnaean sense of that term; and, in the second, it is clearly not congeneric with *Cabalus modestus*, since the two are widely different in many characters, both external and internal. The chief of these differences are—(1) the whole plumage of *C. modestus* is much looser than in *R. dieffenbachii*, owing to the almost complete absence of barbules; (2) the beak is relatively much longer and more slender in the smaller bird, and is less sharply decurved at the extremity; (3) the sternum in *Cabalus modestus* is very much more reduced, the keel being almost obsolete, while in Dieffenbach's rail it is fairly well developed. The general form of the bone is also different in the two species.

Hutton and Buller have both pointed out that, in the general style and colouring of the plumage, *R. dieffenbachii* is somewhat similar to *Hypotaenidia*, but the difference in the form of the beak, in the proportions of the metatarsus, and in many other osteological characters, exclude it from that genus; and for similar reasons it cannot be regarded as an *Ocydromus*. This being the case, it seems necessary to introduce a new generic term for this species, and I therefore propose the name *Nesolimnas*, the only species of which is *N. dieffenbachii*.*

It is unfortunate that none of the bones of the type-specimen of this species were preserved by its discoverer, but this deficiency can now be made good, since in the collection at Tring there is an almost perfect skeleton which clearly belongs to this rail, the form of the beak and metatarsus being identical with those of the type. In addition to this valuable specimen, there are also skulls and other portions of the skeleton of many other individuals.

The *skull* (Pl. X., figs. 3, 4) is very similar to those of *Ocydromus*, the so-called *Cabalus sylvestris*, and *Hypotaenidia celebensis*, to which there is much greater similarity than to the skull of the smaller *H. philippinensis*. In the cranial region there is a very near approach to *Ocydromus*, the only noticeable differences between the two being that in the New Zealand bird the lambdoidal ridge is a little more prominent and the paroccipital processes smaller. In the larger size of these processes, *Cabalus* (?) *sylvestris* and *Erythromachus* are more similar to the Chatham Island bird, to which the former of these species is also similar in its larger post-orbital processes. In the base of the skull also there are no marked differences from the same region in *Ocydromus*, although the basi-temporal platform may be slightly less prominent and the pre-temporal wing rather more developed. In *Erythromachus* the basi-temporal platform is much more prominent. The interorbital region is almost exactly the same as in *Cabalus sylvestris* and *Ocydromus*.

The posterior portion of the margin of the orbits is truncated by the impression of a supra-orbital gland, but to a less extent than in *Ocydromus*; in this respect, and also in the greater width of the interorbital region of the frontals, *Cabalus* (?) *sylvestris* comes nearest to the present species.

It is in the form of the beak that *Nesolimnas* differs most widely from the other forms: the whole culmen is convex from before backwards, and the tip is sharply decurved. In *Ocydromus* the beak is only slightly curved; otherwise in its relative size and in the proportions of its narial and pre-narial regions it is very similar to that of the present species.

* In Part I., not having had occasion to consider the systematic position of this bird, I followed recent writers in employing the name *Cabalus dieffenbachii* for it, and I am indebted to Professor Hutton for drawing my attention to this point. Numerous measurements of the skeleton of this species have been already given in Part I. under the name *Cabalus*.

In *Cabalus sylvestris* the beak is relatively much longer, and the same is the case to a still greater extent in *Erythromachus*. In *Hypotaenidia* the nostril is shorter and is continued anteriorly as a groove on the side of the beak.

Except for its greater curvature, the mandible is very like that of *Ocydromus*. The posterior angular process is, however, a little more prominent. In the specimen described a short bony process projects backward from the symphysis between the mandibular rami.

The dimensions of the skull described are given below (measurements of the skulls of several other rails are added for comparison):—

	Nesolimnas dieffenbachii.	*Ocydromus.*	*Cabalus sylvestris.*	*Erythromachus leguati.*	*Hypotaenidia celebensis.*
Total length of skull *	70	79	82	104	70
Length of beak	43	45	50	75	39
,, narial opening	25	25	27	43	17
,, pre-narial portion	14	15	19	29	20
Width at paroccipital processes	20	21	19	19	17
,, postorbital processes	24	25	24	21	22
Width of interorbital region of frontals	8	6	7·5	7	5
Total length of mandible	62	68	72	97	61
Length of mandibular symphysis	15	12	21	29	11

The vertebral column in the specimen described appears to be complete. It consists of thirteen vertebrae with fused ribs (true cervicals) and nine with free ribs, of which the anterior two are probably cervico-dorsals and the remaining seven true dorsals: this vertebral formula is the same as that of *Ocydromus* and *Hypotaenidia*. The individual cervicals are broader in proportion to their length than in *Hypotaenidia*, and correspond most nearly to those of *Ocydromus*, as indeed do the other vertebrae. When the whole twenty-two free vertebrae are articulated in a straight line the column measures about 167 mm. in length.

The paired catapophyses are well developed on vertebrae 6—10, and gradually approach one another till they nearly enclose a carotid canal. On the 11th they are replaced by a median haemapophysis which is repeated to the 17th, on which it is bifid. The sides of the centra of 12—15 are perforated by pneumatic foramina.

The *sternum* (see Pl. X., figs. 5, 6) is in many respects intermediate between those of *Ocydromus* and *Hypotaenidia*. As in the former, the coracoid grooves are separated from one another in the middle line by a considerable interval, which is occupied by a deeply concave thickened border, the *spina externa* being quite obsolete; in *Hypotaenidia*, on the other hand, the coracoid grooves nearly meet in the middle line, and there is a well-developed simple *spina externa*. In the height of the keel the sternum comes exactly midway between the two genera mentioned. The reduction of the keel is accompanied by a shortening of the body of the sternum, which no longer extends as far back as the xiphoid processes, as in *Hypotaenidia*, and is irregularly notched in the middle line; the apex of the keel, though thickened, is not bifid as in *Ocydromus*. Comparison of this sternum with that of *Cabalus modestus* figured by Hutton shows that the differences between them are very great, greater indeed than between it and the sternum of *Ocydromus*. In *Cabalus modestus* the keel is almost obsolete, the coracoid grooves more widely separated, the whole bone wider in proportion to its

* Taken from the occipital condyle to the tip of the beak.

length than in the present species; behind the last rib-facet it is much constricted, so that at this point the width is only half that between the ends of the antero-lateral processes.

In *Erythromachus* the sternum is remarkably similar to our specimen, but it is a little longer in proportion to its width, the keel is rather more reduced, and the anterior border is less deeply concave and somewhat longer.

The dimensions of the sternum associated with the individual skeleton here described are given below, together with those of some other rails for comparison :—

	Nesolimnas dieffenbachii.	*Erythromachus leguati.*	*Cabalus*(?) *sylvestris.*	*Hypotaenidia celebensis.*	*Ocydromus.*
Width between ends of antero-lateral processes	22 mm.	26 mm.	23 mm.	20 mm.	29 mm.
Width at narrowest part	11 „	10 „	11 „	10 „	11 „
Greatest length	47 „	—	48 „	47 „	50 „
Length in median line	36 „	46 „	38 „	47 „	40 „
Height of keel (measured from the inner surface to the highest point)	10 „	8 „	8 „	12 „	7 „

The *coracoid* (Pl. X., fig. 7) is relatively more slender than that of *Ocydromus*, and the lateral (hyosternal) process is much more prominent ; in the latter point the coracoid of *Hypotaenidia* is more similar. The length of the coracoid is 25 mm., the width at the hyosternal process 9 mm.

The blade of the scapula is considerably more slender in proportion to its length than in *Ocydromus*, but offers no important peculiarities. Its length is 38 mm., the width of the proximal end 7 mm.

The slender *furculum* is U-shaped, and resembles that of *Hypotaenidia*, except that the hypocleidium is much reduced and does not form any downward projection. If straight lines be drawn from the lowest point of the furculum to the upper extremities of the arms, we find that the angle enclosed between them is about 45°. In the case of *Hypotaenidia*, by the same method, we get an angle of 40°, and in *Ocydromus* one of about 55°. This point is of some interest because these angles give a fair measure of the degree of divergence of the coracoids, which commonly tends to increase as the power of flight decreases, and we therefore see that in this respect, as in the condition of the sternum, *Nesolimnas* comes nearly midway between the flying *Hypotaenidia* and the flightless *Ocydromus*.

The slender *humerus* (Pl. X., fig. 9) is almost identical in form with that of *Ocydromus*, but is perhaps a little more curved.

The *radius* and *ulna* are also like those of *Ocydromus*, and the metacarpus differs only in the shortness of its fused first metacarpal, and in the somewhat greater width of the interosseous foramen between the second and third; on the outer side of the second, near its distal end, is a deep groove for a tendon which I have not observed in the metacarpus of *Ocydromus*.

The principal measurements of the wing-bones are :—

Humerus :		*Radius :*	
Length	45 mm.	Length	31 mm.
Width of upper end	11 „	*Ulna :*	
„ lower end	7 „	Length	34 „
„ shaft	3 „	*Metacarpus :*	
		Length	22 „
		Width of upper end	7 „

Comparison of these dimensions with those given in the table on page 80 of the present volume shows that, although this bird is about the same size as *Hypotaenidia celebensis*, the wing is considerably shorter than in that species, although it is probably rather less reduced than in *Ocydromus*.

The *pelvis* (Pl. X., figs. 10, 11) is very like that of a small *Ocydromus*, but the post-acetabular portion is relatively wider and shorter, and the ilia are more widely separated posteriorly; from the pelvis of *Hypotaenidia* the differences are of the same kind. The supra-acetabular ridge is less prominent than in either of the genera just mentioned, but the process overhanging the ischio-femoral surface is well developed; this surface is a much more quadrate area than in *Hypotaenidia*, and even than in *Ocydromus*, being both higher, and, at the same time, shorter, from before backwards. On the posterior margin the point of junction of the ilium and ischium is marked by a shallow concavity only, as in *Cabalus sylvestris* and *Hypotaenidia*, not by a deep notch as in *Ocydromus*. The pelvis of *Cabalus modestus* is said to generally resemble that of *Hypotaenidia philippinensis*, but to differ from it in the following points: (1) the ilia are not expanded anteriorly, and (2) the ileo-neural orifices are obliterated. Since in *Nesolimnas* the ilia are considerably expanded at their anterior end and the ileo-neural canals are open, it appears that it also differs considerably from *Cabalus* in this part of the skeleton.

The pelvis of *Erythromachus* is remarkably similar to that of the present species, but is relatively somewhat wider, particularly in its posterior half. The posterior renal fossae are shorter, the portion of the ilia forming the floor of their hinder half being less developed and supported by the transverse processes of two fused caudals only: in *Nesolimnas* and *Hypotaenidia* there are three such vertebrae; in *Aphanapteryx* and *Diaphorapteryx* there are only two, as in *Erythromachus*.

The dimensions of the pelvis are:—

	Nesolimnas dieffenbachii.	*Ocydromus.*	*Hypotaenidia celebensis.*	*Cabalus* (?) *sylvestris.*
Total length of ilia	56 mm.	66 mm.	51 mm.	57 mm.
Width of ilia at narrowest point (middle of iliac fossa)	10 ,,	11 ,,	9 ,,	—
Width at antitrochanters	24 ,,	27 ,,	22 ,,	26 ,,
Length of sacrum	46 ,,	51 ,,	39 ,,	46 ,,

In form and proportions the femur (Pl. X., fig. 12) is closely similar to that of *Hypotaenidia celebensis*; it is much more slender and has a much less massive distal end than the femur of *Ocydromus*.

The tibia (Pl. X., fig. 13) also is like that of *H. celebensis*, but is somewhat stouter, thus approaching the corresponding bone in *Ocydromus*.

The *metatarsus* (Pl. X., figs. 14, 15), as usual, presents the most distinctive characters. Comparing it with that of *H. celebensis*, we find that, although it is actually shorter, the shaft is considerably stouter, and the distal trochleae are slightly more divergent; on the other hand, it is considerably more slender than that of *Ocydromus*, and the distal end is relatively narrower. This metatarsus, therefore, occupies a position on the line of modification which culminates in *Aptornis*, midway between *Hypotaenidia* and *Ocydromus*.

The dimensions of the bones of the leg are :—

	Nesolimnas dieffenbachii.	*Hypotaenidia celebensis.*	*Ocydromus.*	*Cabalus (?) sylvestris.*
Femur :				
Length	60 mm.	54 mm.	65 mm.	63 mm.
Width of lower end	11 „	10 „	13 „	11 „
„ shaft	4 „	4 „	5 „	5 „
Tibia :				
Length	79 „	80 approx.	92 „	87 „
Width of lower end	8 „	„	10 „	10 „
„ shaft	4 „	3·5 „	5 „	4 „
Metatarsus :				
Length	46 „	50 „	52 „	51 „
Width of upper end	8 „	7 „	11 „	10 „
„ lower end	8 „	7·5 „	12 „	10 „
„ shaft	4·5 „	3·5 „	5 „	4·5 „

If the length of the tibia be represented by 100, the femur will be 76, the metatarsus 58. Again, if the length of the leg be taken as 100, the length of the wing will be about 53. In *Hypotaenidia* and *Ocydromus* numbers arrived at by the same method are 63 * and 46·5 respectively, so that in this case also *Nesolimnas* is intermediate between these two genera.

The toes are more slender than in *Ocydromus*, approaching those of *Hypotaenidia*.

From the above description it will be seen that in *Nesolimnas* we have an annectant form linking the flying to the flightless rails. In its plumage, in the condition of its sternum, and in many other points, it reminds us of *Hypotaenidia*, while, on the other hand, in the reduction of its wings and the consequent modification of its hind-limb it approaches *Ocydromus*. The existence of such an intermediate type seems to give strong support to the opinion expressed in Part I., that the Ocydromine rails have originated from forms capable of flight at a comparatively recent date and in the islands they now inhabit.

* In Part I. this proportion was slightly underestimated owing to the imperfection of the specimens measured, and was given as 59·5.

NEW SPECIES OF *DREPANULIDAE*, *URANIIDAE*, *EPIPLEMIDAE*, AND *GEOMETRIDAE* FROM THE PAPUAN REGION,

COLLECTED BY MR. ALBERT S. MEEK.

By W. WARREN, M.A., F.E.S.

Family *DREPANULIDAE*.

1. **Drepana fleximargo** sp. nov.

Forewings: ochreous, dappled and suffused with grey-brown; costal area pale, the extreme costal edge dark brown, towards apex spotted with brown and paler intervals; first line at one-fourth, pale and indistinct, outwardly toothed on the veins, followed by a deeper brown shade; cell-spot round, black; outer line pale ochreous, slender, straight, from inner margin at three-fourths to shortly before apex, where it is acutely angled, runs inwards parallel to veins for a short distance, and is again angled before reaching costa; veins within this line all pale ochreous; marginal area brownish, above anal angle with a patch of mixed ochreous, grey, and blackish scales; fringe reddish brown.

Hindwings: darker brown, except along costa, which is ochreous freckled with brown and black; outer line of forewings produced across middle of hindwings, slightly wavy, preceded by dark grey and blackish shading, and with the veins all pale ochreous within it; marginal space deep brown, mottled with black, with a hyaline space beyond the cell formed of two contiguous ovals, nearly touching the central line, and bearing minute black raised scales; fringe dark brown.

Face and palpi bright red-brown; vertex and shaft of antennae white; terminal half of shaft fuscous, the pectinations rufous; thorax and abdomen brown, the latter becoming ochreous on anal segments. Underside pale yellowish ochreous, with coarse dark fuscous specks and reddish and fuscous suffusion towards hindmargin; the outer line of forewings thick and dark, and not so near margin as on upperside; inner margin of both wings and apex of hindwings whitish.

Expanse of wings: 48 mm.

One ♂ from Fergusson Island, October 1894.

The costa of forewings is abruptly bent at two-thirds; the apex produced and bluntly falcate; hindmargin with a blunt tooth between veins 2 and 3, with a shallow excision above and below it. Hindwings with the apex at vein 7 prominent and rectangular; the hindmargin nearly straight.

The species bears a superficial resemblance to *D. specularis* Moore.

2. **Drepana sera** sp. nov.

Forewings: dull yellow, the markings obscure; a rufous spot on the upper vertical arm of discocellular, and a white rufous-edged spot at the lower angle of cell; a rufous curved line near base, plainest on inner margin; a rufous outer line from centre of costa to middle of inner margin, strongly outcurved and thickened opposite cell, then oblique inwards; a submarginal curved line of blackish spots between the veins, that opposite the cell most distinct and swollen; apical region suffused with rufous; fringe rufous from apex to middle, then yellowish.

Hindwings: with the three lines as in forewings, and with a rufous blotch at end of cell.

Thorax and abdomen yellow; face ferruginous above. Underside yellow, with the outer line of forewings alone showing through.

Expanse of wings: 32 mm.

One ♂ from Fergusson Island, November.

3. **Oreta (?) scintillans** sp. nov.

Forewings: olive-ochreous, mottled all over with pale brownish; the mottlings intensified and forming a curved line at one-third, and a diffuse shade in the middle; traces of dark spots towards hindmargin.

Hindwings: the same.

Face reddish; antennae rufous; thorax and abdomen concolorous with wings. Underside paler, with a dark fascia from near apex of forewings to inner margin before anal angle, slightly marked across the centre of hindwings; some black marks in both wings towards hindmargin.

Expanse of wings: 26 mm.

One ♀ from Fergusson Island, December.

The only example is considerably worn; but even as it is, the upper surface bears traces of being covered with glistening scales.

4. **Teldenia nigrinotata** sp. nov.

Forewings: snow-white; a black dot below costa beyond middle; exterior line grey, interrupted below costa and opposite cell, and running in strongly along the second median to middle of wing; preceded above and below the cell by two irregular blackish blotches in each case, and above inner margin by three; submarginal line dark grey, formed of lunules, and bent, but not interrupted, above cell and on second median: a marginal series of distinct black spots; three costal black streaks before apex; fringe white.

Hindwings: the same; the central line twice sinuate, but not interrupted.

Face above and antennae brownish; lower part of face, thorax, and abdomen white. Underside entirely pure white.

Expanse of wings: 24 mm.

One ♂, one ♀, from Fergusson Island, October and November.

Family *URANIIDAE.*

5. **Urapteroides semiobsoleta** sp. nov.

♂. *Forewings:* white; costal streak dark fuscous, narrow at base, gradually broadening till it meets the broad fuscous hindmargin; extreme costal edge in middle of wing dotted with whitish; from middle of inner margin an erect ochreous fuscous streak rises, not reaching the median vein; a faint ochreous spot on inner margin beyond it. In the ♀ the first streak reaches the dark costal border, and the spot beyond becomes a streak reaching the first median nervule; fringe fuscous.

Hindwings: white, with a broad blackish fuscous submarginal fascia from apex to base of tail, bent round and narrowed to anal angle; an ochreous fuscous straight fascia from costa at one-third bent round to inner margin before anal angle; two large oblong black blotches, one in tail, the other before it towards anal angle; fringe fuscous from apex to base of tail, black from anal angle to tail, along upper part of tail white.

Palpi, face, and vertex white below, blackish above. Head, thorax, and abdomen white. Underside white, with the costal and hindmargins fuscous as above; wholly

fuscous from anal angle of hindwing to tail; in ♂ with a fuscous blotch above anal angle.

Expanse of wings: ♂, 50 mm.; ♀, 52 mm.

Two ♂♂, two ♀♀, from Fergusson Island, September to November.

Like *U. pannata* Feld., but that species has no trace of transverse lines or streaks on the disc of either wing.

6. **Stesichora quadripunctata** sp. nov.

Forewings: white, with a small black blotch at apex, and some black dots on costa at irregular intervals, but more numerous towards base.

Hindwings: white, with a black spot in the tail and a small black spot on the margin below it; the hindmargin on either side of the tail with a fine black line.

Head, thorax, abdomen, and underside of wings all pure white.

Expanse of wings: 36 mm.

One ♀ from Fergusson Island, December.

A pair unnamed are in the British Museum collection from New Guinea. Distinguished from *S. puellaria* Wlk. by the much smaller size and proportionately broader wings.

7. **Stesichora quadristrigata** sp. nov.

Forewings: white, with three or four costal spots near base; four erect blackish lines from inner margin, none of them attaining the costa; first near base oblique outwards; second parallel to first, from inner margin before middle; both these lines end at the costal vein; third broader than the first two and slightly divergent in direction, at the same distance from second as second from first, and not reaching costal vein; fourth from before anal angle parallel to hindmargin, reaching only to middle of wing.

Hindwings: white, with three pale greyish fulvous streaks from costa, a narrower one along inner margin, and two rows of fine strigulae towards hindmargin, all fused in a dull fulvous cloud at anal angle; hindmargin with five black spots, the two upper the smallest.

Head, thorax, abdomen, and all underside white; forelegs tinged with fuscous; face quite narrow; eyes large.

Expanse of wings: 48 mm.

Two ♀♀ from Fergusson Island, November and December.

Family *EPIPLEMIDAE*.

8. **Dirades annulifer** sp. nov.

Forewings: dull grey, dusted with darker; a thick black ring on inner margin beyond middle, to the edges of which two faintly darker oblique and curved lines can be traced from the costa before and beyond middle; a series of minute submarginal black dots on the veins hardly forming a line; fringe grey.

Hindwings: like forewings, the inner half darker, edged by a dark curved line from middle of costa to inner margin above anal angle; fringe leaden grey, with a dark pale-edged basal line.

Head, thorax, and abdomen grey, the anal tuft ochreous; vertex and shaft of antennae white. Underside dull dark grey.

Expanse of wings: 26 mm.

One ♂ from Kiriwini, Trobriand Islands, April.

9. **Epiplema angulata** sp. nov.

Forewings: fuscous grey, much dusted with dark atoms; costa dotted with black; first line very indistinct, curved, at one-third; second at two-thirds, obtusely angled outwards below costa, and more acutely inwards opposite the cell, then vertical and twice curved to inner margin before anal angle, where it is darkened and becomes double; a dark lunulate blotch before hindmargin opposite the cell.

Hindwings: with angulated basal line, two dark dots united by a sinuous line on discocellular; a double postmedian line from costa before apex to inner margin above anal angle, obtusely angled in the middle above the lower tooth; a dark lunate line from upper tooth to below lower tooth, interrupted at the latter by a white dash.

Face dark brown; vertex, thorax, and abdomen pale grey. Underside pale, freckled with darker grey; both wings with obscure submarginal dark fascia.

Expanse of wings: 24 mm.

Five ♂♂, four ♀♀, from Fergusson Island, October to December 1894, and one ♂ from Kiriwini, Trobriand Islands, April 1895.

The ♂♂ are uniformly paler, not so much dusted with dark atoms as the ♀♀. In the hindwings there is sometimes a trace of a dark central shade, most visible towards inner margin. The single ♂ from the Trobriand Islands is smaller than the rest, with the markings darker and more definite; the hindwings with a black discal mark interrupted by a white dash.

10. **Epiplema angulata** ab. **illiturata** ab. nov.

A single ♂ from Fergusson Island, taken at the same time as all the rest, but in quite perfect condition, differs so much that at first sight it appears to be a distinct species; I describe it here as an aberration.

Forewings: pale grey, suffused with rufous; costa spotted with black and ochreous; first line indistinct, curved, ferruginous, produced as a basal line across hindwings and basal segment of abdomen; second line obsolete; a double black blotch at anal angle and some irregular dark marks along hindmargin.

Hindwings; whitish grey, with the markings as in the type; the central area with a band of rusty streaks; marginal space brighter ferruginous, the sinuous submarginal line edged internally with whitish ochreous and preceded by pale leaden-coloured scales.

Underside of both wings bright ochreous; the forewings entirely suffused with dull brownish except along costa and inner margin and some submarginal lunular spaces; the hindwings with a distinct submarginal brown fascia. Face and palpi black. Head, thorax, and abdomen whitish grey, the latter shaded with darker.

11. **Epiplema coeruleodisca** sp. nov.

Forewings: dull black-brown in ♂, uniform grey-brown in ♀; costa spotted with black; the lines curved, ferruginous edged with black; first at one-third, regularly curved; second from costa before two-thirds, outwardly curved to middle, thence nearly vertical to inner margin at three-fourths, where it is preceded by a blackish blotch; marginal third in ♂ more red-brown, becoming blacker round anal angle; submarginal line in ♀ thick, velvety black, from apex to tooth above anal angle; in ♂ fine, black, and wavy, edged on either side with ferruginous; fringe whitish, with a waved black basal line; a small white discal spot, more distinct in the ♂.

Hindwings: with an angulated ferruginous basal line and a curved dark-edged

postmedian line; a large oval discal ocellus, with ferruginous centre and black margin, preceded in cell and followed as far as postmedian line by patches of blue scales; two similar but smaller patches below the first median nervule; marginal area dusted with blue scales; submarginal line black, irregular, from upper tooth to beyond lower tooth; the veins ferruginous; in the ♀ the ferruginous tints are absent, being obscured by the uniform grey suffusion.

Face dark brown; vertex, collar, and antennae pale ochreous; thorax and abdomen brown. Underside of both wings dull grey.

Expanse of wings: ♂, 26 mm.; ♀, 28 mm.

Two ♂♂, one ♀, from Fergusson Island, October to December.

The hindmargin of forewings is in this species somewhat irregular, being bulged below apex and again below the middle; inner and hind margin both excised on each side of the anal angle; hindwings with a tooth at end of veins 4 and 6.

12. **Epiplema denigrata** sp. nov.

Forewings: white, the costa minutely dotted with black; traces of four transverse fasciae, denoted by ochreous-yellow patches; the fasciae lying at one-third, one-half, and two-thirds respectively, the last being submarginal; the patches forming the fasciae are in rows along the submedian interspace, the cell, and above the subcostal nervure; the submarginal fascia consists of small spots between the veins.

Hindwings: the same, the first fascia being represented by a single yellowish spot in middle; towards the hindmargin are a few fine threadlike fuscous strigulae; a fine blackish marginal line between the teeth; fringe of both wings white.

Head, thorax, and abdomen white. Underside white; hindwings with faint traces of some yellowish scales before the tails.

Expanse of wings: 24—26 mm.

Two ♂♂, two ♀♀, from Kiriwini, Trobriand Islands, March to May 1895.

Allied to *E. nivosaria* Wlk., *ruptaria* Moore, and *fulvilinea* Hmpsn.; distinguished by the entire absence of any black markings.

13. **Epiplema grisea** sp. nov.

Very much like *E. moza* Butler, from Japan, but dull purplish grey instead of red-brown, and not speckled with darker atoms; costa of forewings dotted with black and ochreous; the lines blackish, with a few blackish scales on either side. In the hindwings only the inner-marginal area is slightly varied with dark scales; a curved sinuous submarginal line from upper tooth to near anal angle, enclosing a darker marginal cloud, is intersected by two white dashes. The hindmargin of forewings is nearly entire, showing slight irregularity only just below apex.

Expanse of wings: 24 mm.

One ♀ from Kiriwini, Trobriand Islands, May.

14. **Epiplema lacteata** sp. nov.

Forewings: white, with short irregular ochreous fuscous transverse speckles; costa thickly dotted with blackish; first line indicated by three dull fuscous dots on veins; a long dull fuscous cell-spot; exterior line forming an oblique costal fuscous streak, and a double darker fuscous blotch on inner margin, interrupted and excurved between, its course indicated only by irregular fuscous lunate blotches; a bilobed fuscous blotch above middle of hindmargin, thinning off to apex; a fuscous blotch at anal angle.

Hindwings: white, with a twice-angulated basal line; two ferruginous dark spots at the ends of discocellular, often united together; a streak of close blackish atoms down the middle of wing; exterior shade formed by two dark lines with pale fuscous between them, angled outwards in middle; submarginal shade similar, but starting below costa and ending above tail, while the exterior shade starts from costa and runs to inner margin; apex and inner margin with dark striae; two black marginal lunules above the tail; the tail edged above with a fuscous streak projecting somewhat inwards, with an ocellus below; fringe of both wings white, chequered with fuscous opposite the fuscous shades.

Palpi and face deep dark red; antennae rufous; vertex, thorax, and abdomen white, the last with greyish segmental markings. Underside white, the forewings somewhat discoloured with cinereous.

Expanse of wings: 30—32 mm.

Three ♀♀ from Fergusson Island, November and December.

Larger than *E. conflictaria* Wlk., with fainter markings; somewhat resembling also *E. cretacea* Butler, from Japan.

15. **Epiplema particolor** sp. nov.

Forewings: grey, sprinkled with fuscous atoms; the costa dotted black and ochreous; lines ferruginous and blackish; the first at one-third, oblique outwards from costa, sharply angulated towards the discocellular, and marked by a blackish spot below on the submedian fold; second from a dark costal spot at two-thirds, oblique outwards to middle of wing, then inwards to a brown-black spot on inner margin at three-fourths; an incurved ferruginous and blackish submarginal line from below apex to below middle; fringe chequered, light and dark grey.

Hindwings: pale straw-colour; two dark basal lines and a costal blotch; discocellular mark ferruginous and black, enclosing with the central chestnut streak a wedge-shaped blotch of pale straw-colour with three or four brown dots on its inner edge; postmedian line sinuous, dark brown, edged externally with pearl-grey, angulated in the middle; its costal half with chestnut on either side, and another lustrous line towards hindmargin; inner-marginal half of wing chequered with fuscous streaks and dusting; a fine curved black line from upper tooth to below lower tooth, sharply cut at the lower tooth by a white dash; fringe pale straw-colour, mottled with darker between the teeth. In the ♀ the ground-colour of hindwings is dull suffused ochreous grey, like the forewings.

Face and palpi velvety black; vertex, thorax, and abdomen pale grey; basal segment of abdomen blackish, the others marked with darker grey. Underside of forewings dark grey; of hindwings pale ochreous, towards the hindmargin mottled, and beyond the cell suffused, with dark fuscous; in the ♀ both wings are cinereous.

Expanse of wings: 22 mm.

Three ♂♂, one ♀, from Fergusson Island, October to December.

Somewhat resembles *E. ochreofumosa* Warr., from India.

16. **Epiplema quadricaudata supproximans** subsp. nov.

Differing from typical *quadricaudata* Wlk. only in the outer line of the hindwings, which, instead of being curved into the anal angle, is at first nearly vertical from the costa, and afterwards curves into hindmargin half-way between anal angle and the lower tail.

Two ♂♂, one ♀, from Fergusson Island, November and December.

17. **Epiplema sordida** sp. nov.

Forewings: dirty whitish, freckled with fuscous atoms and strigae; costa dotted with brown, and with two or three larger fuscous spots and blotches towards apex; lines indistinct, the first denoted by fuscous spots on the veins, the second by an oblique shade from costa; submarginal shown by three or four brownish spots before the subapical excision, which is shallow and reaches to middle of hindmargin.

Hindwings: with some darker indistinctly expressed markings down the middle; postmedian line pale brown, near the hindmargin, obtusely angled in the middle and double from the angulation to the inner margin; a diffuse fuscous cloud beyond it; a black curved marginal line from upper tooth to lower, where it becomes thicker and is followed by a small dark spot; fringes of both wings pale ochreous, except between the teeth of hindwings, where they are blackish with a yellowish basal line.

Face and palpi deep red-brown; head, thorax, and abdomen white, the last with two fuscous lines on the penultimate segment corresponding to the double postmedian line of hindwings. Underside of both wings smoky ochreous brown; the hindmargin of hindwings paler, with a black dot before lower tooth.

Expanse of wings: 24 mm.

Two ♂♂ from Fergusson Island, October.

18. **Epiplema undulata** sp. nov.

Forewings: whitish, densely irrorated and suffused with iron-grey; the costa darker, speckled with white and black; no first line visible; second line from three-fourths of costa to inner margin before anal angle, blackish edged outwardly with rufous, sinuous outwards to middle, where it forms a blunt tooth, then strongly incurved and again running outwards to a dark patch, which is contiguous to a rufous patch at anal angle; a cloudy shade from costa before apex to anal angle; a submarginal line formed of small black dashes between the veins; fringe rufous and grey, with a dark basal line.

Hindwings: paler, but with the costal area much suffused with mixed fuscous, olive, and rufous shades; a dark curved antemedian line; a double sinuous postmedian line, the inner branch the thicker; a confused sinuous submarginal shade and a double crenulate submarginal line of black lunules, edged with lustrous leaden scales; fringe pale, becoming bronzy rufous in upper half of margin.

Palpi black; face grey; vertex and shaft of antennae white; collar blackish; thorax and patagia pale shining grey; abdomen dull grey, with the basal segment black. Underside of forewings dark grey, dusted with pale along costa; of hindwings whitish, dusted with fuscous towards apex.

Expanse of wings: 24 mm.

One ♀ from Fergusson Island, December.

Very much like *Phazaca erosioides* Wlk., which, however, has the hindwings almost wholly whitish.

19. **Gathynia albibasis** sp. nov.

Forewings: cinereous, dusted with darker; the costa blackish; the lines dark, the first at one-third, curved in middle, the second at two-thirds, slightly curved to anal angle, the first edged internally, the second externally, with dull yellowish; a thin black submarginal line from apex, sharply angulated and incurved below apex and not reaching inner margin; fringe cinereous.

Hindwings: with the costa white, the inner edge of the white patch irregular; rest of the wing cinereous, with two curved darker lines edged with yellowish and with some scattered black patches; submarginal line fine, irregularly denticulate and edged with whitish towards apex. In the ♀ the whole hindwing as far as the submarginal line, except the inner-marginal area, is coal-black.

Thorax and abdomen cinereous; face and palpi blackish; vertex and shaft of antennae snow-white. Underside dull cinereous, the hindwings paler.

Expanse of wings: ♂, 22 mm.; ♀, 24 mm.

Two ♂♂, three ♀♀, from Fergusson Island, September to December.

Several ♂♂ from Fiji, and a ♀ from Australia, either of this or a closely allied species, are in the British Museum collection unnamed.

20. **Gathynia nigrescens** sp. nov.

Forewings: dark lead-colour, the lines thick, bronzy black; the first at one-third, angled in midwing, with some yellow scales on the inner edge; the second beyond two-thirds, nearly straight to inner margin before anal angle, followed by some yellowish scales; fringe shiny, with a dark bronzy black basal line.

Hindwings: with the outer line consisting of round spots lying in a curve, and edged with yellowish scales, and with some yellowish scales towards base.

Underside dull dark cinereous. Head, thorax, and abdomen cinereous. The ♂ has the face, palpi, and anal segments of abdomen blackish.

Expanse of wings: ♂, 24 mm.; ♀, 26 mm.

Two ♂♂, three ♀♀, from Fergusson Island, October to December. In the ♀♀ the costal area of forewings is sometimes speckled with paler.

The species is nearly related to *G. longipennis* Hmpsn. from the Nilgiris.

Platerosia gen. nov.

♂. *Forewings:* elongate, narrow; costa slightly convex near base and before apex, faintly indented in the middle; apex rounded; hindmargin obliquely curved, subcrenulate, with a slight excision above anal angle; inner margin lobed at base to near the middle.

Hindwings: nearly round, twice as broad as forewings; costa strongly fringed except at middle; hindmargin crenulate, with a sharp tooth at veins 3, 4, 6, and 7; inner margin developed.

Abdomen (♂) long, extending beyond hindwings, with expansile anal tuft. Antennae thick, lamellate, flattened; palpi porrect, slender; tongue absent; frenulum stout; the retinaculum at base of cell on the median vein; legs short and stout; hind tibiae swollen, with four spurs.

Neuration: forewings, cell one-third of wing; discocellular very faint; first median at two-thirds, second well before end of cell, third from end; the two radials stalked with last subcostal; third and fourth subcostals stalked; second anastomosing with first for a considerable distance, both rising towards base. Hindwings with cell very broad; discocellular very faint, at one-third; the two subcostals from upper end of cell; radial from about middle of discocellular; first median from near base, second just before end of cell, third from the end.

Type: *Platerosia rotundipennis* sp. nov.

21. **Platerosia rotundipennis** sp. nov.

Forewings: white, covered with fuscous grey striations; two dark grey contiguous blotches on inner margin at middle; lines very indistinct; first at one-third, curved, running to first blotch; second from the middle of costa, dark grey, running obliquely outwards to the middle of wing, irregularly waved, then incurved to second blotch; a dark grey interrupted streak from costa before apex to hindmargin below middle; a slight fuscous cloud at anal angle; fringe chequered white and dark, with a fine but irregular marginal line.

Hindwings: with interrupted dark curved basal line, and a ferruginous interrupted much curved postmedian line, with dark dots on the veins beyond it; basal and marginal areas more striated than central space; space below median vein white, without striations, from base to margin; submedian fold with strong fuscous striations; a ferruginous fuscous submarginal interrupted line, running out into the teeth.

Face, palpi, and collar dark brown; vertex, thorax, and patagia white; abdomen whitish at base, ochreous beyond inner margin, the fringe of inner margin also ochreous; anal tuft blackish. Underside of forewings whitish, freckled with fuscous, with a fuscous blotch along lower half of hindmargin; hindwings whitish, unfreckled, with a curved fuscous marginal band from apex to middle, containing dark spots between the veins; outer tuft of costal margin fuscous. Fore tibiae and tarsi fuscous; the other legs ochreous whitish.

Expanse of wings: 24 mm.

One ♂ from Fergusson Island, December.

Family *GEOMETRIDAE.*

Subfamily OENOCHROMINAE.

22. **Sarcinodes subfulvida** sp. nov.

Forewings: reddish fawn-colour, deeper red beyond the outer line, the whole surface obscurely speckled with fuscous; basal line indicated only by a dark dot on the median vein; discal mark linear, oblique; an obscure dark central shade angulated below costa and oblique to inner margin before middle; a straight pale ochreous line, with a dark edge outwardly and minute dark dots inwardly on the veins, from costa before apex to inner margin beyond middle; submarginal line sometimes indicated by two dark fuscous blotches opposite the cell; fringe dark red.

Hindwings: with the oblique line central.

Head, thorax, and abdomen concolorous. Underside fulvous, space between central and submarginal lines darker; costa spotted with white, and with a violet line below it; the apex white; veins with a row of white dots at edge of submarginal, and a row of black ones along the oblique line; hindwings at anal angle tinged with violet.

Expanse of wings: 50—60 mm.

Three ♂♂ from Kiriwini, Trobriand Islands, March and April.

Subfamily ORTHOSTIXINAE.

23. **Celerena cana** sp. nov.

Forewings: pale yellow; costa with a black streak to one-third, followed by a black spot before middle; a slaty grey curved fascia at two-thirds, blackish on costa, ending in anal angle; marginal space very pale whitish grey, except a pale yellow fascia beyond the grey one.

Hindwings: yellow, whitish towards base; a pale whitish grey marginal fascia, broader towards apex, its inner edge angled opposite the cell.

Head, palpi, collar, and abdomen yellow; thorax and patagia whiter. Underside like upper, but all the tints deeper; the inner edge of the grey margin of both wings black.

Expanse of wings: 60 mm.

Two ♂♂ from Fergusson Island, November.

This species belongs to the group in which the antennae of the ♂ are armed at one-third with a thick curled tuft of hair. The cell of forewings is without fovea, but hairy on underside, and with a slight tuft of hair in its lower half before the middle. Hind tibiae yellowish, with tuft of dark hair near base on the inner side.

24. **Celerena griseofusa** sp. nov.

Forewings: grey, paler and more yellowish grey towards base; a yellow oblique truncated fascia from costa beyond middle to above anal angle, thickly edged with blackish.

Hindwings: yellow, with narrow grey hindmargin, internally black-edged, and broader towards apex.

Face, vertex, and thorax yellow; abdomen yellow, tinged with grey, slightly in ♀, strongly in ♂; palpi blackish towards tips. Underside with the grey markings blackish; tuft of hind tibiae of ♂ blackish.

Expanse of wings: 60 mm.

Two ♂♂, two ♀♀, from Fergusson Island, September to November.

In one ♂ and one ♀ the yellow fascia of forewings is distinctly broader than in the other two.

25. **Eumelea aureliata sanguinifusa** subsp. nov.

In this form of *aureliata* Guen. the ♀♀ are slightly more reddish than in the type, but the ♂♂ are almost entirely deep orange-red above and blood-red below; the base is dusted with yellow, especially below the median vein, and there are two yellow blotches along the submedian interspace between the lines; a larger yellow blotch below costa beyond the middle, and a smaller one at apex and at middle of hindmargin; the hindwings have only the apical blotch yellow; thorax in front yellow; abdomen red. Possibly this ♂ form may be that figured by Cramer as *rosalia*.

Two ♂♂, two ♀♀, from Fergusson Island, September to December.

26. **Eumelea unipuncta** sp. nov.

Forewings: yellow, much dusted with dull orange fuscous-centred dots; costa marked with close fine purplish strigae; traces of a curved line at one-fourth, marked by somewhat larger fuscous-orange spots on and above inner margin; an indistinct fuscous-orange cell-blotch; an obscure oblique fascia formed of fuscous-orange spots

and blotches from inner margin beyond middle towards apex, becoming obsolete in the middle of the wing; hindmargin more thickly suffused with fuscous-orange and dusted with purplish dots, forming blotches between the veins; purplish dots are also scattered along all the veins; a deep purplish rather large round spot on the radial towards hindmargin, from which an indistinct submarginal band can be traced to anal angle, formed of orange blotches with purple scales on them; a row of purplish spots along hindmargin between the veins; fringe purplish grey.

Hindwings: like forewings in colour, with the oblique line of forewings produced more distinctly as a central fascia marked with purple below costa; a purple spot on costa near apex, with two or three smaller ones in a line below it.

Thorax yellow; abdomen yellow, spotted with orange and purplish; vertex yellow, with bright red dots; face and palpi red above, yellow below; antennae reddish. Underside yellow, with the spots and lines deep purplish and much more strongly marked than above.

Expanse of wings: 68 mm.

One ♀ from Fergusson Island, October.

Related to *E. obliquifascia* Warr., from Amboina.

Subfamily PSEUDOTERPNINAE.

27. **Actenochroma (?) caesia** sp. nov.

Forewings: slate-colour, the lines black-edged, with greenish yellow scales; two short curved lines close to base; inner line at one-third, outer at two-thirds, and the submarginal line, all black, denticulate, and wavy, starting from large black costal spots; discal ocellus large and black, with a black costal blotch above it; an interrupted crenulate black line before hindmargin; fringe slate-colour, mottled with darker; the whole wing is thickly mottled with dark spots, mixed with a few yellowish green scales.

Hindwings: like forewings.

Thorax and patagia slate-colour, with a black line across the front; abdomen paler, with two black rings at base and black blotches along the back; head and palpi slate-colour, dotted with blackish. Underside bluish slate-colour; the outer line and a diffuse submarginal fascia black; forewings with large black cell-spot, hindwings with a small one; costa of forewings ochreous, spotted with black.

Expanse of wings: 52 mm.

One ♀ from Fergusson Island, December.

A very distinct species.

28. **Actenochroma (?) prasina** sp. nov.

Forewings: green, slightly speckled with darker; costa with dark striae; a small dark basal patch margined with blackish and dull red; first and second lines blackish, irregularly dentate, widely separate on costa and approaching each other on inner margin, the second elbowed at vein 4; enclosing in the ♂ a dark liver-coloured fascia, mottled with fuscous and red towards the first line; in the ♀ the space remains green, with reddish mottlings along costa and a few specks along the lines; discal dot black, distinct in ♀, obscured in ♂; submarginal reddish fuscous, denticulate, starting from a large costal blotch; space beyond more or less clouded with darker in ♀, but almost entirely green in ♂; fringe mottled green and reddish, with a more or less continuous dark crenulate line at base.

Hindwings: with denticulated dark central line edged with paler; a pale submarginal line with two dark reddish blotches on it; discal dot reddish fuscous; fringe as in forewings.

Face green, with reddish central band; vertex green; collar and base of patagia reddish; thorax, rest of patagia, and abdomen greenish. Underside of forewings, as far as second line above the median vein, orange, leaving a small green space beyond the dark cell-spot; the outer line edged with red; marginal area red speckled with dark, leaving greenish spaces along outer line, at apex, and on middle of hindmargin; inner margin pale green. Hindwings wholly orange to second line, which is blackish red, followed by a broad whitish green space; margin broadly blackish, tinged with red, leaving a small whitish blotch below middle. Underside of abdomen and legs yellow.

Expanse of wings: 44 mm.

Four ♂♂, five ♀♀, from Fergusson Island, November and December.

29. **Actenochroma (?) prasina** ab. **suffusa** ab. nov.

One ♀ and three ♂♂ differ so much on the upperside as to appear at first sight to belong to another species, but, agreeing exactly as they do on the under surface, they must be referred to *prasina* as an aberration. Instead of being nearly clear green, these specimens are largely suffused with darker tints. In the ♂♂ the usual dark central fascia is confusedly interrupted in the middle, while on either side are dark shades more or less contiguous; the hindmargin is likewise much suffused with dark, leaving a small pale blotch at middle; in the hindwings the whole of the basal two-thirds is dark, while the marginal area is much confused with dark shades.

All four specimens are from Fergusson Island, and caught at the same time as the typical form.

30. **Pingasa angulifera** sp. nov.

Forewings: very pale green, slightly freckled with darker; costa finely dotted with blackish; first line at one-third, reddish grey, starting from a black costal spot, forming an acute angle outwards on the submedian fold; discal dot black; second line black, sinuous, with black teeth externally along the veins, starting from a black costal spot; marginal area red-brown, leaving the apical area, a smaller blotch on hindmargin, and another on inner margin beyond second line pale green; submarginal line denticulate, running paler through the reddish margin and bounding the apical patch; fringe pale green, with a dark marginal line where the red area reaches the hindmargin.

Hindwings: the same, with no inner line or discal dot, but the extreme base speckled with fuscous reddish. Underside whitish, with basal half on forewings tinged with pale fuscous; both wings with a broad blackish border, marginal in forewings, but leaving the apex white, scarcely touching the margin on hindwings; forewings with large black discal spot.

Vertex, thorax, and abdomen green, the latter with the tufts reddish; palpi white, reddish above; top of face with a black bar.

Expanse of wings: 44 mm.

One ♀ from Fergusson Island, November.

SUBFAMILY GEOMETRINAE.

31. **Agathia cinerea** sp. nov.

♀. *Forewings:* green, the markings olive-grey, with transverse darker striae; basal blotch grey, with a dark spot on outer edge above median and wholly dark fuscous on inner margin, traversed close to base by a narrow green fascia, and followed by a much broader one, which is succeeded by a narrow curved grey fascia connected with a large grey crescent on the discocellular; an irregular green fascia comes next; outer half of wing occupied by a broad grey fascia, with both edges irregular, containing the outer line, which is marked by black dashes on the veins, and running up to apex, which is fuscous; the marginal area below the apex is green, speckled with fuscous; marginal line fuscous; fringe white.

Hindwings: with dark basal blotch; marginal two-thirds brown-grey, with green blotch at apex, containing a blackish line from before apex to anal angle, more or less obliterated below the centre by dull grey scales; outer line indicated by black lines on veins; fringe whitish above the angle, fuscous below.

Top of face, vertex, thorax, and abdomen green, the segmental rings of abdomen grey; lower part of face and palpi reddish grey. Underside pale green; forewings irregularly blotched and speckled with fuscous grey; hindwings with a diffuse dark grey submarginal fascia.

Expanse of wings: 42 mm.

Two ♀♀ from Fergusson Island, October and December.

This belongs to the same group as *A. diversiformis* Warr., in which the hind-margin of hindwings runs straight from anal angle to end of vein 4.

32. **Agathia diversilinea** sp. nov.

♂. Larger, on the average, than *lycaenaria* Kollar, and differing in the following points. In *lycaenaria* the central band below the middle is inclined basewards, the lowest blotch reaching the inner margin evidently before the middle, and sloping towards the base; in *diversilinea* the lower arm of the central band is vertical; the lowest blotch is curved outwards and reaches the inner margin slightly beyond the middle. The outer line is still more different: in *lycaenaria* the line, which is yellowish, is edged with three dark brown teeth below costa, and passing through a large brown blotch on veins 3 and 4, not touching the margin, is then curved inwards to a brown spot on inner margin before anal angle; in *diversilinea*, on the other hand, the line from the costa is broadly brown internally, edged with pinkish grey outwardly; the central blotch is obliquely placed, narrow, and connected with the margin, the line thence running straight to anal angle and forming the edge of the reddish grey marginal colouring which runs without any interruption, red-brown or reddish grey, and toothed, to the radial; this edge in *lycaenaria* is black-brown and interrupted between the veins. Similarly in the hindwings the submarginal band is much broader and straighter, the inner margin being without any trace of the dark blotch which in *lycaenaria* marks the extremity of the outer line. These differences are equally noticeable on the underside, where the dark markings are blood-red instead of black-brown. The ♀ differs in a similar way from the ♀ of *lycaenaria*.

Expanse of wings: ♂, 40 mm.; ♀, 42 mm.

Three ♂♂, three ♀♀, from Fergusson Island, November and December; two ♀♀ from Kiriwini, Trobriand Islands, March and April.

33. **Agathia subcarnea** sp. nov.

♂. *Forewings:* bright green; costa pinkish grey, varied with fuscous brown; a narrow yellowish brown basal blotch; a slightly curved pinkish brown fascia before the middle; the edges darker brown, funnel-shaped below costa, and swollen at middle and on inner margin; marginal area red-brown; its inner edge straight and obtusely angled opposite the cell, deeper red-brown, immediately followed by a pale pinkish grey line; a subapical green patch, edged with yellow, forming a single sinus outwardly and a double one inwardly, its top oval and yellow, its bottom round and yellow; fringe yellow.

Hindwings: with the marginal area and inner margin red-brown; an oval yellow subapical patch, and a white spot before the tail; fringe yellow, red-brown about the tail. ♀ with the red-brown marginal area broader, varied with yellowish externally, and with its inner edge and the pale line irregularly sinuous; the subapical patch of forewings flattened and irregular in shape.

Vertex, collar, base of patagia, and metathorax bright green; rest of patagia, thorax, and abdomen brown-red, the abdomen varied with ochreous; face and upper parts of palpi reddish, the latter ochreous below. Underside pale whitish or yellowish green, the markings dark red in the ♂, paler red in the ♀.

Expanse of wings: ♂, 42 mm.; ♀, 40 mm.

Three ♂♂, two ♀♀, from Kiriwini, Trobriand Islands, March to May, and four ♂♂, one ♀, from Fergusson Island, October to December.

Agathiopsis gen. nov.

Forewings: ample, triangular; costa straight till just before apex; apex slightly produced; hindmargin curved outwards in middle, more strongly in ♀ than ♂, and consequently more oblique below.

Hindwings: with inner margin lengthened; hindmargin produced to points at veins 4 and 6.

Metathorax tufted; antennae of ♂ shortly pectinated; palpi horizontally porrect, the terminal joint short; hind tibiae with four spurs.

Neuration: forewings, cell not quite half the length of wing; discocellular inangulated; first median from about one-half, second and third from end of cell; upper radial stalked with last four subcostals, the first free. Hindwings with last two medians and two subcostals stalked.

Abdomen red-brown, with snow-white dorsal spots, most distinct in ♂.

Type: *Agathiopsis maculata* sp. nov.

34. **Agathiopsis basipuncta** sp. nov.

♂. *Forewings:* pale yellowish green, the costa gilded; a red-brown basal patch on inner margin; first line marked by fine ferruginous scales, densest on inner margin; cell-spot small, deep black; disc strewn with ferruginous scales; a red-brown patch with a purplish and darker centre towards the apex, with the veins beyond it and some scattered scales ferruginous; a small red-brown patch at anal angle, with scattered ferruginous scales above it; marginal line fine, ferruginous; fringe pale ochreous, with brownish mottlings.

Hindwings: with base deep red-brown, followed by a gilded space on inner margin containing some red-brown marginal spots; a larger brown blotch at one-third; cell-spot black; exterior line at two-thirds, curved from costa, and forming

a large sinus outwards below the median; marginal space with ferruginous strigae, which towards the line form a dull cloud with some black scales on it; fringe pale pinkish brown.

Palpi and face deep red; vertex dark olive-green; prothorax pale yellow-green; patagia olive-green at base, becoming reddish towards the tips; thorax dark reddish grey; abdomen reddish grey, mixed with darker, with three white dorsal triangles; sides and anal segment pale ochreous. Underside pale greenish ochreous, with a black patch towards apex of forewings.

♀ darker green, with the whole margin beyond the sinuous second line dull reddish brown mixed with pinkish grey scales, the apex remaining green and running down the hindmargin as far as the cell. Hindwings with the marginal space shaded with fuscous grey; the abdomen with the white spots much reduced. Underside with a broad black curved marginal fascia in the forewings; the hindwings with only the apex slightly blackish-tinged.

Expanse of wings: 40 mm.

Six ♂♂, four ♀♀, from Fergusson Island, October to December.

35. **Agathiopsis maculata** sp. nov.

♂. *Forewings:* apple-green, shagreened with paler; the costa greyish; first line indicated by reddish dots on the veins placed in a curve; second line irregularly sinuous from inner margin beyond two-thirds to upper radial, where it runs outwards to near the hindmargin, then vertical to vein 7, thence oblique into apex; the whole of the marginal space beyond this line is filled in with dark purplish brown, except a small green patch on the margin between the second and third medians; a dark marginal line; fringe pale pinkish brown.

Hindwings: with inner margin brown from base, widening to anal angle, where it becomes a purplish grey and brown blotch; a similar kite-shaped blotch at apex narrowing downwards, the tail connected with the blotch at anal angle, and cutting off a large oblong green space on margin from vein 7 to 2; marginal line thick, dark red-brown; fringe pinkish grey, becoming reddish at the teeth and anal angle; a ferruginous cell-spot in both wings.

Face, collar, prothorax, and patagia green; vertex, thorax, and abdomen reddish grey dusted with blackish, with three snow-white triangles; the anal segments and sides of abdomen ochreous; palpi and antennae brownish. Underside whitish green, the dark marginal space darker brown, and narrower than on the upperside.

♀ with the marginal space paler, pinkish brown, and much broader than in the ♂, the dark brown limiting line preceded by a yellowish tinge; in the hindwings the green marginal space is more restricted, and totally absent in the forewings; underside with the marginal markings black; abdomen pinkish grey, with the white spots obsolete.

Expanse of wings: ♂, 38 mm.; ♀, 42 mm.

Several ♂♂ and ♀♀ from Fergusson Island, September to December.

Anisogamia gen. nov.

Forewings: with costa hardly curved; apex obtuse; hindmargin subcrenulate, curved.

Hindwings: with inner margin lengthened; hindmargin crenulate, slightly elbowed at end of third median.

Antennae of ♂ shortly and uniformly pectinated nearly to apex, of ♀ simple;

palpi porrect, extending well beyond face; second joint hairy, third smooth; hind tibiae of ♂ with four spurs and a long process at end; frenulum present.

Neuration: forewings, cell half as long as wing; discocellular angulated; first median at two-thirds, second before end, third from end of cell; lower radial from just above the angle of discocellular; upper radial from upper angle; last four subcostals stalked, first free, closely approximated to second towards costa. Hindwings, cell only one-third of wing; discocellular straight, oblique; radial from above its centre; the two subcostals and last two medians stalked. Scaling fine and sparse; the wings semitransparent; markings of the two sexes dissimilar.

Type: *Anisogamia pieroides* Wlk.

36. **Anisogamia absona** sp. nov.

♂. *Forewings:* semitransparent sea-green, the veins dotted with white, representing curved transverse lines; base with three more or less interrupted white curved lines; a white blotch on the discocellular; exterior and submarginal lines represented by a series of white lunules; the apex washed with white; fringe green, with white spots at base at the ends of the veins; costa narrowly fuscous along basal half, then broader, spotted with white throughout.

Hindwings: the same, with the base and inner margin whitish; a white linear cell-mark; exterior line on costa marked by a white blotch, with fulvous and green scales at its centre.

Head, thorax, and abdomen green dotted with white; antennae ferruginous; palpi externally bright ochreous orange. Underside whitish green; hindwings with a brown-black blotch at apex; forewings with traces of a dark blotch.

♀. Dull apple-green; costa broadly dull white, freckled with fuscous and connected with a similar-coloured discal blotch; first line from costa at one-fifth to inner margin at one-third, finely whitish; second line from costa at two-thirds, forming a sinus outwards opposite the cell, then incurved, and again forming a sinus outwards between veins 2 and 3 that nearly touches hindmargin, and reaching inner margin at two-thirds, fuscous edged interruptedly with white, and followed by a diffuse fuscous curved shade; marginal area dirty white, containing a yellowish green patch beyond the upper sinus; fringe white with fuscous basal line. Hindwings the same, without first line; the inner margin narrowly fuscous and white. Front of thorax and patagia green; thorax and abdomen whitish ochreous, with sordid fuscous scales; face and vertex white; palpi bright ochreous. Underside pale whitish green without markings.

Expanse of wings: 36 mm.

One ♂ from Fergusson Island, November; one ♀ from Kiriwini, March.

Differing much, like all the genus, sexually; but almost certainly sexes of the same species.

37. **Berta olivescens** sp. nov.

Forewings: dull olive-green; first line marked by whitish spots on veins, starting from an elongate white costal streak; discal spot white, with an elongate white costal streak above it; outer line very wavy, each undulation marked inwardly and outwardly by a whitish spot; submarginal line formed of white spots; fringe concolorous, with white spots at ends of veins.

Hindwings: the same, with all the white spots larger.

Head, thorax, and abdomen olive-green, the abdomen with white dorsal spots;

face and palpi brown; vertex white. Underside of forewings pale yellowish green; of hindwings whitish, with faint greenish marginal fascia.

Expanse of wings: 26 mm.

Four ♂♂ from Fergusson Island, October to December.

Chrysochloroma gen. nov.

Forewings: ample, triangular; costa faintly convex; hindmargin oblique, imperceptibly elbowed at one-third below apex; anal angle well expressed.

Hindwings: kite-shaped, the inner margin rather long; hindmargin crenulate from anal angle to middle, which is slightly angulated.

Palpi porrect or obliquely upcurved; the second joint stout, squamous, the third minute; tongue present; antennae of ♂ thickly pectinated for three-fourths; hind tibiae of ♂ slightly thickened, with three spurs, the outer median being absent.

Neuration: forewings, cell not half as long as wing; discocellular curved; first median at two-thirds, second and third from lower end of cell; lower radial from *upper* end of cell; upper radial stalked with the last four subcostals; first subcostal free, but approaching costal; costal deflexed to costa from the point of approach; the second subcostal also approaching first, the first similarly deflexed to costa away from the second; the latter in its turn deflexed from the point of approach of the stalk of the third and fourth. Hindwings with discocellular straight; the two subcostals and last two medians stalked; radial from the upper end of cell.

Type: *Chrysochloroma meeki* sp. nov.

38. **Chrysochloroma meeki** sp. nov.

Forewings: deep green; the fringe red-brown, with brighter red base; first line from one-fourth of costa to one-third of inner margin, curved below costa, obscurely yellowish green; second line from two-thirds of costa to two-thirds of inner margin, also bent below costa, yellowish green; cell-spot small, rust-red.

Hindwings: with no first line; the cell-spot much larger; the second line curved.

Palpi and face red-brown above, paler below; antennae green; vertex white; thorax and abdomen green, the latter with small white spots on dorsum. Underside of forewings green on costal half, the rest from the cell becoming orange-yellow; hindwings wholly deep orange-yellow; fringes of both wings red-brown.

Expanse of wings: 44 mm.

Three ♂♂ from Kiriwini, Trobriand Islands, March to May.

Named in honour of the collector.

39. **Comostola flavicincta** sp. nov.

Forewings: apple-green; the costa bright yellow, with a few purple flecks on its lower edge; first line marked by three ferruginous dots on subcostal, median, and submedian veins, the last the largest, and with a purplish edge internally; exterior line denoted by seven regular ferruginous dots, the lowest the largest, and edged outwardly with purplish; a large ferruginous spot on discocellular, edged with bright yellow and centred by a broken metallic streak; extreme hindmargin and fringe bright yellow, preceded by a bronzy purplish series of contiguous lunules, edged inwardly by a distinct ferruginous line.

Hindwings: like forewings, but the discal spot larger, with the metallic mark trifid.

Thorax and abdomen green; metathorax with a dull yellow tuft; head and antennae bright yellow; face and palpi ferruginous. Underside paler, with the markings showing through.

Expanse of wings: 16 mm.

One ♂ from Fergusson Island, November.

Distinguished from *perlepidaria* Wlk. by the yellow head and antennae.

Diplodesma gen. nov.

Forewings: short and broad; costa straight, curved at base and before apex, which is blunt; hindmargin curved.

Hindwings: with distinct projection at vein 4.

Palpi rather long, obliquely ascending; tongue present; antennae of ♂ shortly ciliated, of ♀ simple; frenulum absent.

Neuration: forewings, cell about one-third of wing; first median nervule at two-thirds; second and third stalked; upper radial stalked with the five subcostals; the first and second, one after the other, running into and coalescing with the costal. Hindwings with last two medians and both subcostals stalked.

Type: *Diplodesma celataria* Wlk.

The species which I described as *Idiochlora contracta* (Nov. Zool. III. p. 107), from the Khasia Hills, is evidently identical with this, and my name must sink Walker's type of *celataria* was from Sula.

40. **Episothalma obscurata** sp. nov.

Forewings: dull olive-green, the costal and marginal areas dark green; costal edge yellow, striated obliquely with dark green; first line at one-third, vertical and wavy below, paler green, with a darker outer edge; second line at two-thirds, wavy and denticulate, paler, with a darker inner edge; marginal line dark green; fringe dull green, slightly darker at ends of veins.

Hindwings: like forewings, without basal line, and with a dark green discal mark.

Thorax and abdomen concolorous; face and palpi the same; front of vertex narrowly white. Underside whitish green; hindwings with broad black marginal fascia; forewings with black fascia from anal angle, divergent from margin and becoming obsolete before costa.

Expanse of wings: 36 mm.

Three ♂♂ from Fergusson Island, November and December.

In the genus *Episothalma* Swinh., vein 11, the first subcostal, is free, and does not anastomose, as in *Chlorodontopera*, with 12 and 10. The hind tibiae of the ♂ are slightly but not prominently thickened.

Halterophora gen. nov.

Forewings: ample; costa straight till near apex; apex somewhat produced; hindmargin faintly bent in beneath apex, and then outcurved; anal angle distinct.

Hindwings: with inner margin lengthened; hindmargin subcrenulate, with a short tail at vein 4.

Metathorax with suberect tuft. Palpi thick, obliquely ascending, the terminal joint short and blunt; tongue present; antennae of ♂ pectinate for two-thirds; hind tibiae thickened, with two pairs of spurs; the frenulum thickened towards extremity and ending in a club; the retinaculum also with a scaly appendage.

Neuration: forewings, cell half as long as wing; discocellular inangulated; first median at two-thirds, second and third from end of cell; lower radial from above the middle of discocellular, upper from upper angle; last four subcostals stalked, the second rising just before the fifth, the first free. Hindwings with last two medians and two subcostals stalked. Scaling thick and woolly.

Type: *Halterophora bicolor* sp. nov.

41. **Halterophora bicolor** sp. nov.

Forewings: dull green; the costa striated fuscous and white; the lines indicated by deeper green shades and marked by white dots on the veins, the lowest joined to one on the inner margin; fringe mottled alternately fuscous and white; cell-spot round, black.

Hindwings: the same, without the basal dots.

Head, face, palpi, thorax, and abdomen dull green; the latter with anal segment, sides, and dorsal spots white; antennae brown and white; metathoracic tuft ochreous. Underside of forewings pale green; costa yellowish, striated with brown; cell-spot dark; fringe as above; underside of hindwings white; pectus and femora of legs green; tarsi white, spotted with fuscous.

Expanse of wings: 40 mm.

Four ♂♂ from Fergusson Island, October to December.

42. **Hemithea pictifimbria** sp. nov.

Forewings: glaucous green, with the two lines whitish, as in *H. insularia* Guen. and *tritonaria* Wlk.; the costa yellowish, with sparse dark striae; hindmargin with a thick dark purplish line, interrupted by white wedge-shaped spots; fringe yellow and fuscous, with a yellowish basal line, and dark spots opposite the white dots.

Hindwings: like forewings, with dark green cell-spot and no basal line.

Thorax and abdomen yellowish green, the latter with very slender pale red-edged tufts; vertex and shaft of antennae white; face and palpi dark red-brown. Underside yellowish green, the costa of both wings yellowish; hindwings with an oblong black-brown blotch at apex; forewings with the extreme hindmargin and fringe at anal angle brown.

Expanse of wings: 26 mm.

Three ♂♂ from Fergusson Island, October to December.

43. **Hemithea subflavida** sp. nov.

Forewings: dull green, the costa spotted fuscous and ochreous; the lines denoted by thick darker green shades at one-third and two-thirds, wavy and denticulate; fringe green, with slightly darker green marginal line.

Hindwings: the same, without the first line; cell-mark linear, dark green.

Head, thorax, and abdomen concolorous; abdomen without any dorsal red marks or tufts; face and palpi olive-brown. Underside of forewings pale gilded green; of hindwings whitish green, with an olive-brown blotch at apex.

Expanse of wings: 34 mm.

One ♂ from Fergusson Island, October.

Metallochlora gen. nov.

A development of *Hemithea*, with which it agrees in neuration and in the structure of the antennae; differing in the hind tibiae of the ♂ having four spurs

instead of two, in the abdomen of the ♂ possessing five raised bosses of metallic scales instead of the three reddish tufts, as well as in the scaling and markings, the scaling being smooth and fine and the markings silvery fasciae instead of denticulated lines.

Type: *Metallochlora meeki* sp. nov.

Of the two species which, by reason of their both possessing the metallic tufts of the abdomen, I refer to this genus, *meeki*, the type, has the hindwings with a prominent tooth in the middle of hindmargin; while the other, *lineata*, has the tooth small, and the margin above it excised opposite the cell. Another point of difference is that in *meeki* vein 10 of forewings rises before vein 7 from the common stem, while in *lineata* the reverse is the case.

44. **Metallochlora lineata** sp. nov.

Forewings: olive-green, the costa ochreous drab, with distinct fuscous striae; two diffuse silvery streaks from base, one running to inner margin beyond middle, the other over the black cell-spot in the direction of the apex; before the hindmargin is another, more distinct, silvery streak from inner margin before anal angle, slightly diverging from hindmargin and recurved to costa; fringe pinkish; marginal line concise, subcrenulate, black, finely edged on both sides with yellowish; basal two-thirds of wing slightly darker green than the rest.

Hindwings: like forewings; the outer silvery streak curved; the darker basal two-thirds irregularly washed with silvery scales and with a paler green patch on discocellular.

Thorax and abdomen concolorous; dorsal drops pinkish, placed on black squares, separated by white streaks, and lined laterally with pinkish grey scales; face and palpi pinkish brown. Underside dull pale green; forewings, with cell-spot and a diffuse straight fascia from anal angle to costa, blackish; hindwings with olive-brown apical blotch.

Expanse of wings: 26 mm.

One ♂ from Fergusson Island, October; two ♂♂, one ♀, from Kiriwini, Trobriand Islands, April.

45. **Metallochlora meeki** sp. nov.

Forewings: dull yellowish green, the costa slightly spotted with fuscous and tinged with grey; cell-spot faintly darker; a darker green diffused wavy oblique streak from middle of inner margin to costa at two-thirds, edged within with silvery, curved round along the costa and then again to inner margin parallel to hindmargin, and edged externally by a broadish silvery streak; hindmargin with a yellowish line, preceded by a row of black linear dashes; fringe dull silvery grey.

Hindwings: with a dark green shade on the discocellular; the outer line as in forewings, but curved; faint traces of a straight silvery line from about middle of costa to anal angle; the yellowish marginal line running into the tail.

Thorax and abdomen concolorous, the metallic drops pinkish grey; face brown, darker above; palpi ochreous, ferruginous at tips. Underside dull yellow-green; the marginal dashes expressed; hindwing with small brown-black blotch at apex.

Expanse of wings: 32 mm.

Four ♂♂ from Fergusson Island, October to December.

46. **Oenospila (?) floresaria** Wlk.

Six ♂♂ from Fergusson Island, October and November.

Though probably referable here, these specimens show traces of a pale bent exterior line (in one case plainly marked by white vein-dots), which Walker does not mention. The ferruginous marginal line is broad, and interrupted at the extremities of the veins by wedge-shaped white spots; and the white costa of the forewings is edged beneath from apex to outer line by a broad ferruginous streak. In one example the veins also below the apex are tinged with ferruginous. This species differs from *Oenospila strix* Butler and *Oe. flavifusata* Wlk. in two points. The ♂ antennae are uniformly pectinated for two-thirds; in the other two broadly pectinated only to one-half. Again, the hind tibiae have four spurs instead of two, of nearly equal size; whereas in the single pair of the others the inner spur is extremely long and slender. Of the six examples received, four are markedly smaller than the remaining two.

47. **Oenospila stellata** sp. nov.

Nearest to *Oe. strix* Butler, but somewhat smaller, the spots lighter and brighter red; discal spot of hindwing bright orange-red; blotch on inner margin of hindwing always smaller; hindmargin of both wings with brick-red triangular marks between the veins, and *large* white spots at their extremities; the fringes reddish; costa of forewings broadly white, becoming red-brown towards apex.

Expanse of wings: 30 mm.

Three ♂♂, one ♀, from Fergusson Island, October and December.

Pyrrhorachis gen. nov.

Forewings: triangular; costa straight; apex blunt; hindmargin curved.

Hindwings: with inner margin lengthened, hindmargin rounded.

Antennae of ♂ with apical half simple, the basal half pectinated; palpi slender, extending well beyond forehead; frenulum absent.

Neuration: forewings, cell one-third of wing; discocellular inangulated; last two medians stalked; upper radial stalked with the five subcostals; hindwings with last two medians and both subcostals stalked; ground-colour of wings pale blue-green, the wings margined with red; abdomen with red and black dorsal stripes.

Type: *Pyrrhorachis cornuta* sp. nov.

48. **Pyrrhorachis cornuta** sp. nov.

Comostola pyrrhogona Meyr., *Tr. E. S.* (1889), p. 491 (*nec* Wlk.).

Differs from *pyrrhogona* Wlk., from India, in the marginal red border being decidedly broader, with a red projection towards centre of wing from before the anal angle; the blackish crenulate line, which traverses the red border, is in the Indian form much broader and touches the hindmargin. Mr. Meyrick's description of the New Guinea form is very accurate; his two ♀♀ were from Port Moresby. In a single example in the British Museum, from Mr. Moore's collection, labelled "Andamans," the projection from the anal angle is slightly shown.

One ♂ from Fergusson Island, November.

49. **Thalassodes albifusa** sp. nov.

Forewings: dark green, with two oblique diffuse broad greyish white fasciae; one from middle of inner margin to upper edge of cell, and embracing the black cell-spot; the other submarginal, extending to the lower radial; fringe green; costa yellowish.

Hindwings: similar, the base whitish.

Face, palpi, vertex, and thorax green; front of vertex and shaft of antennae white. Abdomen whitish, tinged above with green; basal segments blackish green. Forewings pale whitish green.

Expanse of wings: 36 mm.

One ♂ from Fergusson Island, November.

Subfamily STERRHINAE.

50. **Antitrygodes parvimacula** sp. nov.

Forewings: stone-colour, tinged with pink and thickly dusted with grey specks; the costa finely ochreous; a small green blotch near base below the median, and a green spot above it; first line obsolete; two oblong irregularly oval green blotches, one on either side of the discocellular, a smaller round one between the first and second medians, and an oblong vertical one, sometimes divided into two, below the median; a curved cloudy brownish shade just beyond; a dull brown submarginal line, outwardly curved to near the anal angle, followed by three green subapical lunules; a dark brown crenulate marginal line; cilia concolorous.

Hindwings: like forewings, but without the green basal blotch.

Thorax and abdomen concolorous with wings, the latter with green dorsal spots; upper half of face and collar ferruginous; lower half of face and vertex white. Underside pale ochreous, tinged with reddish; both wings with a curved dark brownish red submarginal band.

Expanse of wings: 38 mm.

One ♀ from Fergusson Island, December; one ♂, two ♀♀, from Kiriwini, Trobriand Islands, March, April, and May. In two of the examples from Kiriwini the green markings have become bright ferruginous.

The hindmargins of the wings are only faintly crenulate, as in *cuneilinea* Wlk., not deeply excised, as in *divisaria* Wlk. and *agrata* Feld.: from which species it may be likewise at once distinguished by the smaller green spots with rounded margins.

Ptochophyle gen. nov.

Forewings: short and broad; costa straight; apex blunt, square; hindmargin oblique only above anal angle, bowed in the middle.

Hindwings: with hindmargin faintly crenulate and with a slight projection at vein 4; the anal angle prominent.

Antennae of ♂ strongly pectinate; palpi very short; hind tibiae with four spurs.

Neuration: forewings, cell not half the length of wing; discocellular vertical, almost obsolete; first median at two-thirds, second before the end of cell; lower radial from centre of discocellular, upper from top end of cell; last four subcostals stalked, the first anastomosing with them to form a single areole; the first from one-third of cell, the stalk of the other four at two-thirds. Hindwings with last two medians and two subcostals from the ends of cell.

Type: *Ptochophyle notata* sp. nov.

To this genus also belongs *volutaria* Swinh. = *tristicula* Swinh.

51. **Ptochophyle notata** sp. nov.

Forewings: yellowish ochreous, dusted with orange speckles, the markings dull red-brown; costa broadly brown; a thick vertical fascia near base, enlarged along the median and submedian veins; cell-spot large, round, white, edged with ochreous, then with dark brown, followed by a dark brown curved central line, incurved below the median, and forming lunules between the veins; exterior line similar, thickened below costa and above inner margin, and approximated to central line below the median; submarginal line interrupted, blotchy; all the veins in the lower half of wing dark brown; marginal line dark brown; fringe ochreous.

Hindwings: the same, but with only one line beyond the discal spot, which is strongly outcurved in middle; marginal area above anal angle wholly red-brown.

Head, thorax, and abdomen concolorous; face darker. Underside paler, with the markings all dull pinkish.

Expanse of wings: 24 mm.

One ♂ from Fergusson Island.

52. **Ptochophyle volutaria innotata** subsp. nov.

Along with four specimens of *P. volutaria* Swinh., taken in Fergusson Island in the months September to December, is a ♂ from Kiriwini, Trobriand Islands, taken in April, which is of the usual olive-ochreous ground-colour, thickly dusted with pink scales, but without any markings whatever, except the oblique line from costa that forms the outside edge of the usual central fascia; fringes paler, without any trace of darker marginal line; cell-spots obsolete.

53. **Ptychopoda (?) sericeipennis** sp. nov.

Forewings: silky ochreous, with numerous rufous ochreous obscure wavy lines, two submarginal being the most distinct; the margin itself rufous; a small dark discal spot; fringe long and silky, with minute dark dots at base at the ends of the veins.

Hindwings: the same, with the cell-spot hardly visible.

Head, thorax, and abdomen rufous ochreous; face reddish. Underside the same, with the markings still more obscure.

Expanse of wings: 12 mm.

One ♀ from Fergusson Island, October.

Subfamily TRICHOPTERYGINAE.

Pardodes gen. nov.

♂. *Forewings:* with costa straight or faintly sinuous, convex before apex, which is strongly rounded; hindmargin strongly curved.

Hindwings: narrow, with round hindmargin.

Abdomen long, with the claspers very long and exserted; eyes large; antennae thick, flattened; palpi twice as long as head, the second joint inclined upwards, the third porrect; tongue ill-developed; legs long; hind tibiae with four spurs.

Neuration: forewings, cell half as long as wing; first median at two-thirds, second close before end, third from end of cell; lower radial from centre of discocellular, upper from top angle of cell; first two and last three subcostals stalked, the second anastomosing with stem of the other three, forming a single areole; the fourth and fifth curved downwards in middle. Hindwings with discocellular

angulated, the radial from the angulation; costal anastomosing with subcostal to near end of cell; both subcostal nervules from upper angle; first median at three-fourths, second before end of cell, third from end; inner-marginal area restricted, with one short internal vein.

Type: *Pardodes flavimaculata* sp. nov.

54. **Pardodes flavimaculata** sp. nov.

Forewings: pale yellow, with four double slightly curved and interrupted orange bands, forming blotches on inner margin and above the median; hindmargin with an apical blotch and another above anal angle connected with the submarginal band; some orange marks at base; fringe very short, yellow.

Hindwings: yellow, tinged with orange.

Underside duller yellow, with the orange markings fainter.

Head, thorax, and abdomen yellow, mottled with orange.

Expanse of wings: 26 mm.

Three ♂♂ from Fergusson Island, November and December.

55. **Remodes brunnescens** sp. nov.

Forewings: dull silvery grey, crossed by deep olive-green lines and shades; five vertical and wavy before middle; the second and fifth broadest, the fifth forming a blotch on costa; cell-spot dark olive-green, in a broader pale fascia of ground-colour; four postmedian lines, the first two vertical, the others wavy and excurved between veins 7 and 2, the first and fourth much narrower than the second and third; two broad excurved submarginal shades, the inner one double, with a paler line down the centre; fringe grey like the margin; the scales around the anal incision are darker green.

Hindwings: brownish fuscous.

Face, palpi, head, and thorax olive-green; abdomen ochreous grey; antennae dark fuscous grey. Underside olive-brown, tinged with yellowish towards inner margin; tibial tuft black and brown; lateral tufts of abdomen ochreous; anal tuft bright ferruginous.

Expanse of wings: 34 mm.

One ♂, Fergusson Island, December.

56. **Sauris nigricincta** sp. nov.

Forewings: pale ochreous, covered with dull olive-green denticulated lines, which in parts are darkened with blackish scales; all the lines blackish at costa; the ante-median lines blackish below the median, and forming a blackish blotch on inner margin from near base to middle; cell-spot oblique, blackish; all the lines between it and margin between veins 3 and 5 blackish, and on either side of vein 2; submarginal line blackish from apex to below middle, then olive-green; a row of black marginal spots; fringe green.

Hindwings: dark grey.

Collar, thorax, and base of abdomen olive-green; abdomen grey; vertex and base of antennae pale greenish grey; face and palpi dark olive-green; antennae, front of vertex, and a line in front of each shoulder deep black. Underside dull greenish grey.

Expanse of wings: 26 mm.

One ♂, Fergusson Island, October.

Subfamily DEILINIINAE.

57. **Borbacha parviscripta** Warr.

One ♀, two ♂♂, in good condition from Kiriwini, Trobriand Islands, dated April and May, and one ♀, three ♂♂, all somewhat worn, from Fergusson Island, September to December, agree well with the type described Nov. Zool. III. p. 130, from S. Java, except in being somewhat larger.

58. **Scardamia fasciata** sp. nov.

Forewings: with base and costa dull leaden-grey, speckled with black; a fine vertical crimson fascia at one-fifth, preceded on inner margin by an orange blotch; a thicker crimson fascia at one-fourth; a broad central crimson fascia, swollen below costa, and containing a silvery discal spot; a slightly curved broader orange fascia at four-fifths, containing scattered black strigae; a dull crimson submarginal fascia with a few black strigae on it, and the veins across it leaden-grey; all these fasciae are separated one from another by dull leaden-grey fasciae of uniform width, the first two vertical, the third angled beyond the cell, the fourth slightly waved, the fifth marginal, containing a row of black dots between the veins; fringe with inner half dull crimson, the outer half leaden-grey.

Hindwings: the same, without the leaden-grey costal margin.

Thorax and abdomen leaden-grey, tinged with orange-crimson; collar, face, and palpi fuscous. Underside pale yellow, with broad blackish marginal bands.

Expanse of wings: 22 mm.

One ♂ from Fergusson Island, October.

Subfamily PLUTODINAE.

59. **Plutodes signifera** sp. nov.

Forewings: yellow, darker towards costa, which is yellow throughout, washed with silvery scales; a brown basal blotch on inner margin, edged by a darker metallic line; terminal half of wing pale pinkish brown, washed with yellowish, and edged by a metallic leaden line, irregularly D-shaped, the inner edge slightly waved and oblique; a little before the middle of this blotch is a dull wavy brown shade; fringe yellow.

Hindwings: the same, but the basal blotch is continued down the inner margin nearly to anal angle; the D-shaped blotch is narrower.

Head, thorax, and abdomen pale yellowish brown; vertex and antennae pale yellow. Underside dull yellowish, the markings faintly brown.

Expanse of wings: 34 mm.

Five ♂♂ from Fergusson Island, October to December.

A single ♀ with the brown markings much darker, the apical ones rounded and more restricted, very much like *P. discigera* Butler, is probably the same species as the ♂♂ above described. *P. discigera* is recorded by Mr. Meyrick from Port Moresby, but he does not state the sex. The present ♀ differs from *discigera* only in the *bent* margin of the basal patch of the hindwing, which in *discigera* runs straight to the inner margin at one-half.

The specimen is marked November, Fergusson Island.

Subfamily BRACCINAE.

60. **Craspedosis semiplaga** sp. nov.

Forewings: black, with a narrow oblique white fascia from below costa at middle to above anal angle, of nearly uniform width throughout.

Hindwings: wholly black.

Body and underside black; forewings with the white fascia of upperside.

Expanse of wings: 38 mm.

Two ♂♂, one ♀, from Fergusson Island, November.

61. **Craspedosis uniplaga** sp. nov.

Forewings: black, with a rather narrow oblique white fascia from below middle of costa to above anal angle, narrowest at top, swollen in the middle, and blunt, slightly incurved, below.

Hindwings: with a large round white spot filling the basal half.

Head, thorax, and abdomen black. Underside the same.

Expanse of wings: 40 mm.

One ♂, one ♀, from Fergusson Island, November and December.

62. **Craspedosis funebris** sp. nov.

Wings above dull smoky brown-black, with a purplish and greenish tinge in certain lights. Forewings with extremely faint traces of a slightly paler fascia from middle of costa to anal angle. Underside darker, the traces of the fascia on forewings more distinct.

Head, thorax, and abdomen all concolorous.

Expanse of wings: 48 mm.

One ♀ from Fergusson Island, November.

The solitary example is worn and without antennae.

63. **Panaethia flexilinea** sp. nov.

Forewings: slate-colour; a black spot at base; a pair of black basal lines, curved outwards in middle and thickened on the median vein, incurved towards base below; a black central line, slightly outcurved in the upper part, vertical below, touching a large black oval cell-spot; an oblique black line thickened on the veins and slightly excurved above inner margin; a broad black fascia-form line parallel to hindmargin; a submarginal series of spots, oval above and rounded below; a marginal series of blotches; the spots and blotches of the last two series separated by the paler veins; fringe blackish.

Hindwings: the same, with only a single basal line.

Head, thorax, and abdomen dark slate-colour; face and palpi darker. Underside dark cloudy blackish, with the cell-spots black.

Expanse of wings: 46 mm.

Four ♂♂ from Fergusson Island, September to December.

64. **Panaethia obsoleta** sp. nov.

Forewings: dull smoky slate-colour; a deep black oval cell-spot; first line indistinct, marked by a dull black costal spot and another at base of first median; a fine curved blackish exterior line, obsolete below first median; a submarginal row of dull blackish blotches; fringe concolorous.

Hindwings: the same, but without first line.

Head, thorax, and abdomen concolorous; eyes brown. Underside the same, with the cell-spots only black.

Expanse of wings: 40 mm.

Four ♂♂ from Fergusson Island, October to December.

65. **Panaethia atrimargo** sp. nov.

Forewings: yellow; the costa broadly black; hindmargin black from just beyond middle of costa to before anal angle; its inner edge curved and slightly waved; no trace of grey subterminal shade, as in *cyanoxantha* Meyr.

Hindwings: with the marginal one-fourth black.

Face, thorax, and abdomen yellow; collar blackish; palpi fuscous. Underside like upper.

Expanse of wings: 44 mm.

One ♀ from Fergusson Island, December.

Subfamily EUBYJINAE.

66. **Cusiala semiumbrata** sp. nov.

Forewings: white, with dark atoms; the whole wing, except along inner margin and a patch at middle of hindmargin, overspread with rufous fuscous, the base along costa being somewhat paler; first line at one-third, blackish, angulated; outer line at two-thirds, irregularly dentate, excurved opposite the cell, and incurved below it, where it throws out an angle to touch the central line; central line vertical and wavy, touching an irregular 8-shaped discal mark, and nearly touching outer line on inner margin; submarginal line parallel and near to hindmargin, slightly waved; a row of black spots along hindmargin between veins; fringe white, fuscous above.

Hindwings: white, speckled with fuscous olive, without dark suffusion; the extreme base fuscous; two sinuous bent blackish lines, one before, the other beyond the middle; submarginal line black and straight from anal angle to opposite cell, then angled to costa; fringe white.

Face and palpi dark grey; vertex and thorax smoky grey; abdomen whitish, grey at base. Underside of forewings dirty white at base and along inner margin; apical half dull smoky grey, except the whitish spot in middle of hindmargin; hindwings wholly dull white.

Expanse of wings: 60 mm.

One ♂ from Fergusson Island, December.

Subfamily ASCOTINAE.

67. **Chogada episticta** Meyr., *Tr. E. S.* (1889), p. 499.

The examination of seventeen specimens from Fergusson and Trobriand Islands shows this to be a much more variable species than Mr. Meyrick's description would lead one to suppose. Indeed, I am not sure that the species described by him on the previous page as *Boarmia callicrossa*, also from Port Moresby, is not one of its aberrations; and if such should prove to be the case, the name *callicrossa* must be retained for the species. The "flat spreading tuft of white scales from posterior edge of thorax covering base of abdomen in the ♂" is very distinct in all the ♂♂. Of this, in *callicrossa*, Mr. Meyrick makes no mention; but his description of the ♀

tallies precisely with one of the aberrations received from Kiriwini, Trobriand Islands. In view of the wonderful variability shown by these examples, I have thought it well to give a brief description of the four principal aberrations, premising that Meyrick's type-form is pale ochreous, with fuscous irrorations.

ab. **fasciata** ab. nov.

♂. Ground-colour as in type-form; a broad blackish fascia occupying the space between median and postmedian lines of forewings, and extending somewhat beyond the latter; in the hindwings forming a still broader blackish central fascia; basal line of forewings and submarginal line of both wings strongly marked with blackish; in the forewings opposite the cell two black streaks connect the submarginal line with the hindmargin; abdomen with blackish band corresponding to the band of hindwings. In several of the whiter forms, otherwise agreeing with Meyrick's description, the hindwings have a distinct greyish or fuscous central fascia, but the dark markings in general are not so pronounced as in the aberration *fasciata*.

ab. **semialba** ab. nov.

♂. *Forewings:* entirely suffused with blackish fuscous, except a blotch at apex and on middle of hindmargin, and a semicircular space from base of costa to inner margin beyond middle, which are pale with fuscous specklings; submarginal line only distinct and edged with paler.

Hindwings: with only the apical region blackish; the lines only clouded with black.

One ♂ from Fergusson Island.

ab. **rufigrisea** ab. nov.

♀. *Forewings:* wholly dull grey, with a reddish tinge, the veins dusted ochreous and fuscous; space between first line and median shade whitish; cell-spot prominent, dull grey, with whitish scales in centre; a dark fuscous submarginal blotch below apex.

Hindwings: the same, but the whole basal third white; fringes of both wings whitish.

One ♀ from Kiriwini, Trobriand Islands.

ab. **suffusa** ab. nov.

♀. *Forewings:* wholly suffused with dark reddish grey; a yellowish patch at base; the first line preceded and the second followed by an irregular band of yellowish and blackish scales, the veins being yellow towards hindmargin.

Hindwings: the same; fringes of both wings dull grey.

Abdomen grey; thorax and head whitish grey.

One ♀ from Kiriwini, Trobriand Islands.

This aberration, except in point of size, answers well to the description of Meyrick's ♀ *callicrossa*; but nearly all the examples under consideration are from 48 to 50 mm. in expanse.

The undersides of all the above forms agree, being pale or dull smoky cinereous, with large black cell-spots and blackish submarginal shade, leaving apex and spot in middle of hindmargin of forewings and the whole hindmargin of hindwings paler. The pale shades are, as a rule, more developed in the ♀ than in the ♂.

68. **Elphos subrubida** sp. nov.

Forewings: whitish, dusted with fuscous and ferruginous; the three lines, as usual, double, dark fuscous; traces of a darker suffusion between the exterior and submarginal lines from costa to hindmargin in middle.

Hindwings: similar.

Head and thorax fuscous; abdomen paler. Underside of forewings whitish; a large cell-spot, dark; a very broad submarginal dark fascia not reaching inner margin and touching hindmargin opposite the cell. Hindwings with the submarginal fascia very broad at costa, narrowing to anal angle; costal region whitish; all the rest of the wing dull reddish orange.

Expanse of wings: 90 mm.

One ♀, Fergusson Island, October.

The single ♀ is in too poor condition to admit of more detailed description, but is sufficiently distinguished by the unusual coloration of the hindwings beneath.

Zygoctenia Warr., Nov. Zool. II. p. 128.

The opportunity of examining a series of *males* in good condition of the following species has enabled me to correct the original diagnosis of this genus in one point. In the ♂ the outer side of the shaft of the antennae is armed with strong fascicles of cilia, appearing almost pectinated, *the inner side with simple cilia;* the upper surface of the shaft being clothed with thick hairlike scales. The genus is a development of *Gyadroma* Swinh., and with it must be referred to the *Medasina* group, vein 11 of forewings being given off from 12, and 10 being free.

69. **Zygoctenia albisparsa** sp. nov.

♂. *Forewings:* red-brown, much dotted with white; the markings indistinct, darker brown; first at one-fourth, denticulate; second at three-fourths, denticulate, the teeth marked by blackish vein-dots; incurved below middle, where it is approached by an obscure curved brown shade from costa beyond middle; submarginal line wavy, edged and indicated by paler; a black cell-spot; fringe red-brown.

Hindwings: like forewings; the central brown streak curved.

The white dots, though sometimes occurring over the whole wing, are more often confined to the space between the central and outer lines. The ♀ is paler, the ground-colour being more broken up by ochreous tints, especially along the hindmargin, where the apex and lower half of wing are strikingly paler. Underside dark red-brown, with irregular white frecklings, which are sometimes quite wanting.

Head, thorax, and abdomen rufous cinereous; the tufts of hair on underside of hindwings rufous; ridge of hair on antennae fuscous; tufts of hair on hind tibiae and femora of ♂ ochreous, those at the base of the femora blackish.

Expanse of wings: 62 mm.

Seven ♂♂, one ♀, from Fergusson Island, November and December.

Paradromulia gen. nov.

Forewings: with costa sinuous, convex near base and towards apex, incurved between; apex and hindmargin rounded, the latter subcrenulate.

Hindwings: with hindmargin rounded and more strongly crenulate.

Antennae of ♂ finely ciliated, of ♀ simple; palpi short, very stout, upcurved,

terminal joint minute; hind tibiae of ♂ swollen, with a pencil of hairs; pectus, femora, and base of abdomen hairy; fovea of forewings present. Hindwings of ♂ with a ridge of hair beneath along the submedian fold.

Neuration: forewings, 10 and 11 stalked, and separating only a little before costa; 7, 8, 9, stalked.

Type: *Paradromulia ambigua* sp. nov.

70. **Paradromulia ambigua** sp. nov.

Forewings: dark fuscous, speckled with blackish, and varied with ferruginous ochreous; first line at one-fourth, curved, second at two-thirds, sinuous, marked by dark spots on veins—both very obscure and hidden by the dark fuscous shading; a large dark cell-spot; submarginal line dentate, the teeth filled up with dark and tipped with pale; a row of black dots along hindmargin; fringe mottled testaceous and fuscous; veins paler, dotted with fuscous.

Hindwings: with basal two-thirds dark; the outer and submarginal line as in forewings; the margin crenulate, with black basal line; in the more usual form the marginal area of both wings is more or less ferruginous ochreous, especially above anal angle of forewings, but in some cases the whole wing is dark, with only the pale dots of the submarginal line standing out.

Underside smoky grey, with large blackish cell-spots and broad darker marginal band; the ochreous marginal markings sometimes showing through.

Head, thorax, and abdomen mottled fuscous and ochreous.

ab. **maculata** ab. nov.

In this form the ground-colour of both wings is darker, but the anal angle of both is marked by two rounded contiguous blotches of bright pale ochreous, the apex of forewings also being pale ochreous; all these pale patches are shown on the underside.

ab. **rufigrisea** ab. nov.

Forewings reddish ochreous, striated and in parts suffused with fuscous; the lines distinct; the costa spotted with black; central fascia between the two lines silvery grey, with dark central shade, the grey on hindwings extending to the base; apical area of forewing bearing a dark patch. Underside whitish grey, with the other markings as in the type-form.

Expanse of wings: 44—48 mm.

Six ♂♂, two ♀♀, of the type-form, two ♂♂ of ab. *maculata*, and a ♂ and ♀ of ab. *rufigrisea*, all from Fergusson Island, November and December.

Subfamily SELIDOSEMINAE.

Polycrasta gen. nov.

Forewings: with costa straight, slightly convex before apex; hindmargin oblique, faintly irregular; inner margin convex.

Hindwings: broad; costa and inner margin convex; apex bluntly angled; hindmargin rounded, subcrenulate; anal angle truncate.

Abdomen of ♂ long; antennae strongly pectinated, the apex simple; palpi stout,

upcurved, and appressed to face; second joint hairy, third smooth, short and bent forwards; tongue well developed; legs long; hind tibiae with four spurs; base and cell of both wings strongly hairy beneath.

Neuration: forewings, cell not half as long as wing; discocellular straight; first median at one-half, second before end of cell, third from the end; lower radial from slightly above the centre of discocellular, upper from top end of cell; last four subcostals stalked from well before end; first anastomosing strongly with costal; all the veins strong and straight. Hindwings with costal approximated to subcostal close to base, then curving away to the apical angle; first subcostal considerably before end of cell; no radial; first median at two-thirds, second before end of cell.

Type: *Polycrasta ocellata* sp. nov.

The genus appears to be a development of *Petelia* H.S. The typical species reminds one superficially of the American species of *Thysanopyga*, with which it agrees also in having the anal tuft of abdomen whitish in the ♂.

71. **Polycrasta ocellata** sp. nov.

Forewings: fuscous, striated with darker; a very obscure curved shade near base, and a curved thick central shade before middle; the small black cell-spot lying just beyond; a dark brown line edged internally with dull orange, incurved from apex to anal angle; the marginal area included pale grey, mixed with brown, and with traces of a toothed submarginal line through it; a row of minute black dots at ends of veins; fringe fuscous.

Hindwings: browner, with traces of two dark curved central fasciae; cell-spot oval, black, finely edged with yellow; extreme hindmargin from apex to opposite cell yellow; fringe fuscous, with yellowish basal line.

Thorax and abdomen concolorous; the anal tuft white; collar, face, palpi, and antennae darker. Underside dull cinereous brown.

Expanse of wings: 46 mm.

One ♂ from Kiriwini, Trobriand Islands, April and May.

Subfamily SEMIOTHISINAE.

72. **Azata variegata** sp. nov.

♂. *Forewings:* yellowish, thickly dusted with dark brown, and more or less suffused with greyish purple; the lines thick, dark brown; first at one-fourth, angled below the costa, then oblique to inner margin near base; second central, oblique, and slightly waved; third more waved, at three-fourths; submarginal line distinct only in the lower half; the purplish suffusion is thickest between the first and second lines, and beyond the third line, the space between the second and third and the apical region remaining yellower; fringe mottled dark purplish and yellowish, with a row of dark lunules at base.

Hindwings: the same, but all the lines thicker, the first wanting.

Head, thorax, and abdomen purplish grey, the segments of the abdomen paler; the vertex of head dusted with yellow. Underside paler, thickly dusted with brown, the lines brown; the hindmargin broadly brown; forewings with a large ferruginous orange costal blotch before apex. ♀ uniformly paler, with the lines finer, the purple suffusion less intense, but embracing the whole wing.

Expanse of wings: ♂, 28 mm.; ♀, 26 mm.

Three ♂♂ and three ♀♀ from Fergusson Island, September to December.

Differs from typical *Azata* in the forewings not being excised below the apex, the hindmargin being regularly curved and subcrenulate; the antennae are quite three-fourths as long as the forewings, in the ♂ thickened beyond the base with slight serrations and densely pubescent. The fovea in the forewings of the ♂ is strongly expressed, oval, and semihyaline.

73. **Calletaera sordida** sp. nov.

♂. *Forewings:* dull ochreous grey, covered with dark atoms; the costa with dark spots at the origin of the lines, which are indistinctly darker; first at one-third, second in middle, third at two-thirds; the last indicated by black dots on the veins and followed by a broad dull grey fascia; fringe concolorous, dusted with blackish, a row of black dots at base between the veins.

Hindwings: the same.

Underside bright straw-colour, the margins deeper; forewings dusted with black, with two oblique bands, the one central, narrow, the second submarginal, broad and denticulate; hindwings with both bands, but with the ground-colour unspeckled.

♀ with the forewings broader than in the ♂; the underside brighter.

Expanse of wings: 36 mm.

Two ♂♂, two ♀♀, from Fergusson Island, September to December.

Near *C. grisea* Warr., from Nias Island.

74. **Luxiaria (?) straminea** sp. nov.

♀. *Forewings:* pale straw-colour, sparsely speckled with fuscous olive scales; the lines hardly expressed, indicated on costa by the usual dark spots; the exterior with a slight olive shade beyond it; submarginal line marked by a double black spot beyond the angle of exterior line; a black subapical costal blotch; fringe straw-colour, tipped with dark opposite the veins and with black spots at base between them.

Hindwings: the same, but the basal area paler, not so much suffused with the olive atoms.

Head, thorax, and abdomen concolorous; face and palpi ferruginous. Underside brighter straw-colour, with all the markings more distinct; both wings with a diffuse rusty submarginal fascia.

Expanse of wings: 36—38 mm.

Two ♀♀ from Fergusson Island, dated December; occurs also in Nias Island.

Orthotmeta gen. nov.

Forewings: with costa straight, faintly curved at base and becoming convex before apex; hindmargin irregular, with two blunt teeth below apex, then excised, and again bulged outwards, with two blunt teeth at ends of veins 3 and 4, thence oblique to anal angle, which is obtuse; inner margin rather convex.

Hindwings: with anal angle squared, the apex truncate, with two strong teeth at ends of veins 6 and 7; hindmargin straight from vein 6 to anal angle.

Antennae of ♂ bipectinate, the pectinations pubescent; of ♀ minutely serrate; palpi with second joint hairy, stout, obliquely ascending and reaching beyond front;

third joint smooth, decumbent; tongue present; hind tibiae of ♂ thickened, with four spurs.

Neuration: as in *Luxiaria*, of which it is a development.

Type: *Orthotmeta dentata* sp. nov.

75. **Orthotmeta dentata** sp. nov.

Forewings: grey-brown, with short black transverse striae, and more or less suffused with tawny; first line ferruginous, dark brown on costa, veins, and inner margin, from costa at one-fifth, below which it is excurved, thence irregularly sinuous to inner margin near base; exterior line from costa at three-fifths, irregularly dentate and more or less parallel to hindmargin, indistinct to submedian fold, then black and vertical to inner margin at middle; an oblique thick black-brown central line from middle of costa, slightly angulated in cell, to inner margin close before exterior line; a submarginal dentate line, indicated by dark blotches internally; fringe irregularly crenulate, concolorous, with a row of black lunules at base.

Hindwings: paler, less suffused and varied with darker; the lines very indistinct, the exterior one denoted by black spots on veins.

In the ♀ the markings are paler, the lines finer, more ferruginous; the outer line more oblique above inner margin, more excurved and nearer the hindmargin. Underside ferruginous orange, speckled with blackish, especially in the forewings, with three oblique irregularly sinuous black lines, the third very broad on hindwings and inner margin of forewings.

Head, thorax, and abdomen concolorous with ground-colour of wings; vertex and collar ferruginous; face and palpi dark brown.

Expanse of wings: 40 mm.

A good series from Fergusson Island, October to December.

76. **Semiothisa connotata** sp. nov.

♂. Ochreous drab, with scattered fuscous atoms; first line brownish, at one-fourth, bent below costa, then slightly oblique to inner margin; second line brownish in middle, forming a broad angulation outwards opposite the cell and a smaller one on the submedian fold; discal spot brown; submarginal line dull ferruginous, straight, from a little before anal angle to before apex, where it is retracted to costa; marginal area more thickly dusted with fuscous, especially below apex along the shallow excision; fringe ochreous, mixed with fuscous.

Hindwings: without basal line; a ferruginous central line passing over the black cell-spot; outer line slightly curved from costa before apex to anal angle.

Head, thorax, and abdomen concolorous. Underside like upper, with all the frecklings and markings thicker and coarser.

♀ with the markings as in ♂, but the ground-colour from base to outer line whitish; outer line not so near the margin, double, with a pale centre; the marginal area broader and darker, with two small blackish spots beyond the outer line on either side of the third median nervule. Underside with a ferruginous submarginal fascia, entire on the hindwings, distinct only towards costa in forewings, interrupted by dark fuscous and grey below; marginal area varied with fuscous and grey.

Expanse of wings: ♂, 34 mm.; ♀, 36 mm.

Two ♂♂, three ♀♀, from Kiriwini, Trobriand Islands, March to May.

77. **Semiothisa isospila** Meyr.

Macaria isospila Meyr., *Tr. E. S.* (1889), p. 501 (♀).

Mr. Meyrick described the species from a single ♀. The ♂ is darker, with the strigulations denser, and all the lines thicker and more distinct; in particular the exterior line below the angulation is distinctly double, and much more oblique.

Several examples from Fergusson Island, September. Meyrick's specimen was (presumably) from Port Moresby.

Subfamily ENNOMINAE.

78. **Corymica oblongimacula** sp. nov.

Forewings: bright yellow, the costa dotted with brown, at the base with a shallow brown and grey patch; a dull rust-red triangular patch on hindmargin from apex, where it is deep brown, to near the anal angle; its apex connected by a ferruginous tinge with a similar-coloured shade at base of costa; no trace of cross lines; on the inner margin the ordinary brown patches are connected so as to form an oblong patch with an oval yellow centre.

Hindwings: with a rust-red cell-spot and a postmedian curved line of similar spots, those on costa and inner margin being red-brown; a brown white-centred spot on middle of costa; inner-marginal area dull ochreous, without markings as far as vein 2; hindmargin rusty; fringe of both wings white, with brown-red marginal line; fringe of forewings along the patch ferruginous tipped with white.

Face, vertex, thorax, and base of abdomen yellow; palpi, antennae, and collar brown; abdomen ochreous, the tip brown. Underside yellowish; in forewings varied with grey and brown; the marginal triangle red-brown; the oblong patch of forewings and costal spot of hindwings filled in with whitish.

Expanse of wings: 34 mm.

One ♂ from Fergusson Island, December.

79. **Hyposidra schistacea** sp. nov.

♀. *Forewings:* dull silvery slate-colour, the markings darker, purplish slate-colour; first line at one-fourth, bent below costa, thick; the basal area within it darker along inner-marginal half; a dark fascia beyond middle, edged internally by a nearly straight line and outwardly by a wavy and bluntly angulated one; hindmargin suffused with darker, preceded by an obscure wavy dark submarginal line and a dark vertical streak at anal angle.

Hindwings: with basal two-thirds more or less suffused with dark, the whole marginal area pale, with the darker waved submarginal line more distinct. Underside like upper, but duller, neither wing with the base darker.

Head, thorax, and abdomen all concolorous; the centre of abdomen blacker.

Of six ♂♂, one agrees both in colour and markings with the ♀♀; of the other five, three have only the edges of the fascia darker, but agree in colour; the remaining two not only have no fascia represented, but are much browner in tone, being varied, especially in the hindwings, with greyish ochreous scales.

Expanse of wings: ♀, 50—60 mm.; ♂, 36—46 mm.

Three ♀♀, six ♂♂, from Fergusson Island, November and December; one ♀ from Kiriwini, Trobriand Islands, March.

80. **Hyposidra variabilis** sp. nov.

♀. *Forewings:* dull grey-brown, freckled with darker and varied with ferruginous, the latter tint being confined to a wavy submarginal fascia and the inner margin; traces of two darker brown lines, one straight and oblique in middle, the other beyond it and strongly excurved.

Hindwings: more or less freckled with pale grey and ferruginous, with two dark curved central lines and a ferruginous subapical costal blotch.

Underside dull dark brown, with two dark lines on each wing. Head, thorax, and abdomen concolorous.

♂ like ♀, but with the markings clearer; the ferruginous subapical patch marked on upperside; discal spots black above and below.

ab. **pallida** ab. nov.

♂. Ferruginous ochreous, with the costal region fuscous; a dark brown-black curved mark from inner margin close to base to middle of wing; a thick brown-black slightly bent line from middle of costa to middle of inner margin; the exterior line marked by dots from the costa, but becoming brown-black at inner margin, and followed by an undulating line at anal angle; the centre of inner and hindmargin pale ochreous. In a second example of this form the lines are less distinct, but the central one is contiguous to a round black blotch on inner margin. Underside testaceous ochreous, freckled with darker, and with the two lines and discal spots dark.

ab. **nubilosa** ab. nov.

♂. Darker, more suffused with purplish, with the lines darker; apex of forewings dark purplish beyond the usual ferruginous patch; a purplish brown cloud at anal angle, with undulating edge reaching middle of wing. In a second example this cloud is restricted to a V-shaped mark at anal angle. Underside dull slaty grey, with the lines and freckles black.

All the forms agree in having a ferruginous submarginal band distinct on the underside of forewings, and on the upperside towards the anal angle on the inner margin of hindwings a small pale blotch, edged above by a double black line, and below by a ferruginous patch.

Expanse of wings: ♀, 64—72 mm.; ♂, 44—48 mm.

Two ♀♀, six ♂♂, from Fergusson Island, October to December.

Related to *H. incomptaria* Wlk., from Aru, and *H. corticata* Wlk., from Tondano.

Note.—Since this paper was sent to press I have discovered that two species have been already described. *Comostola flavicincta*, p. 288, is the same as *C. neseidaria* Snellen, from Celebes. *Borbacha parviscripta*, p. 296, originally described on p. 130, is identical with *Onychodes euchrysa* Lower, the type of which, now in the Tring Museum, I have lately seen. This will stand as *Borbacha euchrysa* Lower.

NEW INDIAN *EPIPLEMIDAE* AND *GEOMETRIDAE*.

By W. WARREN, M.A., F.E.S.

Family *EPIPLEMIDAE*.

1. **Epiplema arcuata** sp. nov.

Forewings: dark leaden-grey, with numerous dark fuscous strigae, and a large dark discal blotch; lines indistinct, dull ferruginous; first at one-fourth, curved below costa, then vertical to inner margin; second at two-thirds, forming two angles, one below costa, the other below middle, thence incurved to inner margin at two-thirds; a large dark semicircular patch on hindmargin from apex to the middle tooth; fringe dark leaden-grey.

Hindwings: with outer line a little beyond the middle, forming two curves meeting at an angle in middle, ferruginous, edged outwardly with ochreous; basal two-thirds dark leaden-grey, with a chestnut middle streak from base, joined by a dark streak on the discocellular; marginal space ochreous, especially towards costa and inner margin, suffused towards outer margin with brown and leaden-grey scales, and striated with darker; fringe dark grey, with a rather lustrous paler grey line at base.

Face and palpi blackish; head, thorax, and abdomen dark grey. Underside of forewings dull dark grey, with fuscous mottlings; of hindwings paler, somewhat tinged with ochreous, with straggling fuscous streaks.

Expanse of wings: ♂, 26 mm.; ♀, 32 mm.

One ♂ (August), one ♀ (February), from the Khasia Hills. The ♀ is considerably paler than the ♂.

2. **Epiplema fulvata** sp. nov.

Forewings: white, with patches of fulvous scales and striae; costa at base with a few fuscous striae; a small darker spot at one-fourth and one-half, from the first of which a faintly double curved fulvous line arises, and beyond the second another, accompanied by fulvous scales internally and with a black blotch above inner margin; fulvous patches on costa before apex, above anal angle, and at middle of hindmargin; a minute black subapical dot before the hindmargin.

Hindwings: almost wholly suffused with orange-fulvous, the base, a narrow antemedian space, and the hindmargin alone remaining white; a double curved postmedian line, only distinct in the middle, where it is blackish; a minute black dot before the lower tail.

Head, thorax, and abdomen white; face white, with a brown central bar; palpi white, ringed with black. Underside of forewings ochreous fuscous, of hindwings whitish; both with darker central fascia.

Expanse of wings: 16 mm.

One ♂ from the Khasias.

Near *E. ruptaria* Moore.

FAMILY *GEOMETRIDAE.*

SUBFAMILY PSEUDOTERPNINAE.

3. Pingasa subviridis sp. nov.

Forewings: greenish white, dusted and suffused with dull grey-green; first line near base, forming two curves in the middle; second line beyond middle, outwardly curved and strongly dentate, as in *P. chlora* Cram.; a large diffused grey-green discal blotch; marginal space beyond second line darker, especially towards costa; submarginal line pale, wavy, indistinct; a row of dark dots along base of fringes; inner margin, especially at anal angle, tinged with rosy.

Hindwings: like forewings, but with the base darker; the rosy tinge along inner margin at anal angle more pronounced.

Head, thorax, and abdomen concolorous; top of face and vertex of thorax very dark green. Underside white, tinged with yellow towards base; both wings with broad black submarginal band, touching hindmargin opposite the cell; forewings only with black cell-spot.

Expanse of wings: 48 mm.

Three ♂♂ from Cherrapunji, October 1893.

4. Terpna funebrosa sp. nov.

Forewings: dull rufous, thickly suffused and striated with dark green; two oblique wavy subbasal black lines, the space between them filled up with dull pale green; a curved black discocellular mark; postmedian line black, denticulate, shaped much as in *vigens* Butler; submarginal line indicated by whitish spots on the veins; a white subapical blotch on the hindmargin; fringe dark green, with black spots at base between the veins.

Hindwings: the same, without the subbasal lines; the veins rufous, with dark specks.

Palpi pale, mixed with reddish; lower half of frons black; upper half, vertex, and front of thorax pale green; patagia dark green; abdomen greyish rufous, with oblique black streaks at the sides of the tufts, and blackish lateral blotches; underside of abdomen ochreous whitish; legs blackish, spotted with white; fore femora red above. Underside of forewings white, with broad black marginal band, containing a white blotch at apex; a large black discocellular spot; band of hindwings submarginal, leaving the whole margin white.

Expanse of wings: 48 mm.

Several specimens from the Khasias, all ♂♂, February and March 1894.

Most like *T. apicalis* Moore, but distinguished from that species by the pure white ground-colour of the underside of the wings.

SUBFAMILY GEOMETRINAE.

Comostolodes gen. nov.

Forewings: with costa faintly curved; apex rounded; hindmargin obliquely curved.

Hindwings: with fully rounded hindmargin.

Palpi reaching beyond forehead, with third joint distinct. Antennae of ♂ pecti-

nated to two-thirds, of ♀ simple; hind tibiae not dilated, with four spurs. Forewings with the upper radial and last four subcostals stalked, the first free; last two medians from lower angle of cell. Hindwings with the two subcostals stalked. Frenulum present, but fine. Abdomen with white red-edged spots.

Type: *Comostolodes albicatena* sp. nov.

Here belong also *inductaria* Guen., *dispansa* Wlk., and *smaragdus* Hmpsn.

5. **Comostolodes albicatena** sp. nov.

Forewings: green, rather thinly scaled; costa red-brown, streaked longitudinally with white scales, towards apex with a white central streak; a white red-edged spot at one-third and two-thirds indicates the origin of the two lines; first line shown by a small white red-edged spot at origin of first median, and a larger one on inner margin before middle; second line by a small similar dot on third median and a larger one at anal angle, and by small red dots on the other veins; hindmargin with a snow-white line bounded inwardly by a row of curved red marks, and outwardly by a red line at base of fringe, which is ochreous reddish.

Hindwings: with only the marginal lines, the white spots at end of third median and at anal angle larger; a brown-red streak along middle of inner margin; both wings with discal mark dark green.

Thorax and base of abdomen green; face and vertex green, often fading to rufous; abdomen ochreous, the basal and anal segments marked with red and white; the antepenultimate segment white, with a red ring above it; palpi ochreous, red-brown above. Underside whitish green, becoming pale green towards costa of forewings.

Expanse of wings: 26 mm.

Four ♂♂ from the Khasias, January to March.

Intermediate between *inductaria* Wlk. and *smaragdus* Hmpsn.

6. **Hemistola rectilinea** sp. nov.

Forewings: bluish green, subtransparent; costa white, speckled with red; the lines whitish, indistinct, straight, not denticulated as in *H. rubrimargo* Warr.; first near base, curved and distinct only on inner margin, where it is followed by a reddish spot; second from two-thirds of inner margin, where it is preceded by a larger reddish spot, parallel to hindmargin, and becoming obsolete before reaching costa; extreme hindmargin white, edged internally by a fine red line consisting of a series of curves; fringe reddish, with the tips yellowish.

Hindwings: with an oblique faintly curved white median line, preceded on inner margin by a reddish spot; fringe as in forewings; discal spot in both wings slightly darker green.

Head and thorax blue-green; abdomen ochreous, red along the dorsum, with a white line down the middle; face red-brown; vertex green. Underside paler.

Expanse of wings: 30 mm.

One ♂ from the Khasias.

7. **Iodis delicatula** sp. nov.

Forewings: pale pearly green, with fine iridescent scales; first line pale, indistinct, wavy, with slightly darker shade externally; second line pale, and regularly dentate, parallel and near to hindmargin, internally edged with darker.

Hindwings: with the outer line angled, and running parallel to hindmargin; fringe of both wings concolorous; a distinctly black spot on the lower arm of the discocellular of each wing.

Face, thorax, and abdomen pale green; vertex and front of thorax white. Underside silvery white, the costa of forewings yellowish green.

Expanse of wings: 26 mm.

Both sexes from the Khasias, May 1894.

Subfamily STERRHINAE.

8. **Craspedia hyphenophora** sp. nov.

Forewings: very pale whitish ochreous, sparsely dusted with black scales; the lines faintly darker ochreous; inner line marked by a few black scales forming dots on the veins; cell-spot and central line hardly darker; exterior line marked by black scales on veins, the spot on the radial distinctly black and hyphen-shaped; a row of deep black spots along margin between veins; fringe concolorous.

Hindwings: like forewings, but the cell-spot small and black.

Face and palpi dark; collar pale ochreous brown; thorax and abdomen concolorous with wings, the abdomen slightly spotted with black along back. Underside with the costa and cell of forewings fuscous; the cell-spot black and linear; the two outer series of spots in both wings expressed.

Expanse of wings: 30 mm.

One ♂ from the Khasias, March 1894.

9. **Craspedia nigridentata** sp. nov.

Forewings: ochreous, sparsely dusted with black scales; first and central lines brownish, curved and sinuous, the first marked with black scales on inner margin; discal dot small, black, with some brownish scales; exterior line brownish, double, marked by black points on the veins at the ends of the denticulations, with a black W-shaped mark opposite cell, and a double black denticulated mark on inner margin before anal angle; submarginal line pale, wavy, and indistinct, marked by a dark patch opposite cell, and another at anal angle; a row of black marginal spots between the veins; fringe concolorous, with a row of dark dots along the base at ends of the veins.

Hindwings: with black cell-spot preceded by a brownish line; the other lines as in forewings.

Head, thorax, and abdomen ochreous, the last with black dorsal spots; face and palpi black. Underside paler, with all the marginal markings distinct and black; disc of forewings suffused with grey.

Expanse of wings: 26—30 mm.

One ♂ from Shillong, November; another from the Khasias, August.

The black markings sometimes become more or less obsolete.

10. **Craspedia undulataria** ab. **straminea** ab. nov.

Like typical *undulataria* Moore, but the ground-colour wholly straw-colour.

Shillong, July to October.

ab. **subcarnea** ab. nov.

Ground-colour greyish ochreous, tinged with pink, and thickly dusted with fuscous atoms.

Shillong, February.

ab. **pulverosa** ab. nov.

Ground-colour greyish ochreous, without the reddish tinge, and with very scant dusting; the markings in the ♀ cloudy and indistinct.

Khasia Hills, March.

The ground-colour of Moore's type is whitish; it differs from *remotata* Guen. in having all the lines more oblique and complete, the outer ones not incurved beyond the cell. The three forms here determined agree in these respects with the type-form, while differing much in colour; they are easily confounded with the correspondingly coloured forms of *remotata* Guen., though on the average larger in size.

11. **Discoglypha variostigma** sp. nov.

Forewings: fulvous red, dusted with darker; the costa darker; cell-spot small, dark; lines as in *D. inflammata*, to which it is closely allied, differing in the absence of the unsuffused fulvous streaks; fringe wholly fulvous red; a row of dark red spots along hindmargin between veins, but no trace of whitish spots at the ends of the veins.

Hindwings: with the discal spot large and round, either white with black edges, or wholly filled up with black; never triangular, as in *inflammata*. On the underside the two outer lines are both strongly marked.

Expanse of wings: 30—32 mm.

Two ♂♂, one ♀, from the Khasia Hills.

12. **Eois costiguttata** sp. nov.

Forewings: dull olive-grey; the lines wavy, pale ochreous, rising from large ochreous costal blotches, at one-third, one-half, and three-fourths respectively; an ochreous subapical costal blotch, and row of ochreous spots along hindmargin; fringe olive-grey.

Hindwings: with three wavy ochreous lines and marginal row of ochreous spots.

Face blackish; vertex and shoulders ochreous; thorax and abdomen grey. Underside paler, with the lines as above; the marginal spots all but obsolete.

Expanse of wings: 14 mm.

One ♂ from the Khasias.

The forewings are elongate, with apex produced; hindmargin straight and very oblique; hindwings with hindmargin very distinctly angulated in middle.

13. **Eois (?) maculata** sp. nov.

Forewings: rufous ochreous, with dark fuscous olive markings; these consist of basal, antemedian, postmedian, and submarginal fasciae, all considerably interrupted, and distinct only on costa and inner margin; a marginal row of dark spots; cilia ochreous.

Hindwings: with the four fasciae complete, their outer edges irregular.

Underside the same, in the forewings suffused with grey. Head, thorax, and abdomen ochreous, the latter with dark middle segments.

Expanse of wings: 12 mm.

One ♂ from the Khasias, March 1895.

The only example has the forewings rubbed; probably in fresh specimens the dark fasciae are as well marked as in the hindwings. The antennae are subserrate and finely ciliated; the hindwings deeply emarginate on either side of the middle; the forewings elongate, with apex produced, and hindmargin very oblique and slightly elbowed in middle. It is here placed in *Eois* provisionally; veins 6 and 7 of hindwings are on a very long stalk.

14. **Perixera flavispila** sp. nov.

Forewings: stone-colour, thickly and very uniformly dusted with pinkish grey atoms; the costa slightly darker; first and third lines very fine, wavy and denticulated, both marked by dark dots on the veins; cell-spot dark, linear, or narrowly oval; an indistinct waved and denticulate cloudy dark shade between it and the third line; a pale submarginal line is hardly visible; a row of black marginal spots at base of fringe between the veins; fringe concolorous.

Hindwings: the same, but the discal spot round and filled up with orange, edged with black.

Head, thorax, and abdomen concolorous; palpi and upper part of face dull red-brown; lower part of face white. Underside whitish, unspeckled, with the costa, linear discal spot, the dark spots on the third line and the marginal line darker; hindwings with no discal spot shown.

Expanse of wings: 38 mm.

Common from the Khasia Hills; also occurring in Fergusson Island.

The species is distinguished from its allies by the yellow-centred cell-spot of the hindwings; it is referred by Hampson to *interpulsaria* Wlk. = *arenosaria* Moore, but it is certainly not identical with Moore's species.

15. **Perixera rufidorsata** sp. nov.

Forewings: ochreous, dusted with pinkish and fuscous scales; costa narrowly fuscous; cell-spot linear, blackish; first line shown by three or four dark dots on veins; a very obscure darker central shade; exterior line marked by dots on veins, the upper four lying in a curve nearer the base than the lower four; submarginal line indicated by dark cloudy patches; fringe ochreous; a row of large black spots at ends of veins and of small dots between the veins.

Hindwings: like forewings; discal spot round and large, smoky black with paler centre.

Head, thorax, and abdomen ochreous, the last tinged with red along the back; face and palpi ochreous, tinged above with rosy. Underside paler, freckled with rosy, with the costa, discal line, and row of large marginal spots blackish; upper spots of exterior line also marked; the black discal mark of hindwing only showing through.

Expanse of wings: 32 mm.

Two ♂♂ from the Khasias.

A form occurs with the centre of the discal spot of hindwing large and white.

16. **Ptychopoda albiflava** sp. nov.

Forewings: white, with very sparse black atoms; the lines pale yellowish ochreous; the first curved at one-third; the central and exterior both outcurved round cell, and somewhat strongly inangulated opposite cell; exterior line and marginal area yellowish; a row of minute black marginal dots; fringe yellowish; cell-spot large, black.

Hindwings: similar.

Face and palpi dark brown; head, thorax, and abdomen pale ochreous. Underside whitish; the marginal spots of both wings only shown.

Expanse of wings: 18 mm.

One ♀ from the Khasias, April 1894.

Resembles *P. complanata*, but smaller, whiter, with the apex of forewings more rounded.

17. **Ptychopoda complanata** sp. nov.

Forewings: white, with pale ochreous-brown markings; the dark dusting very minute and often obsolete, except along costa; basal, inner, and central lines oblique, rather thick, and curved only towards costa; exterior line double, forming an oblique fascia with wavy edges; hindmargin ochreous brown like the lines, so that the submarginal wavy space is distinctly pale; fringe concolorous, with a row of exceedingly minute dark dots along margin.

Hindwings: like forewings; a minute black cell-spot in both.

Face and palpi dark brown; collar pale brown; head, thorax, and abdomen whitish ochreous. Underside with the outer lines of forewing expressed, the base and disc suffused with fuscous; hindwings wholly whitish.

Expanse of wings: 24 mm.

Abundant from the Khasias, April 1894; also from Darjiling.

All the Darjiling examples are devoid of dark dusting, while most of the Khasia specimens have it more or less developed.

Allied to *aspilataria* Wlk., which, however, has no cell-spots.

18. **Ptychopoda consimilata** sp. nov.

Forewings: ochreous, dusted thickly with blackish or fuscous; the lines pale brown; exterior line much nearer hindmargin than in *P. inangulata*, and marked by black points on veins; not inangulated, as in *inangulata*, beyond the cell; submarginal line indistinct; a row of black marginal points between the veins; fringe ochreous, with a row of smaller dots opposite the veins.

Hindwings: the same.

Face and palpi dark brown; collar pale brown; head, thorax, and abdomen ochreous; abdomen sometimes with dorsal black spots. Underside pale, with the exterior lines strongly marked; forewings suffused with grey.

Expanse of wings: 24 mm.

Numerous from the Khasias, January to April.

Distinguished from *inangulata* by the different course and position of the outer lines.

19. **Ptychopoda grisescens** sp. nov.

Forewings: mouse-grey, with darker dusting; first line black at one-fourth, toothed outwards on subcostal, median, and submedian veins; second line from middle

of costa, starting from a black spot, then fainter, curved round the black cell-spot, and vertical to inner margin at middle; exterior line blackish, sinuous inwards opposite the cell, outwards below it, then incurved and reaching inner margin near central line; followed by a dark fuscous fascia with lunate edge, which is interrupted opposite the cell; its pale edge formed by the submarginal line; fringe paler, with a row of dark spots in it at base.

Hindwings: similar.

Head dark brown; vertex and thorax grey; abdomen dark grey. Underside uniform dull grey.

Expanse of wings: 20 mm.

One ♂ from the Khasias, March 1895.

Allied to *humeraria* Wlk., of which it may prove to be a dark race.

20. **Ptychopoda inangulata** sp. nov.

Forewings: yellowish ochreous, dusted with black scales; the lines thick, pale brown, wavy, and denticulate; central line strongly inangulated in cell to touch the black cell-spot; exterior line double, brownish, the inner area marked with dark scales; both strongly inangulated beyond cell; hindmargin brownish, leaving the wavy pale submarginal line distinct; a row of black spots along margin between the veins; fringe clear ochreous, without spots.

Hindwings: the same.

Face and palpi dark brown-black; collar brownish; head, thorax, and abdomen ochreous, sometimes speckled with black. Underside paler, with the marginal black spots distinct; forewings suffused with grey.

Expanse of wings: 24 mm.

Several of both sexes from the Khasias, April, June, and August.

21. **Ptychopoda quinquestriata** sp. nov.

Forewings: whitish ochreous, sparsely dotted with blackish atoms; the costa whitish; the forewings crossed by five pale brownish ochreous oblique lines; the first angled below costa, the next three slightly curved opposite cell, the last marginal; fringe ochreous, finely black-speckled, with a row of small black dots at base.

Hindwings: with four lines; both wings with minute black cell-spot.

Face and palpi dark; thorax and abdomen ochreous. Underside ochreous, with dull rusty frecklings; base of forewings greyish fuscous; the lines ochreous grey.

Expanse of wings: 21 mm.

One ♀ from the Khasia Hills.

22. **Ptychopoda semilinea** sp. nov.

Forewings: fawn-colour, dusted with black atoms; costa black at base; first line fine, black, oblique from costa to subcostal vein, then interrupted, marked by a spot on median and at inner margin; outer line at four-fifths, slightly curved inwards formed of small round vein-dots connected by a fine threadlike line; submarginal line wavy, hardly discernible except at costa, where it is preceded by a black tridentate blotch, and at anal angle, where it is edged with blackish; fringe concolorous, with a row of largish black spots opposite the end of the veins; a very obscure dark central shade, which develops into a black blotch at middle of inner margin.

Hindwings: the same, but with the central shade broad and black, containing a black cell-spot.

Face dark brown; head, thorax, and abdomen concolorous, the last with a dark ring. Underside pale ochreous, with the markings distinct and black; base and costa of forewings fuscous.

Expanse of wings: 22 mm.

A pair from the Khasias.

Allied to *P. obliquilinea* Warr.

23. **Ptychopoda unilineata** sp. nov.

Forewings: ochreous, not dusted with darker; the markings pale brownish ochreous; first line thick and slightly curved, the area within it likewise brownish ochreous; central shade broadening towards costa, and containing a pale discal spot; exterior line twice bent, slightly oblique outwards from costa, then oblique inwards, marked with brown opposite the cell and on the submedian fold; a broad submarginal and marginal brownish ochreous shade, the wavy submarginal line paler; fringe pale ochreous, with four or five small dark marginal dots below apex, and a pale line at base.

Hindwings: with antemedian brownish ochreous shade; small black cell-spot; a fine exterior line, and the submarginal and marginal bands and fringe as on forewings.

Face and palpi brown; collar pale brown; thorax and abdomen ochreous. Underside paler, with all markings greyish ochreous, the exterior line especially marked.

Expanse of wings: 26 mm.

One ♀ from the Khasias.

Distinguished by the single dark line and pale cell-spot of forewings.

Subfamily HYDRIOMENINAE.

24. **Xanthorhoë subbrunnescens** sp. nov.

Forewings: dark leaden-fuscous, mixed with chocolate; first line at one-fourth, angled just below costa, then straight and oblique to inner margin, plumbeous, inwardly edged with rufous and preceded by a broadish velvety black fascia; outer line at four-fifths of costa, oblique outwards and sharply angulated below costa, incurved opposite cell, and forming another angle below third median, then incurved to inner margin, followed by a plumbeous line with a dark outer edge, which again is succeeded on costa by a short ochreous yellow tooth-shaped mark; in the outer half of the broad central fascia is seen a dark brown line; submarginal line dark purplish brown on costa and opposite the cell, obscure below, the space between it and the fascia being occupied by a dull chocolate band; fringe dark leaden-brown.

Hindwings: dark purplish grey.

Head, thorax, and abdomen dark purplish grey. Underside dull purplish grey, with darker central and marginal fasciae.

Expanse of wings: 22 mm.

One ♀ from the Khasias, September 1894.

Allied to *Xanthorhoë obfuscata* Warr.

SUBFAMILY ASTHENINAE.

25. **Laciniodes denigrata** sp. nov.

Like *L. plurilinearia* Moore, but the general colour yellower, entirely without black or dark markings.

Head, face, and collar yellow, not black; the exterior band of white spots much more distinct and not interrupted in the middle; inner line *curved* below costa, not angulated; outer line recurved to costa, not running straight as in *plurilinearia*, its upper half therefore being sinuous.

Three ♀ ♀ from Shillong, May and July.

SUBFAMILY TRICHOPTERYGINAE.

Proömphe gen. nov.

♂. *Forewings:* ample, triangular; the costa with a prominent bulge at one-third, followed by a slight indentation before the convex outer half; apex blunt; hindmargin as long as inner margin, straight and oblique, and strongly crenulate in the upper half, the teeth at end of veins 4 and 6 being prominent.

Hindwings: small in comparison with the size of forewings, with rounded apex and hindmargin; the inner margin thickened towards base, then lobed to anal angle; the lobe folded over flat on upperside, and hairy within.

Palpi short, pointed, porrect; tongue present; forehead and vertex somewhat protuberant; antennae lamellate.

Neuration: forewings, cell not half as long as wing; discocellular vertical in upper area, oblique below; first median at one-half, second at five-sixths, third from lower angle of cell; lower radial from the angulation of discocellular, upper from top angle of cell; first subcostal anastomosing with stem of the other four, forming a single areole. Hindwings, costal connected with subcostal by a bar; the subcostal bent downwards to middle of wing; first subcostal nervule from the bend; second from the end of cell, reaching hindmargin below middle; discocellular very strongly and acutely inangulated, the radial and last two medians radiating from the acutely pointed lower end of cell; first median some distance before end; the first and second running through to the hindmargin of the lobe that is folded over.

Type: *Proömphe lobata* sp. nov.

A development, as the neuration shows, of *Dysethia* Warr.

26. **Proömphe lobata** sp. nov.

Forewings: ochreous flesh-colour, the lines paler; a red-brown triangular spot on costa near base; another just beyond the costal bulge, edged internally by the pale first line, which is abruptly angled at the apex of the spot and runs slightly wavy to inner margin at one-third; outer line from apex to two-thirds of inner margin; a third, but more indistinct, brown costal triangle is visible just beyond the middle of wing; fringe concolorous.

Hindwings: more yellowish, without any markings.

Head, thorax, and abdomen concolorous; face dark brown. Underside yellowish, in forewings tinged with reddish, in hindwings mottled with darker yellow.

Expanse of wings: 30 mm.

One ♂ from Sikkim, May 1889 (Pilcher *leg.*).

SUBFAMILY TEPHROCLYSTIINAE.

27. **Tephroclystia nigrilinea** sp. nov.

Forewings: shining grey, with numerous waved blackish cross lines; three or four in the basal area; three close together in and beyond middle; these latter excurved beyond cell, followed by a thick slightly curved black line, bent above inner margin; marginal area beyond it rather darker, with several wavy lines; the submarginal finely paler; fringe grey, with a fine black marginal line at the base: cell-spot distinct, black, on the first of the three central lines.

Hindwings: grey, with three basal lines, one central and darker, and several marginal.

Underside paler, with the same lines. Head, thorax, and abdomen all grey, the last with a distinct black lateral streak.

Expanse of wings: 20 mm.

One ♀ from Kasauli, August 1893.

28. **Tephroclystia tenuisquama** sp. nov.

Forewings: thinly scaled, dull pinkish ochreous, dusted with grey and blackish atoms; the veins with black linear dashes in places; cell-spot blackish, with distinct raised scales; basal markings indistinct; an antemedian line angled below costa; another line just beyond middle, strongly angled opposite the cell, then sharply oblique inwards, and vertical to inner margin; the space between these two lines rather darker; a postmedian dark angulated fascia edged on either side by a pale fascia, each with a dark line along its centre; marginal area dark grey, with the submarginal line distinctly paler and fine; fringe mottled pale and dark ochreous, with a darker basal line.

Hindwings: with the whole costal half pale, without markings; the inner margin with alternate dark grey and ochreous fasciae.

Head, thorax, and abdomen dark grey. Underside whitish ochreous, with the markings indicated; the cell-spots and marginal dark line distinct.

Expanse of wings: 28 mm.

Three ♀♀ from Darjiling, March and April (Pilcher *leg.*).

Resembling the European *T. abbreviata*.

SUBFAMILY DEILINIINAE.

29. **Parasynegia** (?) **rufinervis** sp. nov.

Forewings: yellow, with coarse ferruginous orange mottlings; costa at base dark brown; first line at one-fourth, thick, brown-black, curved and slightly indented in middle; second line at two-thirds, thick, parallel to hindmargin; submarginal sinuous, denoted by fuscous ferruginous patches; a similar-coloured cloud between veins 3 and 4 from outer line to hindmargin; veins all orange-ferruginous; the third median brown, and the upper radial with a brown mark towards hindmargin; discocellular orange, with a small dark dot in middle; fringe yellow, with fine orange basal line.

Hindwings: similar; the dark central line slightly bent; the basal fringe-line rust-coloured.

Face, palpi, head, thorax, and abdomen yellow, mottled with orange; collar yellow, with brown-black edge. Underside similar, but paler and duller.

Expanse of wings: 36 mm.

One ♀ from the Khasia Hills, November 1894.

I have queried the genus of this insect, being a ♀. Moreover it differs in neuration: vein 11 rises near cell from the common stem of 7, 10, 9, 8, which rise in the order named.

Subfamily SCOTOPTERYGINAE.

30. **Catascia eolaria** Guen. ab. **fuscobrunnea** ab. nov.

In this form the ground-colour of both wings above is dull rufous brown, without any pale dusting. Underside as in the type-form.

One ♂ from Cherrapunji, October.

In *Fauna of British India*, Vol. III. p. 253, Hampson mentions a specimen of this coloration.

31. **Scotopterix (?) squamosa** sp. nov.

Forewings: dull olive-grey, covered with dark olive-fuscous transverse strigae; the fasciae dark olive; costa with six dull olive-fuscous blotches—one at base, two forming the origin of the basal fascia, two more in the middle, from which the dark central fascia springs, and the sixth before the apex, forming part of the submarginal shade; a similar marginal blotch opposite the cell; a blackish linear cell-spot; the whole wing is sprinkled with shining scales, and above the anal angle are some yellowish scales.

Hindwings: paler, with the fasciae distinct only on inner margin; fringes of both wings dull grey, with dark spots along their base.

Head, thorax, and abdomen grey. Underside dull grey, the forewings darker than the hindwings.

Expanse of wings: 32 mm.

One ♀ from Sikkim, June 1889 (Pilcher *leg.*).

I have only seen two specimens of this insect, both ♀ and more or less worn. It seems to be most nearly allied to *thibetaria* Oberth.

Subfamily ASCOTINAE.

32. **Ectropis serratilinea** sp. nov.

Forewings: whitish, densely speckled throughout with olive-grey striae; the lines black and denticulate; the basal, subbasal, and median all indistinct; the postmedian with the denticulations strongly marked and regular; submarginal irregular, followed by a denticulate white edging; fringe whitish, with dark spots opposite the veins, and black spots at the base between the veins, the latter connected by dark horizontal streaks with the submarginal line; a black cell-spot before the median line.

Hindwings: like forewings, with antemedian, postmedian, and submarginal lines and distinct cell-spot.

Head, thorax, and abdomen concolorous; face paler below; palpi black, with pale terminal joint. Underside blurred cinereous, with the lines thicker and duller; costal region of forewings ochreous.

Expanse of wings: 36 mm.

A few of both sexes from the Khasia Hills, June 1895.

33. **Poecilalcis (?) deceptrix** sp. nov.

Forewings: ochreous, almost wholly suffused with fulvous and fuscous, and with blackish strigae and clouds; first line broad and pale, edged with darker, sharply angled below costa, then oblique and straight to inner margin close to base; a large diffuse blackish cell-spot, followed by a curved and indistinct dark central line; outer line pale ochreous, tinged with fulvous externally and edged with darker internally, straight from costa to inner margin, nearly parallel to hindmargin; submarginal line fine, white, irregularly dentate and wavy, forming a larger sinus opposite the cell, filled in with blackish and bent outwards to anal angle.

Hindwings: paler, the costal region ochreous; a large dark cell-spot, with a dark line from it to inner margin; a broad pale line edged internally with darker, corresponding to the outer line of forewings; a dark wavy pale-edged submarginal line, with a black blotch opposite the cell; fringes of both wings dark, with their base and tips pale; hindmargin of hindwings crenulate from apex to vein 4.

Head, front of thorax, and base of patagia olive-tawny; tops of shoulders, the ends of the patagia, and the metathorax dark fuscous; basal segment of abdomen with a white ring; rest of abdomen mottled fulvous and fuscous. Underside pale straw-colour, mottled with fuscous; both wings with large black cell-spot; forewings with hindmarginal area dark fuscous, except a spot at apex and in middle; hindwings with a black blotch in middle of hindmargin.

Expanse of wings: 44 mm.

One ♂, two ♀♀, from Sikkim, March and April 1889 (J. G. Pilcher *leg.*).

Resembles *P. atrostipata* Moore, but easily distinguished by the different direction of the first line. The neuration also is different, and appears variable. In all three 10 and 11 are stalked together, and 11 anastomoses with 12; in one ♀ 9 is also stalked with 10 and 11, and afterwards anastomoses with 8; in the other, 7, 8, and 9 are stalked; while in the ♂ 9, 10, and 11 are stalked together, 9 not anastomosing with 7 and 8, but separating from 10 near the costa.

Subfamily SEMIOTHISINAE.

34. **Hypephyra subangulata** sp. nov.

Forewings: rufous ochreous, with darker rufous striae and dusted with silvery scales; the basal and marginal areas dull dark brown; the lines ferruginous; first line curved and interrupted at one-fourth; second at three-fourths, distinct and irregularly wavy, preceded by a rusty shade; discal spot small, ferruginous; marginal space dark leaden-brown, with a dull ferruginous patch near costa and a small brighter spot in the middle; fringe concolorous with this marginal area.

Hindwings: the same, but with only the extreme base dark, and the basal two-thirds more densely striated with fuscous.

Head and thorax dark brown; face and abdomen rufous. Underside yellow, with the marginal area dark leaden colour, with a yellowish patch at middle.

Expanse of wings: 40 mm.

One ♀ from Sikkim, May 1889 (J. G. Pilcher *leg.*).

Distinguished from the other two species of the genus by the blunt angulation of the hindwings.

35. **Semiothisa temeraria** Swinh. ab. **fumosa** ab. nov.

Forewings: entirely dull smoky brownish grey, the lines rust-colour; the area beyond the postmedian line, except at apex, dark smoky fuscous, the veins, as usual, remaining paler.

Hindwings: the same, without the dark marginal area.

Underside testaceous grey; inner and hindmargins of forewings slaty fuscous, the latter with the fascia showing blackish; hindwings with only the extreme hindmargin grey. Thorax and abdomen paler grey.

One ♂ from the Khasia Hills, April 1894.

A very distinct-looking insect from the type-form.

SUBFAMILY ENNOMINAE.

36. **Fascellina fuscoviridis** sp. nov.

Forewings: dark green, suffused except towards the apex with purple fuscous, and with darker strigulations; the costa dark purple fuscous, containing a pale olive blotch in middle, streaked with darker; traces of diffuse oblique basal and median dark purple shades; postmedian line irregularly wavy, preceded in middle of wing by a deep purple shading and edged outwardly by a dull silvery line which on costa becomes a brighter blotch; marginal area, except towards apex, darker, traversed by a zigzag faintly lustrous line; a minute white spot on costa before apex; fringe dark purple-brown.

Hindwings: purplish rufous only near base and along costa, with a central slightly curved dark-edged lustrous line, and a faintly silvery zigzag submarginal one.

Thorax and abdomen olive-green; face and palpi red-brown. Underside of forewings olive-green and yellowish, with dark striations; the costa yellow, with rich brown blotches; the postmedian line brightly edged with white; the marginal area black and tawny. Hindwings yellow, with olive striae; the costal region more thickly striated with red-brown; a blotched straight median line, and a fine curved submarginal one.

Expanse of wings: 36 mm.

One ♂ from Cherrapunji, November 1893.

The outer margin of the forewing alone is excised, the inner margin remaining straight.

37. **Mimochroa lugens** Butler ab. **castanea** ab. nov.

All the green shades on the upperside replaced by chestnut, the underside remaining as in the type-form. In one example, however, all the yellow of the underside also has disappeared, being replaced by dull chestnut; the usual dark brown limiting line is represented by a broad whitish line, while the hindmargin is varied with whitish.

The palpi in all three examples are rufous chestnut, not orange.

Three ♂♂ from Darjiling, March and May 1889 (J. G. Pilcher *leg.*).

38. **Omiza cinerea** sp. nov.

Forewings: dingy grey-green, dusted with dark atoms, which are much denser beyond the postmedian line; antemedian line at one-fourth, starting from a short inwardly oblique black costal dash, excurved below costa, then inwardly oblique and

wavy; postmedian line blackish, more distinct, slightly bent at middle and becoming obsolete towards apex, followed above inner margin by a dull rufous grey shade; discocellular annulus oblique, grey-centred, with dark outline.

Hindwings: with a median dark line, bent below costa.

Head, thorax, and abdomen dull grey-green. Underside dull dark cinereous, tinged with greenish, with the lines indistinct.

Expanse of wings: 30 mm.

One ♂ from Shillong, March 1893.

39. **Eurytaphria pallidula** sp. nov.

♀. *Forewings:* pale straw-colour, sparsely dusted with brown atoms, somewhat more densely along base of costa and above anal angle; first line brown, indistinct towards costa, from which it runs outwardly oblique to cell, then inwardly oblique and bent to inner margin near base; second line also brown, straight and oblique from apex, where it is slightly thickened, to inner margin at two-thirds, before which it is slightly curved and intersects a brown blotch; discal spot brown; fringe concolorous.

Hindwings: with brown dash at base; round brown cell-spot, and brown median line, angled bluntly below costa.

Underside duller, tinged with cinereous, the outer line appearing partially double. Thorax and abdomen concolorous; face and palpi somewhat darker.

Expanse of wings: 40 mm.

One ♀ from Darjiling, March 1889 (J. G. Pilcher *leg.*).

The antennae are minutely serrate and pubescent.

A ♂ from the Khasias must be referred here, but whether the same difference of coloration always obtains between the sexes must remain doubtful in the absence of further examples. This ♂ is pale dull green, with the lines and speckles as in the ♀; forewings with a black dot in the middle of the base; palpi blackish. Antennae evenly and delicately pectinated.

NEW LEPIDOPTERA.

By THE HON. WALTER ROTHSCHILD.

1. **Papilio aristolochiae lombockensis** subsp. nov.

♂ ♀. Like *P. aristolochiae antiphus*, but differs as follows: the white streaks on the underside of the forewing are much shorter and narrower, the black border of the wing being almost twice as broad as in *antiphus* from Sumatra; the red submarginal spots on the hindwing below are mostly larger and less linear, the middle ones often overpowdered with black scales; the tail is broader at the base and at the apex, being sometimes as broad as in *aristolochiae kotzebueus*.

Hab. Sawela, Lombock Island, 1000—2000 feet, June 1896 (W. Doherty).

2. **Papilio memnon clathratus** subsp. nov.

Papilio memnon merapu, Nov. Zool. 1895. p. 315 (*c*) (*ex p.*).

I am now in possession of a Sumba specimen of *merapu*, and find that W. Doherty was right when he told me during his last visit here that the Sambawa and Sumba *memnon* are not identical, but belong to two subspecies. Therefore I have to give a name to the Sambawa form. Besides the inferior size, *clathratus* is distinguished from *merapu* by the marginal area of the underside of the hindwing being less ochreous, mostly grey, and more extended on the disc, and by the grey rays of the upperside of the hindwing being, near the margin of the wing, broader. The *female* of *merapu* is unknown; that of *clathratus* I have described in Nov. Zool. 1895. p. 316.

Hab. Sambawa (W. Doherty, September 1891).

3. **Papilio albinus thomsoni** ab. **mordingtoni** ab. nov.

This most singular specimen reminds one strongly in its style of aberration of *Papilio nubilus* Staud. and *P. walkeri* Jans., and I should have gladly given it equal specific rank with these two forms, but it was sent together with a great number of *P. albinus thomsoni* which show so much variation that I can clearly see that this specimen can be made out as an extreme sport.

Forewing: black-brown, with a few white scales between cell and apex.

Hindwing: black-brown; four white patches on disc, one in apex of cell extending half-way to base and rather ill-defined, the second between veins 6 and 7, the third almost obliterated between 2 and 3, and the fourth triangular before vein 7. One oblong red patch between abdominal margin and vein 2 near anal angle; another more indistinct, 11 mm. long, between veins 2 and 3.

Underside as above, but hindwing without white patches; the two red patches near anal angle larger and much more distinct. Both above and below these two spots are dusted with blue scales.

The two first of the series of red submarginal spots of *albinus* are present, although altered in shape.

Hab. Little Kei Island, one ♀ (Capt. H. Cayley Webster).

Although as a rule I do not give a personal name to an *aberration*, I do so in this case at the request of the collector.

4. **Papilio sarpedon dodingensis** subsp. nov.

Papilio sarpedon anthedon, Nov. Zool. 1895. p. 444 (*h*) (*ex p.*).

♂ ♀. I have recently received some more specimens of *sarpedon* from the Moluccas, and find now that these islands are inhabited by two forms, one occurring on the southern group of islands (Amboina, Ceram, and the adjacent islets), the other on the northern islands (Halmaheira and Batjan). The characters in pattern which distinguish the northern form from the southern one are in so far highly interesting as we meet with them again in the Celebensian subspecies; *sarpedon dodingensis* from the Northern Moluccas, therefore, being in pattern more closely allied to *sarpedon milon* and *sarpedon monticolus* (!) from Celebes than to *sarpedon anthedon* from Amboina and Ceram.

P. sarpedon dodingensis differs from *sarpedon anthedon* as follows: band on forewing narrower, having behind a breadth of from 5 to 6 mm. instead of 8 mm.; the band on hindwing also about 2 mm. narrower, which is especially obvious at costal margin and in cell. First submarginal spots on hindwing less arched, almost straight. On underside of hindwing there is, as in *milon* and *monticolus* (!), a red spot before cell between veins 6 and 7, which is absent from all the other subspecies of *sarpedon*.

The bands are in the ♂, not in the ♀, more blue than in *anthedon*.

Hab. Halmaheira (*type*); Batjan.

The differences in the genital armature of *dodingensis* and *anthedon* will be explained in another place.

5. **Papilio sarpedon timorensis** subsp. nov.

P. sarpedon parsedon, Nov. Zool. 1895. p. 442 (*d*) (*ex p.*).

♂. I am now in possession of Australian specimens of *sarpedon* which agree with the type of *P. sarpedon parsedon*, *Tr. Ent. Soc. Lond.* 1872. p. 99. t. 5. f. 1, and which show that I was wrong in applying this name to the Timor insect; *parsedon* is nothing else but a small specimen of *choredon* killed shortly after the emergence from the pupae.

For the Timor subspecies I propose the name of *timorensis*. It has the bluish green colour of *choredon*; the middle band of the forewing is posteriorly not so broad as in *choredon*, while the four anterior spots are larger; especially the third spot is comparatively very large, having a diameter of 4 mm. This spot is placed closer to the apex of the cell than in *choredon* and *sarpedon sarpedon*. The hindwing is longer than in *choredon*, and the tooth even more prominent than in *teredon*, Nov. Zool. 1895. p. 442 (*c*); the band has at the costa a breadth of 7 mm. On the underside the red costal mark of the hindwing stands closer to the median band than in *choredon*; the black line separating it from the band is thinner than the red mark.

A Wetter specimen differs from the Timor form in having the median band of both wings broader. On the left hindwing this individual has a small blue-green discal spot near the apex of the cell between veins 4 and 5, which reminds one of the discal series of spots present in *P. agamemnon* and allies.

Hab. Timor (*type*); Wetter.

The *male* genital armature will be figured and the differences between it and that of *choredon* pointed out by Dr. K. Jordan in another place.

6. **Papilio sarpedon jugans** subsp. nov.

♂. A small form with green, not blue-green, markings. The band of the wings shaped as in *timorensis*; third spot of the same size and position as in that form. Red costal line of underside of hindwing narrower than the black line which separates it from the median band. Hindwing shaped as in Indian *sarpedon*; therefore much shorter than in *timorensis* and *adonarensis*.

Two of my four specimens have an additional green spot between the second spot of the median band of the forewing and the costa.

The genital armature resembles more that of *timorensis* than that of *sarpedon* and *adonarensis*.

Hab. Waingapoeng, Sumba.

This form combines to a certain extent the characters of *sarpedon sarpedon* and *sarpedon timorensis*.

7. **Papilio sarpedon adonarensis** subsp. nov.

Papilio sarpedon parsedon, *l.c.* p. 442 (*d*) (*ex p.*).

♂. The median band of the forewing is nearly shaped and coloured as in *sarpedon sarpedon*. The first spot is relatively large, its diameter being $2\frac{1}{2}$ mm. The following four spots increase gradually in size; their respective diameters are 3 mm., $3\frac{1}{2}$ mm., 4 mm., $4\frac{1}{2}$ mm., and 5 mm.; the diameters of the remaining four spots are $6\frac{3}{4}$ mm., 8 mm., $7\frac{1}{2}$ mm., and $7\frac{1}{2}$ mm. The band of the hindwing has at the costa a breadth of 8 mm., and at the median vein of $3\frac{1}{3}$ mm. Below, the red and black costal lines of the hindwing are both half as broad again as in *timorensis*. Shape of hindwing nearly as in *timorensis*, but the tooth less pointed.

Distinguished from *sarpedon timorensis* and *sarpedon choredon* by the colour of the median band, by the larger anterior spots of the forewing; from *timorensis*, moreover, by the position of the third spot; and from both by the *male* genital armature (as will be explained later on by my assistant, Dr. K. Jordan). From *sarpedon sarpedon* it is distinguished especially by the much longer hindwings and their shorter band.

Four specimens from Tambora, Sambawa, collected by W. Doherty, at an elevation of 2000—4000 feet, in May 1896, stand exactly intermediate between *adonarensis* and Indian *sarpedon* in the shape of the hindwing.

Hab. Adonara (*type*) and Sambawa.

8. **Papilio phorcas ansorgei** subsp. nov.

♂. Differs from *P. phorcas* F. as follows: the spots of the forewing situate along the stem of veins 7 and 8 are smaller, and are separated from the spot at the base of the fork by a black interspace; the spot of the median band before vein 5 is absent, and the following spots are shorter than in *phorcas*. The submarginal band of spots of the hindwing stands farther from the margin, being at vein 5 situate midway between margin and cell. The tails are broader than in *phorcas*.

Hab. Man, Uganda Protectorate, May 18th, 1895, two ♂♂ (Dr. W. J. Ansorge).

Named in honour of the collector.

9. **Papilio phorcas congoanus** subsp. nov.

♂. Considerably larger than *phorcas*, the forewing having a length of 60 mm. The markings of the upperside are in all three individuals yellowish green; the median band is anteriorly broader, the spot between veins 4 and 5 measuring 7 mm. in length, that before it 5½ mm., while the spot behind the stem of veins 7 and 8 has a length of 9 mm. The yellowish green basal area of the hindwing does not extend quite so far to the apex of the cell as in *phorcas*.

Hab. Lukolele, Upper Congo, two ♂♂ (*type*); and French Congo, one ♂.

Whether the peculiar colour of the median band of the upperside is due to damp I do not know; but, as the three specimens have been caught at two different places by different collectors, the colour may be natural. The chief difference between *congoanus* and *phorcas* is the length of the forewing and the form of the median band.

10. **Appias montanus** sp. nov.

♂. Allied to *A. phoebe* Feld. The black apical region of the upperside of the forewing is more extended; the black spot at the apex of the cell is larger; the hindwings are creamy white, with a narrow sulphur-yellow border and a few black scales at the anterior nervules. On the underside the differences are very much pronounced: the apex of the forewing and the whole hindwing are yellow, not white; the hindwing has a black dot upon the second discocellular veinlet, and some very faint traces of black patches in the outer half.

Hab. Mount Calaon, Negros, Philippine Islands, 6000—7000 feet, February 1896 (J. Whitehead).

Mr. J. Whitehead sent a good series of this remarkable insect, which was found only at high elevations.

11. **Euryglottis dognini** sp. nov.

Near to *E. aper* (Wlk.) and *E. davidianus* Dogn., but differs as follows:—

Forewing: the subbasal transverse yellow bands are absent; the broad discal transverse band is similar to that in *E. aper*, but is almost obliterated.

Hindwing: has the white band as in *aper*, but much more distinct.

Underside: without bands.

Abdomen with four longitudinal rows of white spots; the lateral orange patches of *aper* are replaced by large white ones.

Hab. Loja, Ecuador (*type*), and Columbia.

12. **Herpa meeki** Rothsch. sp. nov.

♀. *Forewing:* two-thirds of wing creamy white, outer edge of this white area rounded; outer third black, with three white subapical spots; base and veins in black area bright metallic blue, the blue extending one-third along costa from base, and also costa from white area for 6 mm. into black area is blue; tip of fringe white.

Hindwing: white, bordered broadly with black; base and submarginal border bright blue, the latter colour running along some of the veins for a short way into black area.

Underside: as above, but hindwing with a white spot at apex.

The whole of body blue, except last six segments of abdomen, which are clay-brown.

Expanse: forewing AM 27 mm.; EM 17 mm.; PM 20 mm.
„ hindwing „ 20 „ ; „ 17 „ ; „ 12 „

Woodlark Island (*type*); and Fergusson Island, D'Entrecasteaux group, December 1894 (A. S. Meek *leg.*).

This species has the general appearance of a true *Chalcosia*, but the neuration agrees best with *Herpa*.

The Fergusson single ♀, which is in bad condition, has the black border of hindwing somewhat broader than the four Woodlark ♀♀.

13. **Oenetus marginatus** sp. nov.

♂. *Forewing:* bright yellowish grass-green, broadly reticulated with darker green; just beyond the centre is a transverse band of seven lunulated silver spots, and the costa is heavily spotted with brown; exterior margin with brown spots.

Hindwing: salmon-red, with green border starting from middle of abdominal margin, widest at anal angle, and running gradually narrower to the costa.

Underside: forewing salmon-red, with margins spotted green; costa brown, spotted with green. Hindwing nearly shaped as in *ramsayi* ♂, but shorter, broader, and at the apex more acutely produced; green, slightly washed with red; abdominal third red; costa green and brown-spotted.

Head and front of thorax dark green; mesothorax green, washed with grey, and with two brown dots; rest of thorax and anterior half of abdomen salmon-red; end half of abdomen green.

♀. *Forewing:* golden green to greenish gold, with very heavy dark green reticulations, forming often complete transverse lines; a broad central band extends from inner margin, almost reaching to costa, and is composed of round brown spots varying in number and distinctness.

Hindwing: darker red than in *male*; outer border greenish yellow.

Underside: forewing red, shaded with yellow towards outer margin. Hindwing yellow, washed with red, more so in cell. Body as in *male*.

Expanse: ♂, forewing:	length, 37 mm.	♀. 60 mm.
„ „ „	breadth, 18 „	„ 22 „
„ „ hindwing:	length, 29 „	„ 38 „
„ „ „	breadth, 20 „	„ 22 „

Hab. Kiriwini, Trobriand Islands, March and April 1895 (A. S. Meek *leg.*).

Described from a good series.

14. **Phalaenoides centralis** sp. nov.

♀. *Forewing:* burnt umber-brown, densely powdered with isabelle scales; the usual metallic spots in cell and a broad metallic band along vein 1*b* to inner angle; three creamy white spots; one 3 mm. from base and triangular; second almost triangular beyond middle of cell, separated from the first by a long brown patch; third spot large and ovate, situated outside cell, its size 6 by 3 mm.

Hindwing: uniform burnt umber, with white fringe; in centre of wing a round creamy-patch, 3 mm. in diameter.

Underside: ground-colour burnt umber, shading off into creamy buff towards margins; markings as above, but hindwing with a small additional creamy patch near base.

Head and three streaks on thorax cream-colour; rest of thorax burnt umber. Abdomen above smoky black, last three segments orange. Legs and underside of abdomen pale yellow; fore tibiae and fore tarsi spotted brown.

Expanse: forewing AM 24 mm.; EM 13 mm.; PM 17 mm.
„ hindwing „ 17 „ ; „ 13 „ ; „ 11 „

Hab. Rockhampton, Queensland (coll. Barnard).

15. **Milionia dysphanioides** sp. nov.

♂. *Forewing:* shaped as in *M. elegans*, Nov. Zool. 1895. t. vii. f. 1; purplish black, but without any metallic sheen; a large oblique greyish white patch is situated in the basal fourth, and extends from inner margin to median nervure, and is broadest in front of vein 1*b*; at apical half of cell there is an oblique greyish white band extending from the costa to submedian fold, and split up into three spots by the nervures; another bandlike spot near inner angle between veins 1 and 3; a subapical band consists of three spots, two close together near costa, and one between veins 3 and 4, near outer margin.

Hindwing: deeper black, with the following cadmium-yellow markings: at basal third a band extends from the abdominal margin across the wing to near apex of cell, stopping at middle fold of cell; then a second narrower from abdominal margin close to anal angle to vein 3; lastly two large spots between veins 3 and 6, nearer to the margin.

Underside: markings more extended, and on underwing the two subapical spots coalesce with second band.

Abdomen cadmium-yellow, except first segment, which, like rest of body, is black, as are four small round spots on each side of abdomen.

♀ only differs from *male* in the broader wings, the first band of hindwing above being indistinct; below in not having the second band joined to confluent subapical spots, and in having the middle segments of abdomen black.

Expanse slightly smaller than in *M. elegans* Rothsch.

Hab. Fergusson Island, D'Entrecasteaux group.

Three ♂♂, one ♀, collected by A. S. Meek, September to December 1894.

16. **Milionia flaviventris** sp. nov.

♂. *Forewing:* black, but most of the wing occupied by orange-red, leaving a broad black band along inner margin from base to near inner angle, where a small black patch between veins 1*b* and 2 is joined to it at right angles; the band is 3 mm. broad in centre, and tapers off to each end; the apical region is also black, 10 mm. broad at costal margin, and gradually narrowing to vein 2; a black patch 7 mm. long and 3½ wide reaches obliquely from middle of costal margin to a little beyond the cell; costal margin narrowly black.

Hindwing: entirely black.

Underside: as above; retinaculum black.

Thorax yellowish brown; abdomen yellow; head, underside of thorax, and legs sooty black.

Expanse: forewing AM 28 mm.; EM 17 mm.; PM 20 mm.
„ hindwing „ 20 „ ; „ 15 „ ; „ 14 „

Hab. British New Guinea, between Mounts Alexander and Nisbet, two ♂♂, January 1896 (A. S. Anthony).

17. **Milionia mediofasciata** sp. nov.

♀. *Forewing:* black, crossed by a broad transverse discal white band 6 mm. wide at costa and hindmargin and 9 mm. in centre; inner edge of band straight and at right angles to inner margin of wing; outer edge convex.

The second specimen has the white band somewhat narrower, especially from median vein to costa.

Hindwing: black, with broad oblique band of Chinese orange, reaching from abdominal margin close to anal angle to beyond vein 7; its width is 4 mm. at ends and 8 in centre; inner edge of band slightly undulated, and outer edge convex.

Underside: as above, but paler.

Body above black, below sooty brown.

Expanse: forewing AM 38 mm.; EM 21 mm.; PM 23 mm.
„ hindwing „ 26 „ ; „ 19 „ ; „ 16 „

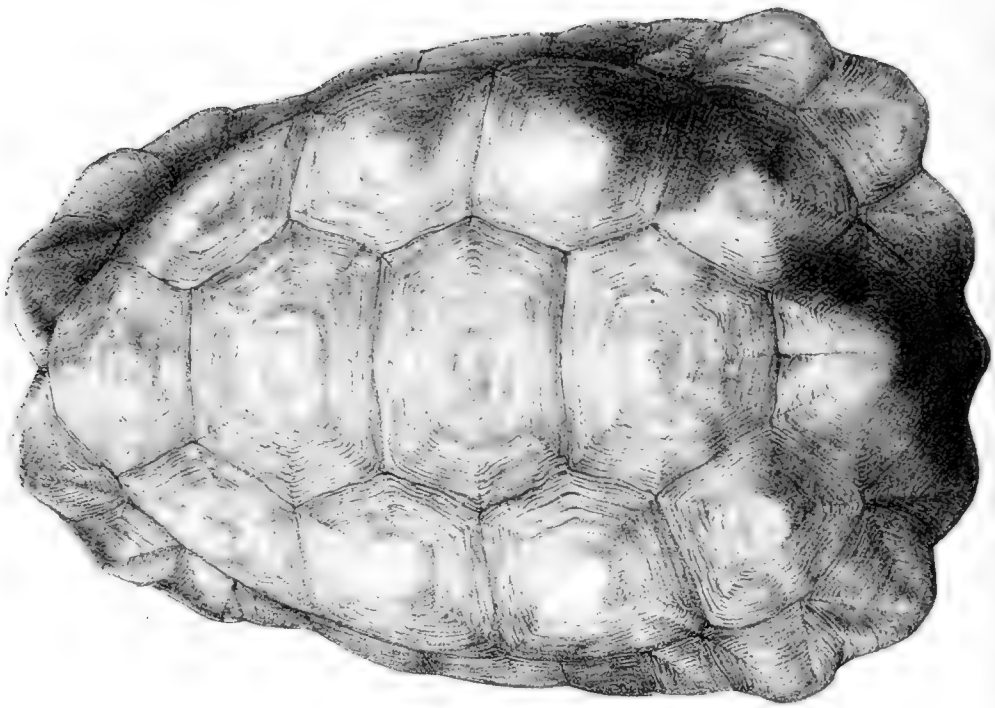
Hab. British New Guinea, between Mounts Alexander and Nisbet, two ♀♀, January 1896 (A. S. Anthony).

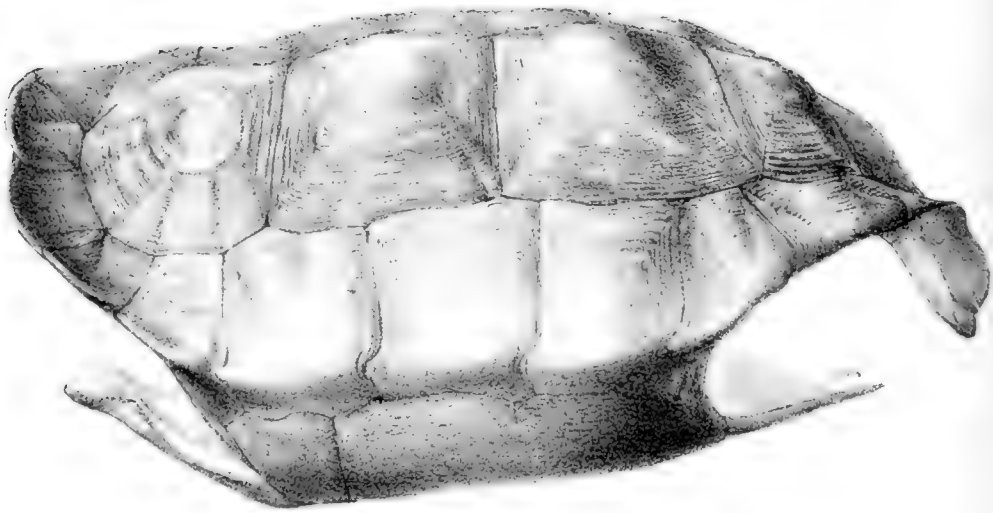
18. **Milionia rawakensis woodlarkiana** subsp. nov.

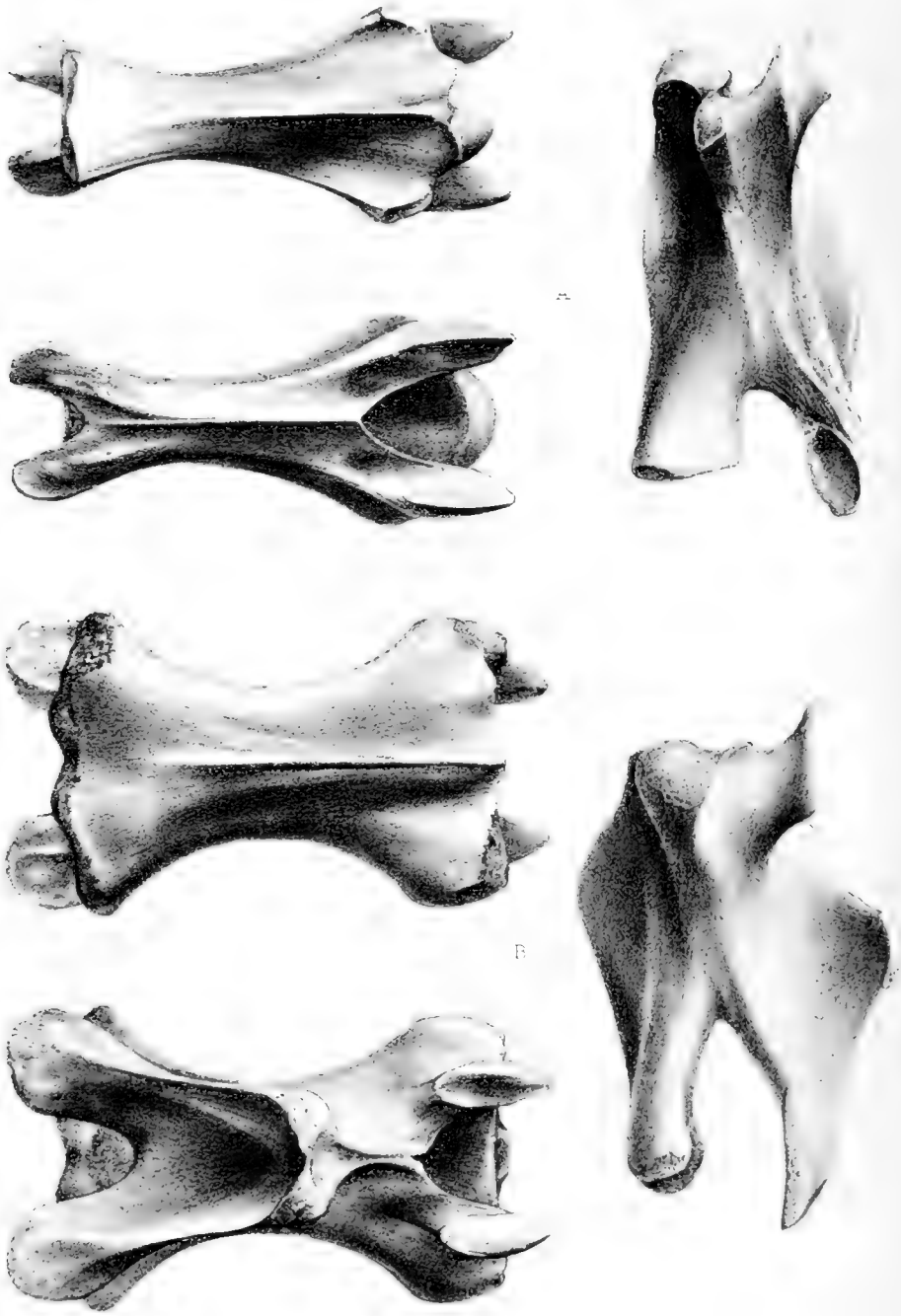
Differs from type in the extreme narrowness of the marginal band to hindwings, which has a uniform breadth of 3 mm.

I have a specimen of *rawakensis* from the Sattelberg, near Finschhafen, German New Guinea, which is intermediate.

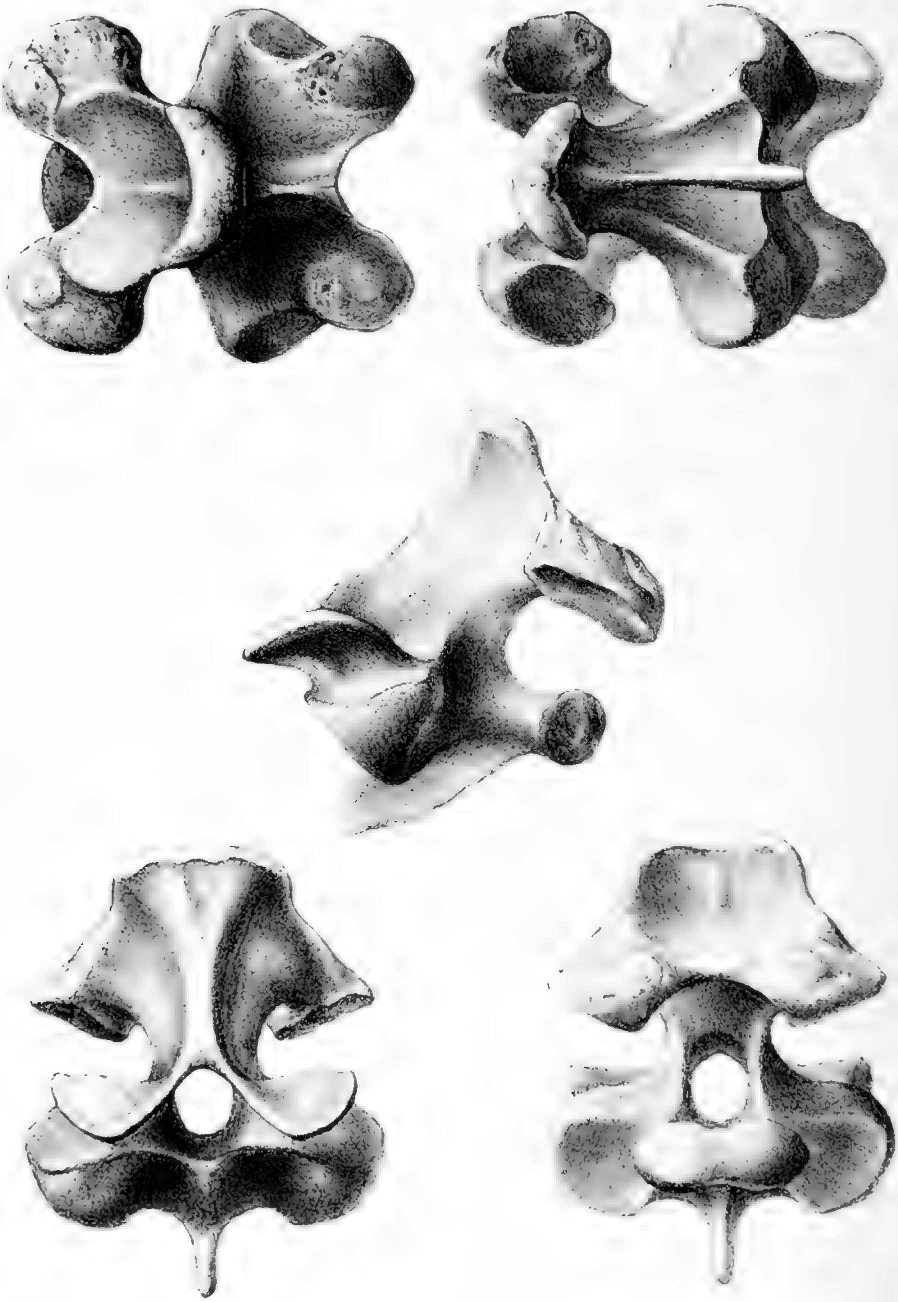
Hab. Woodlark Island, collected by A. S. Meek.







Mintern Bros. imp.



Mintern Bros. imp.

EIGHTH CERVICAL VERTEBRA
OF TESTUDO EPHIPPIUM

NOVITATES ZOOLOGICAE.

Vol. III. DECEMBER, 1896. No. 4.

TESTUDO EPHIPPIUM.

By DR. A. GÜNTHER, F.R.S.

(Plates XX., XXI., and XXII.)

THE subject of this paper is based upon materials which Dr. G. Baur collected in Duncan Island during his visit to the Galapagos Archipelago in 1891, and which were afterwards acquired by the Hon. Walter Rothschild. A large stuffed *male* with bones (carapace 29½ in. long, measured in a straight line) and the skeleton of a smaller *female* (carapace 22½ in.) were retained for the Tring Museum, whilst the skeletons of two *males* (respectively 27½ and 25 in. long) were transferred to, and are now in, the Natural History Museum.

These Duncan Island specimens belong to the species which I described from a stuffed adult *male* in the Edinburgh Museum of Science and Art under the name of *Testudo ephippium*.* The direct comparison with the type, of which carapace, skull, pelvis, and large limb-bones are preserved, leaves no doubt as to their specific identity. The agreement is so perfect as far as the parts mentioned are concerned, that they do not require a new description, but I am enabled to supplement my first account by describing the carapace of a young *female*, and the vertebral column which had been lost in the Edinburgh specimen.

Carapace of the Female, 22½ in. long (Pl. XX.).—The thickness of the shell is much greater than in *Testudo abingdonii*, but the individual plates are attenuated on the margins so as to leave now and then a narrow cleft between them.

As regards general form the differences from the adult *male* are clearly due either to sex or to less advanced growth. The front part of the carapace is less compressed, but the upper profile from the middle of the central dorsal plate is almost horizontal; the sides of the front part are decidedly concave, the concavity being deepened by the reverted anterior margins. The upper part of the shell, when viewed from above, is flat and broad; the hinder part is rounded, its middle portion being steeply declivous, whilst the marginal plates above the hind-legs are as strongly arched outwards and upwards as in the adult *male*. The posterior margin of the shell is deeply scalloped, more so than the anterior. The plates are deeply striated, the striated portion being very distinct from the areolar. Although we know the mode and rate of growth of the epidermal plates from Aldabra specimens kept in captivity, and although, in a state of nature, the growth most probably proceeds intermittently but at regular annual periods, so that each stria represents the extent of an annual growth, it would be somewhat hazardous to calculate the age of our individual from the number of striae. The oldest striae gradually disappear, and more prominent striae are mixed with less projecting. Thus, if in our specimen each visible stria is taken into consideration, its age might have been from fourteen to fifteen

* *Phil. Trans.* Vol. 165 (1875), p. 271; or *Gigant. Land Tort.* (1877), p. 81, with plates.

years, whilst if only the most prominent striae are counted, the age of this tortoise would not exceed ten years.

The sternum is slightly concave, truncated in front and thickened, the hind-margin being slightly excised and attenuated.

Length of carapace in a straight line	22½ in.
„ „ over curve	26 „
Width of carapace in a straight line	16½ „
„ „ over curve	24½ „
Depth of carapace	10 „
Length of sternum	18½ „
Width of sternum	15½ „
Length of caudal plate	2 „
Width of caudal plate	4¼ „
Circumference of vertical section of carapace ...	41½ „

A description of the *skull* would be superfluous. The skulls of these Duncan Island tortoises agree minutely with that of the type of *T. ephippium*, showing especially the same want of depth in the concavity of the palatal region, by which this species is distinguished from *T. abingdonii*. It may be useful to give the measurements of the skulls and cervical columns of the specimens examined:—

	♂ Tring.	♂ N.H.M.	♂ N.H.M.	♀ Tring.
Length of carapace . .	29½ in.	27½ in.	25 in.	22½ in.
„ skull . . .	4¼ „	4 „	3⅞ „	3½ „
„ cervical column .	19 „	18 „	17 „	13 „

For reasons which presently will become sufficiently apparent, I have compared the *cervical vertebrae* particularly with those of *T. abingdonii*, to the description of which I refer the reader. They are rather less slender, of a heavier build but altogether smaller. The crests and ridges are less developed. In other respects they are shaped of the same type, but the third, seventh, and eighth show distinctly specific characters.

In the *atlas* the lateral portion of the neural arch is conspicuously constricted, and in its broadest part it is as wide as the trihedral zygapophysis; this latter is longer than that part of the bone which forms the roof of the neural arch.

The *third* cervical vertebra (Pl. XXI. fig. A) is provided with a high and sharp neural crest extending the whole length of the bone; the haemal crest is also well developed, though much lower than the neural.

The *sixth* cervical vertebra has its haemal crest scarcely more prominent than the preceding vertebrae; and its posterior condyle is nearly completely bipartite.

The *seventh* cervical vertebra (Pl. XXI. fig. B) is, relatively to its length, much deeper than the corresponding vertebra of *T. abingdonii*,* and the summit of its neural crest is swollen, without excision in the middle.

The *eighth* cervical vertebra (Pl. XXII.) is more solidly built than in *T. abingdonii*,† the grooves and impressions being much less conspicuous; especially the deep lateral impression, which is so characteristic of *T. abingdonii*, is entirely absent in *T. ephippium*.

In order to show the measurements of the several vertebrae as compared with *T. abingdonii*, I have prepared the following table:—

* See *Gigant. Land Tort.*, Pl. L. fig. F. † *L.c.*, Pl. L. fig. G.

Cervical Vertebrae.		Length of centrum	Depth of centrum in the middle	Horizontal width of middle of centrum	Width of anterior condyle	Width of anterior glenoid cavity	Width of posterior condyle	Width of posterior glenoid cavity	Distance of outer margins of anterior zygapophyses	Distance of outer margins of posterior zygapophyses
1st.	*T. abingdonii.*	...	...	...	...	...	...	..	...	..
	T. ephippium (Tring ♂).	18	13	11	...	...	...	...	...	31
	T. ephippium (N.H.M. ♂).	12	11	14	...	...	...	...	...	28
	T. ephippium (N.H.M. ♂).	13	13	13	...	...	...	...	...	28
2nd.	*T. abingdonii.*	62	34	15	22	...	...	21	28	35
	T. ephippium (Tring ♂).	45	32	12	15	...	...	15	21	25
	T. ephippium (N.H.M. ♂).	45	27	8	15	...	...	14	19	24
	T. ephippium (N.H.M. ♂).	46	27	12	17	...	...	15	18	22
3rd.	*T. abingdonii.*	88	34	18	22	...	...	26	30	31
	T. ephippium (Tring ♂).	64	31	13	15	...	...	17	30	24
	T. ephippium (N.H.M. ♂).	58	28	17	16	...	...	17	27	24
	T. ephippium (N.H.M. ♂).	62	30	15	16	...	...	19	26	25
4th.	*T. abingdonii.*	122	33	23	25	...	31	...	38	37
	T. ephippium (Tring ♂).	85	25	14	18	...	22	...	32	29
	T. ephippium (N.H.M. ♂).	80	27	12	18	...	20	...	29	30
	T. ephippium (N.H.M. ♂).	83	28	13	19	...	22	...	29	28
5th.	*T. abingdonii.*	114	34	22	...	34	31	...	43	50
	T. ephippium (Tring ♂).	77	28	18	...	25	23	...	36	37
	T. ephippium (N.H.M. ♂).	70	23	15	...	25	22	...	33	28
	T. ephippium (N.H.M. ♂).	77	28	17	...	29	25	...	34	30
6th.	*T. abingdonii.*	118	38	29	...	37	42	...	53	36
	T. ephippium (Tring ♂).	80	31	11	...	30	37	...	39	28
	T. ephippium (N.H.M. ♂).	73	31	21	...	26	28	...	54	30
	T. ephippium (N.H.M. ♂).	77	32	23	...	29	32	...	36	28
7th.	*T. abingdonii.*	99	68	26	...	44	...	47	44	56
	T. ephippium (Tring ♂).	69	48	24	...	37	...	45	30	44
	T. ephippium (N.H.M. ♂).	63	15	20	...	31	...	34	35	42
	T. ephippium (N.H.M. ♂).	65	49	23	...	33	...	34	34	44
8th.	*T. abingdonii.*	63	46	30	45	...	39	...	60	76
	T. ephippium (Tring ♂).	37	42	17	47	...	25	...	45	52
	T. ephippium (N.H.M. ♂).	38	37	23	37	...	23	...	42	48
	T. ephippium (N.H.M. ♂).	42	43	19	39	...	25	...	46	50

The *dorsal vertebrae* have the following measurements :—

Lengths of Centra of Dorsal Vertebrae.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.
N.H.M. ♂	56 mm.	60 mm.	68 mm.	69 mm.	64 mm.	49 mm.	37 mm.	26 mm.	14 mm.	14 mm.
N.H.M. ♂	50 „	57 „	60 „	61 „	58 „	43 „	33 „	22 „	14 „	14 „
Tring ♀	39 „	45 „	51 „	56 „	48 „	37 „	29 „	18 „	13 „	13 „

The number of *caudal vertebrae* is 27 in the *male*, and 26 in the *female*.

With regard to the attachment of the iliac bones the *female* specimen differs from the two *males*. In the latter the iliac bones abut against the pleurapophyses of the tenth, eleventh, and twelfth vertebrae, the protuberance for the articulation being opposite to the pleurapophysis of the tenth vertebra. In the smaller *female* the pleurapophyses of the ninth and tenth form the articulary tubercle, the eighth joining it by anchylosis, and the eleventh (which is rather stout) and twelfth (which is a very slender rod) by cartilage. Of course this is not to be regarded in the light of a sexual character, but merely as an individual variation.

In the foregoing notes I have paid particular attention to a comparison of the material before me with *T. abingdonii*, not only because the two species are outwardly very similar, but also because Dr. Baur, in a paper published some years before his visit to the Galapagos,* maintained that *T. abingdonii* and *T. ephippium* were the same species. He took this view for two reasons.

I. Dr. Baur's first argument refers to the history of the type of *T. ephippium*.

In my first description of this type† I had stated that "nothing is known of its history"‡; but considering Porter's notice of the peculiar saddle-shaped carapace of the Charles Island tortoise applicable to the type of *T. ephippium*, I suggested that this latter might have come from that island. Two years later I abandoned this view, and thought Indefatigable Island more likely to be the true habitat of this race.§

However, in the paper quoted above (*Amer. Nat.* 1889, p. 1039), Dr. Baur informs us of a very interesting discovery which deserves our fullest attention.

* *Amer. Nat.* 1889, December, p. 1039.

† *Philos. Trans. l.c.*

‡ I believe this statement was fully justified on my part. To a letter which I addressed in 1872 to the then Director of the Museum of Science and Art, asking for information about the history of the specimen, I received the following reply:—

"Edinburgh, Museum of Science and Art.
"*March 3rd*, 1872.

"Dear Dr. Günther,—

"Mr. Archer having handed me your letter about the tortoises, I am sorry to say we have no record of its history with which we can assist you in your work. It belongs to the prehistoric period of our museum!

"Yours ever faithfully,
"(*sd.*) Ramsay H. Traquair."

Two years later I made another attempt, and requested my late friend, Dr. Alexander Smith of Edinburgh, to make further inquiries into the matter; but he also, under date of February 16th, 1874, wrote to me that he had been unsuccessful in finding out anything about the history of the specimen.

§ *Gigant. Land Tort.*, p. 11 (1877). It is unfortunate that in republishing in 1877 my first description of 1874, I omitted to alter the passage treating of the probable habitat of this species, and to state the reasons by which I was induced to change my opinion.

He happened to consult an edition of Captain Basil Hall's *Extracts from a Journal* (London, 1840), in which the author, when speaking of the Abingdon tortoises, says : " I preserved one in a cask of spirits, and it may now be seen in the Museum of the College at Edinburgh : *it is of medium size*" * (the italics are mine). This discovery received further confirmation when Dr. Traquair, on renewing his inquiries, found in the records of the old College Museum an entry of a " Large Turtle from South Sea—Captain Basil Hall." Unfortunately no mark or label is attached to the specimen, by which its identification could have been placed beyond question, so that—as Dr. Traquair says at the end of a letter to Dr. Baur—" we have no *absolute* certainty as to whether our *Testudo ephippium* is the specimen from the 'South Sea' presented by Captain Basil Hall or not."

In this I must share Dr. Traquair's opinion, particularly as there is some difficulty in reconciling Hall's statement of the size of his specimen with that of the Edinburgh specimen.

The types of *Testudo abingdonii* brought home by Captain Cookson, R.N., are of extreme age, and have evidently reached the limit of size to which this species grows : one weighed 201 pounds, with a carapace 40½ inches long (over the curve) and a sternum 26 inches long. Hall, who also gives the measurements of the Abingdon tortoise, and of course for that purpose would have selected a large individual, states that a specimen weighing 190 pounds had a shell 43 inches and a sternum 29 inches long. Now, the type of *T. ephippium* with a shell of 40 and a sternum of 24 inches is but little smaller than those giants from Abingdon Island. Is it likely that Hall would have described this specimen as " one of medium size," suitable for preservation in a cask of spirits ? Yet, as far as the historical evidence goes, if there were no other grounds for disagreeing with Dr. Baur's conclusions, I should have felt bound to let the matter rest where he left it.

II. But Dr. Baur thinks to clinch the matter by adding in a footnote on p. 1043 that he had an opportunity of examining a skeleton from Abingdon Island in the U. S. National Museum, and that " a comparison of the elements missing in the British Museum specimens with the corresponding ones of *Testudo ephippium* leaves no doubt that *Testudo abingdonii* is not different from *Testudo ephippium*." I cannot see the logic of Dr. Baur's argument. Even if it were the fact that all those missing elements agree in both species, still there remains the difficulty about those elements which are preserved in both the Edinburgh and British Museum specimens, and which do differ in a remarkable manner, as I have already described. Take, for instance, the skull, as to which I am in a sufficiently good position to form an opinion. Of this part of the skeleton I have examined and compared

Three skulls of *Testudo abingdonii*,
One of the type of *Testudo ephippium*,
Four of the tortoise from Duncan Island.

* Dr. Baur states that in quoting Basil Hall I had *omitted* this note. This may give a wrong impression as to my manner of quoting. The edition which I used is Hall's *own original edition* (Edinb., 1824), and that note *does not appear* in it. It was inserted by Hall in later popular editions of the existence of which I was ignorant ; the edition used by Dr. Baur is not even in the library of the British Museum, and I found it only in that of the Admiralty. The note in question appears for the first time in Constable's *Miscellany of Original and Selected Publications* (Edinb., 1826-7, 16mo).

Of these the five latter agree in all respects, and particularly, independently of age, in the remarkable flattening and shallowness of the palatal region, while the three skulls of *T. abingdonii* have this part narrower and deeply concave. This agreement in the latter is all the more significant as the skulls are those of old individuals, in which one might have expected a certain amount of individual variation.

The enumeration of other distinctive characters would be merely a repetition of what I have pointed out in my former description and in the first part of the present paper.

Dr. Baur himself admits the distinctness of the Duncan Island tortoise from that of Abingdon Island. He says: "We were fortunate enough to find a new species of tortoise in this island." *

Now as far as shell, skull, and large limb-bones—the only parts preserved of *T. ephippium*—are concerned, the agreement of the Duncan Island specimens with *T. ephippium* is perfect, and therefore I see no reason, at present, for separating them under a distinct name, as Dr. Baur seems inclined to do. Indeed a glance at the map of the Archipelago shows the great improbability that the tortoise of Duncan is identical with that of the outlying Abingdon. Not only are the two islands more than 1° of Lat. distant from each other, but there is James Island intervening, which is, or was, inhabited by a distinct type of a deep-black colour and rounded circular shape. Now, if I am correct in assigning the Duncan Island tortoise to *T. ephippium*, the fact of this identity would be strong evidence against the supposition that the type of the latter species is Basil Hall's specimen.

Where, then, does the type of *T. ephippium* come from? As mentioned above, in the Synopsis of the *Gigantic Land Tortoises*, written long after the descriptive portion, I stated that it came from Indefatigable Island. At this time, after a lapse of twenty years, I have no recollection of the grounds which induced me to substitute that island for Charles Island. Possibly Commander Cookson, who by that time had returned home, gave me information pointing to Indefatigable Island as the probable home of *T. ephippium*. If this should prove to be the fact, then its identity with the Duncan Island tortoise could be readily accounted for by the close proximity of Indefatigable and Duncan Islands.

I do not despair that this as well as other obscure points in the distribution of these tortoises are still capable of definite solution, although the majority of the races may be extinct or are being exterminated. There must be many remains of specimens which perished ages ago, scattered over the islands. It is of great importance that in future visitors should collect and preserve those remains, especially skulls. Those found at a great distance from the shore would be the more valuable, as they afford incontestable evidence of being derived from animals really indigenous to the island. For we must not forget that those picked up near landing-places may be remains of specimens which were transported by crews of vessels from some other island and slaughtered when or wherever their meat was required.

* *Ein Besuch der Galapagos Inseln* (München, 1892), p. 35: "Wir waren so glücklich, auf dieser Insel eine neue Art von Schildkröten to finden."

NEW SPECIES OF *DREPANULIDAE*, *THYRIDIDAE*, *URANIIDAE*, *EPIPLEMIDAE*, AND *GEOMETRIDAE* IN THE TRING MUSEUM.

By W. WARREN, M.A., F.E.S.

Family *DREPANULIDAE*.

1. **Albara humerata** sp. nov.

Forewings: fawn-colour, the costal edge from base to middle yellowish; the lines ferruginous, starting from dark brown costal spots; first at one-fourth, oblique outwards, angled on the subcostal, then straight and vertical or slightly oblique to inner margin beyond one-third; second line from costa at middle, runs outward along the subcostal vein for two-thirds of the distance to the apex, is then sharply angulated, incurved opposite the cell and outcurved below it, reaching the inner margin straight at four-fifths; submarginal line strongly denticulate, blackish; marginal area dark grey, with some irregular black marks before the fringe, which is chestnut with a pale basal line; apical one-third of costa with a chestnut streak, the apex itself with one or two snow-white spots; cell-spot large, blackish, followed obliquely below it by four small white spots edged with black, and sometimes altogether black.

Hindwings: fawn-colour, in the ♀ with the costal area ochreous; in the ♂ with the ochreous tint suffusing the wing and leaving only the inner and anal margins fawn-colour; a curved postmedian line, abbreviated in the ♂, reaching to the ochreous costal part in the ♀, which also has a short antemedian line on inner margin which is wanting in the ♂.

Underside glossy yellow, in the forewings more or less suffused with grey. Face and palpi blackish; fillet and antennae purple-black; collar ferruginous; thorax and abdomen fawn-colour; legs and abdomen beneath yellow; the forelegs fuscous-tinged.

Expanse of wings: 22—24 mm.

Many examples from the Khasias, dated May, September, and December. Distinguished by the strongly arched base of costa of the forewings.

2. **Cobanilla jaspidea** sp. nov.

Forewings: red, the basal and outer areas tinged with paler and ochreous; first line at one-third, dark red, curved below costa and oblique inwards; basal area varied with ochreous and darker reticulations, the costal portion rosy; second line from costa at three-fourths, sharply angled outwards towards apex, then oblique to inner margin beyond middle, before which it is slightly bent, dark purple, edged with whitish scales; cell-spot lunulate, red with paler centre and surrounded by a bronzy orange patch; marginal area beyond second line pinkish ochreous with a few dark reticulations, becoming deep red again along hindmargin; apex marked with black.

Hindwings: with the bronzy orange patch larger, edged by an angulated line; the disc and inner margin spotted with patches of white scales; the outer area towards costa with dark spots between the veins; fringe of both wings deep red.

Underside fulvous, spotted with fuscous; the oblique line and anal angle of forewings deep brown. Face, palpi, and forelegs bright red; thorax paler; abdomen deep red.

Expanse of wings: 48 mm.

One ♀ from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

3. **Drapetodes interlineata** sp. nov.

Forewings: pale brownish ochreous, the costal edge white: a subcostal line of shining black scales from middle of base to near apex, before which it is bent at right angles and waved to third median, and again bent and oblique to inner margin before middle; in the lower part and along the waved apical portion it has a broad pale inner edge; between the two lines are two similar brownish lines from inner margin nearer base, waved before apex; a very fine dark lunulate submarginal line from apex, marked with black dots on veins, divergent inwards from the margin above anal angle, to inner margin at three-fourths, and there thicker; fringe concolorous, with a fine dark line; some black streaks on costa at base and before apex; two black discocellular dots.

Hindwings: crossed by a succession of straight lines; basal area pale; two dark antemedian lines enclosing a brown fascia with a line along its centre; a pale fascia with the black cell-dot in it, edged by a brown line; exterior line black, finely crenulate, with a pale broad inner edge, preceded and followed by a pair of brown lines; submarginal line straight, dark, the margin beyond it darker; fringe with a fine dark basal line.

Underside pale ochreous, with only the outer lines shown. Face and palpi ochreous below, red-brown above; thorax and abdomen brownish ochreous.

Expanse of wings: ♂, 24 mm.; ♀, 26 mm.

A pair from South Java, 1891; 1500 feet (Fruhstorfer).

The antennae of the ♂ are not only thickened and flattened, but uniserrate, the teeth curved and close together.

4. **Drapetodes lunulata** sp. nov.

Forewings: brownish ochreous; the inner margin at base and an oblique streak from apex to middle of inner margin ochreous yellow; some darker brown irregular streaks on inner area, oblique outwards from costa and inwards to inner margin; the pale streak towards apex is crossed by two series of strongly sagittiform brown markings, succeeded by six broad whitish lunular marks, the last three lying in an oblique line to the inner margin; a triangular space at anal angle dark grey-brown; marginal line dark brown; fringe chequered pale and dark ochreous.

Hindwings: with basal area yellowish, crossed by two brown lines; median area greyish ochreous, with two black discal spots and a postmedian darker line; marginal space narrowly dark grey, broadening towards anal angle, preceded by a row of large irregular yellow lunules, each edged internally by a paler brown-edged crescentic mark; fringe ochreous grey, with slight pale markings.

Thorax and abdomen ochreous brown, the latter whitish at sides; face and vertex pale ochreous. Underside cream-colour; the fringe and some submarginal spots greyish.

Expanse of wings: 30 mm.

One ♀ from West Java.

5. **Euchera absentimacula** sp. nov.

Nearest to *substigmaria* Hüb., from which it is at once distinguished by the entire absence of the round cell-spot in both wings, above and below; in its place on the upperside of forewings is a flattened oval oblique pale spot. All the grey markings are rufous-tinged, especially those towards apex of forewings; the edge of the basal area and the inner edge of the central fascia, after angulation on the subcostal, descend nearly vertically to inner margin, instead of being oblique and curved; the outer edge of central fascia opposite the cell is blunt and vertically waved, not oblique and angulated; and the exterior wavy line is complete throughout, the marginal area coloured with rufous grey. The hindwings are without any dark suffusion or blotches on the outer line towards apex. On the underside the costal region of forewings is broadly tinged with rufous grey. The same size as *substigmaria*.

One ♂, one ♀, from Java.

Gonocilix gen. nov.

Forewings: with costa arched; apex slightly produced, blunt; hindmargin angled at vein 4, with a shallow excision above and below; anal angle distinct.

Hindwings: with apex rounded; anal angle square; hindmargin bluntly toothed at vein 4.

Antennae thickened and flattened; palpi porrect, not reaching beyond face; tongue and frenulum present.

Neuration: discocellular strongly inangulated; the first subcostal free, running close to second; second anastomosing with stem of third and fourth, forming a long areole; the fifth subcostal given off just before the end of areole; the upper radial from the areole. Hind tibiae with four spurs.

Type: *Gonocilix ocellata* sp. nov.

6. **Gonocilix ocellata** sp. nov.

Forewings: white, the markings blue-grey; first line at one-fourth, marked by three blotches, one on costa, another in the submedian interspace, the third on inner margin; at end of cell is a large oblique oval pale olive blotch, edged outwardly with fuscous brown, the veins within it silvery white, an oblique costal blotch above it, and a larger diffuse one beyond it; a silvery white streak on the inner edge of the ocellus is continued to inner margin as an olive double streak, the branches of which are divergent; a subapical costal blotch and submarginal blue-grey band of partially connected spots; a marginal row of dark grey blotches, continued into the paler grey fringe, which has a fine white basal line and is chequered with white at the ends of the veins, and is altogether white at apex and anal angle; between veins 2 and 3 beyond the ocellus is a round hyaline space, and three or four more in the submarginal band, that at the top, beneath the subapical blotch, the largest.

Hindwings: with a double basal line; an ocelloid blue-grey blotch, containing

first a white line, then the veins silvery, tipped with black, and followed by three hyaline patches; the rest as in forewings.

Underside silvery white, blotched with cinereous brown, most extensively in forewings. Face and palpi brown; thorax and abdomen white, the latter with the three middle and anal segments marked with blue-grey.

Expanse of wings: ♂, 36; ♀, 48 mm.

A pair from the Khasia Hills.

7. **Oreta fuscimargo** sp. nov.

Forewings: yellow, tinged with rosy in parts; no first line; a slightly darker cloud on the discocellular; hindmargin tinged with red and darkened by purple and grey scales, with a darker blotch below the middle; an obscure fine reddish line from before apex to inner margin beyond middle.

Hindwings: with the red line central and plainer; traces of an antemedian line; the area between the two tinged with rosy, and the apex also reddish; fringe yellow, but red at apex; altogether dark red in forewings.

Underside glossy yellow; forewings with a brown marginal band. Face, pectus, and forelegs red; thorax and abdomen yellow.

Expanse of wings: 26 mm.

One ♀ from Coomooboolaroo, Duaringa, North Queensland (A. S. Meek).

The antennae are densely serrate.

8. **Phalacra strigata** sp. nov.

Forewings: ochreous, suffused and dusted with pale brownish; a double angulated line at one-third, the inner arm marked by brown spots on the veins, the outer by brown blotches; from the middle of the discocellular a straight brown striga runs to the hindmargin; three brown subapical costal spots, from each of which runs a curved series of vein-dots, those before the margin the largest; a brown blotch at anal angle; fringe ochreous, chequered with brown.

Hindwings: with four or five very faint parallel lines before the middle, and eight in the marginal area; of these last, the second, third, and fourth are distinct; the submarginal one marked with brown dots on the veins; a brown dot at each end of the discocellular, and some brown costal spots; hindmargin excised below apex and with a tooth below third median.

Underside darker, with interrupted brown submarginal fasciae to each wing; space on inner margin between middle line and fascia whitish; this is also visible on the upperside. Face and palpi blackish; head, thorax, and abdomen ochreous.

Expanse of wings: 42 mm.

One ♂ from Cherrapunji, December.

9. **Teldenia obsoleta** sp. nov.

Forewings: white; a pale ochreous waved line, formed of small lunules near hindmargin; faint traces of ochreous lunules, indicating an exterior line, below costa and in middle; fringe white, with concise black spots between the veins at base.

Hindwings: like forewings, without any trace of an exterior line.

Underside pure white. Palpi and upper half of face red-brown; lower half white; vertex, thorax, and abdomen white.

Expanse of wings: 23 mm.

One ♂ from Dili, Timor, May 1892 (W. Doherty).

10. **Teldenia unistrigata** sp. nov.

Forewings: white, the costa narrowly pale ochreous; a curved ochreous line from two-thirds of costa to four-fifths of inner margin; fringe white.

Hindwings: with the ochreous line parallel to hindmargin, at four-fifths.

Underside white, without markings. Face, vertex, and palpi dark brown; thorax and abdomen white.

Three ♂♂ from Padang Rengas, Perak, Malay Peninsula.

Expanse of wings: 20 mm.

11. **Tridrepana argentistriga** sp. nov.

Forewings: yellow, the outer half with pale red-brown suffusion; a dark red-brown oblique line from before apex to middle of inner margin, meeting there a vertical line which becomes obsolete at the median; an irregularly wavy red-brown submarginal line, its upper half edged externally with silvery white; fringe deep red-brown.

Hindwings: wholly yellow, the oblique line antemedian; a fine threadlike postmedian line; an oval silvery spot at lower end of discocellular, and a fine linear one at the upper end; fringe yellow.

Underside pale yellow, the forewings flushed with reddish, with an abbreviated oblique line and some submarginal spots red-brown. Face bright red above, yellowish below; thorax and abdomen yellow, the latter with a red ring across second segment.

Expanse of wings: 32 mm.

One ♂ from Mt. Mulu, North Borneo (1000—4000 feet).

Near to *postica* Moore and *xanthoptera* Hmpsn.

12. **Tridrepana septempunctata** sp. nov.

Forewings: rich fulvous, except the base and a patch at anal angle; basal line brown, oblique outwards, forming a blotch below the median; outer line just beyond middle, very sinuous, and indented on the submedian fold towards the blotch on first line; a white spot in cell and two at the ends of the discocellular, the bottom one the plainest of the three; two large white oval blotches before hindmargin in the spaces opposite the cell, with black scales on their inner half; two smaller white spots obliquely above them, edged with black, and four blackish spots below them; apical area red-brown; fringe deep red-brown passing into black, except at anal angle, where it is yellow.

Hindwings: wholly yellow, with a basal and wavy postmedian brownish line, most distinct towards inner margin; a submarginal row of black dots; discal spot large, whitish, ringed with fuscous; fringe yellow.

Underside all yellow; forewings with a blackish subapical blotch and the top of an outer line dark. Face, fillet, palpi, and forelegs rather bright red; thorax and abdomen yellow flushed with fulvous.

Expanse of wings: 34 mm.

One ♂ from the Khasias, November 1895.

Related to *albonotata* Moore.

13. **Tridrepana trisulcata** sp. nov.

Forewings: whitish, almost wholly suffused with pale sandy ochreous; first line from costa just before middle, whitish, edged with brown by the costa, angled outwards on subcostal and median veins, incurved in cell, and oblique below the median to inner margin before middle; exterior line straight and oblique from inner margin at two-thirds, twice sharply angled beneath costa, whitish, edged inwardly with brown; submarginal oblique and straight till near apex, where it is bidentate; a fine brown marginal line; space on either side of submarginal line rather darker; costal apical area red-brown between the lines.

Hindwings: pale ochreous, with traces of alternate pale and ochreous bands along inner margin only.

Underside pale ochreous, with the lines faint; base of forewings dull brownish. Face and antennae dark brown; thorax and abdomen yellowish ochreous.

Expanse of wings: 28 mm.

Two ♂♂ from Darjiling.

The pectinations of the antennae are very delicate and rather far apart.

Family *THYRIDIDAE.*

14. **Banisia atriclathrata** sp. nov.

Forewings: reddish cinereous, the basal two-fifths and the costal area throughout dull red-brown; the darker portions with obscure dark reticulation, the paler with distinct black spots and strigae; in the middle of the wing is a pale irregular oval space, not reaching either costal or inner margin, with fairly well defined dark edges; fringe dark red-brown, the marginal area before it tending to become darker.

Hindwings: red-brown, with rows of dark spots, and an ill-defined dark central fascia.

Underside paler, with the markings brown, more distinct. Face, head, thorax, and abdomen all red-brown, the thorax somewhat paler; the abdomen with a deeper dorsal stripe and spotted with black on sides and underneath.

Expanse of wings: 30 mm.

One ♂ from the Khasias, July 1895.

15. **Banisia elongata** sp. nov.

Forewings: pinkish ochreous, faintly reticulated with darker, the markings pale chestnut; basal half of costa with four or five small square brown blotches with darker edges, from which obscure reticulated lines arise; just beyond the middle a large brown blotch, from which a brown fascia runs vertically to inner margin, with a slight arm projecting externally below costa; before the apex a large pale brown triangular blotch, the apex pointing basewards; its base concisely edged and parallel with the hindmargin, with a fine brown streak from its lower angle to the anal angle, where another similar streak meets it from the subcostal projection of the central fascia; fringe concolorous, with a fine basal line.

Hindwings: with a dark basal line, followed by a clear paler ochreous space; a central rich brown fascia, with a duller brown shade following it; a small deep brown spot at anal angle.

Underside paler, with all the markings bright chestnut, the central fascia of the forewings becoming dark brown on the inner margin; hindwings with the basal area, the central fascia, and the hindmargin chestnut, edged with darker, and with dark brown wavy streaks along the inner margin. Palpi and collar dark chestnut; face, thorax, and abdomen greyish ochreous.

Expanse of wings: 32 mm.

One ♂ from Cedar Bay, south of Cooktown (A. S. Meek).

The forewings of this species are more elongate than usual, the costa convex near base and before apex.

16. **Banisia mollis** sp. nov.

Forewings: pale ochreous, the reticulations and markings pale brownish; a narrow fascia at one-third, broadened and angulated on the median; a second before the middle, oblique to the median, then vertical and represented only by an elongated *x*-shaped mark; third beyond middle, broadening outwards to the anal angle, its outer edge curved, and joined above the median to the second fascia; fourth forked at costa and ending at middle of hindmargin; apical area pale brownish; all the pale spaces traversed by wavy slightly interlacing pale brown lines; fringe pale.

Hindwings: without fasciae, but with numerous transverse lines on basal half, and two prominent curved brown lines, one from centre of costa to anal angle, the other from before apex to middle of hindmargin.

Underside precisely the same; the cell of the forewings clothed with pale flossy hairs. Head, thorax, and abdomen ochreous tinged with brownish; the abdomen darker brown.

Expanse of wings: 58 mm.

One ♂ from Sikkim, July 1889 (Pilcher *leg.*).

The costal region of forewings, both above and below, is paler ochreous than the remainder of the wing.

17. **Banisia multifenestrata** sp. nov.

Forewings: greyish fuscous, with darker fuscous reticulations and fasciae; a short curved fascia at one-fifth; an inwardly oblique fascia before middle, with concise outer and diffuse inner edge; beyond the middle a fascia which broadens out towards the centre and below the median becomes bifid, the inner branch reaching inner margin at two-thirds, the outer just before anal angle; apical and marginal area with some ill-defined clouds, containing dark black-spotted reticulated streaks; between veins 2 and 4, on each side of the inner fork of the outer fascia, are hyaline spots traversed by vein 3.

Hindwings: with an obscure basal fascia, a distinct central band, and the whole marginal third, dark greyish fuscous; the space on either side of central fascia more or less hyaline, intersected by the veins and reticulated by transverse strigulae; fringe of both wings concolorous; the edges of the fasciae, especially in the hindwings, are in places marked by black scaling.

Underside paler, with the fasciae brown and more distinct, especially the black scaling at their edges; hindwings with a square blackish blotch at end of cell. Head, thorax, and abdomen all greyish fuscous.

Expanse of wings: 34 mm.

Two ♂♂ from Humboldt Bay, New Guinea, September and October 1892, taken by Doherty.

One of these examples, not in so good a condition as the other, is much more ochreous in tone; this may be owing to the colour fading, but it appears natural.

18. **Camptochilus sinuosa** sp. nov.

Forewings: yellow; the basal area marked with an aggregation of bright ferruginous wavy lines, the ferruginous area extending from one-fourth of costa to inner margin near anal angle; a ferruginous costal triangle with paler centre at two-thirds; fringe yellow.

Hindwings: the same, the basal half deeper ferruginous, dappled with paler. In both wings towards the hindmargin the yellow ground-colour is slightly flushed with orange.

Underside like upper. Head, thorax, abdomen, and legs ferruginous.

Expanse of wings: 32 mm.

One ♀ from Mao, North Manipur (W. Doherty).

The costa of forewings is strongly convex at base and apex, and as strongly concave between; the hindmargin long and strongly curved.

Oxycophina gen. nov.

♀. Like *Banisia* Wlk., but distinguished by the shape of the cell of forewings; the lower angle of cell is at one-half, the upper angle at two-thirds; the discocellular sinuous and oblique outwards, with a strong bent fold from its middle running through cell to base; the lower radial from below this fold, upper radial from a little below the upper angle; first median at two-thirds, second and third close together from the lower end of cell; all the veins free. Antennae shortly and stoutly pectinate. Hind tibiae flattened, hairy, with stout spines. Palpi porrect; forehead protuberant; basal joint of antennae thickened.

Type: *Oxycophina subfenestrata* sp. nov.

19. **Oxycophina subfenestrata** sp. nov.

Forewings: greyish ochreous, almost entirely suffused with reddish brown and reticulated finely with darker; costa with five red-brown spots, first close to base, second at one-sixth, third at one-third, fourth just beyond middle, fifth at two-thirds; from each of the first three of these spots paler reddish fasciae proceed across the wing, the margins of which are undefined; from the fourth a broad darker red-brown fascia, with irregularly dentate brown edges and strongly angulated opposite the cell, goes to the inner margin beyond middle; the spaces on each side of this fascia are paler; marginal area reddish, traversed by several darker, partially connected, lines; fringe whitish, with a broad brown line near its base.

Hindwings: crossed by numerous interlacing dark lines, forming alternately broader and narrower fasciae, of which that in the middle is the darkest and has in the sinuses on its edges some hyaline patches; fringe as in forewings.

Underside the same; the costa of forewings pale, with dark brown spots; the costa of hindwings darker red-brown. Face and palpi bright chestnut; head, thorax, and abdomen paler red-brown varied with darker.

Expanse of wings: 65 mm.

One ♀ from Kinnigunang, New Britain (C. Ribbe).

20. **Pharambara bullifera** sp. nov.

Forewings: white, suffused and reticulated with rufous ochreous and fuscous: costa minutely dotted with dark and with five pale rufous tooth-shaped marks; four oblique series of conjoined bubble-shaped white spots, in the second and third arranged in pairs on either side of a rufous reticulation; the first curved and consisting of three or four single spots at one-fourth, starting from the first tooth; second curved from between second and third tooth, and stopping at the submedian fold; the third from apex to inner margin; the fourth along hindmargin above anal angle; the intervals between these series rufous, reticulated and suffused with fuscous; a darker shade along submedian vein and beyond end of cell; fringe coppery rufous.

Hindwings: with three similar series of spots; fringe as in forewings.

Underside with the markings the same, but the dark markings rich brown, the paler ones yellower; lines of shining black and yellow scales below the subcostal. Palpi, face, antennae, and collar dark rufous; thorax and abdomen rufous varied with grey, the latter with a pale ring across second and third segments corresponding with first pale band of hindwings. Palpi porrect, twice as long as head.

Expanse of wings: 26 mm.

Five examples from the Khasias, September 1895.

Evidently related to *glaphyralis* Hmpsn., but smaller; the apex of forewing distinctly produced, and the hindmargin beneath it incurved, and again outcurved above anal angle.

21. **Pharambara quadrovata** sp. nov.

Forewings: shining greyish flesh-colour, with scattered short fuscous transverse striae between the veins; the costa broadly paler; a round black spot before apex; fringe concolorous.

Hindwings: with the reticulations in the centre of the wing darker and more prominent; two pairs of white hyaline oval spots; the first beyond the discocellular; the second between the origin of vein 2 and the inner margin.

Underside paler, more whitish, the mottlings blacker and coarser; a broad ferruginous subcostal streak, marked with a longitudinal row of black spots above, and with metallic scales along the veins; traces of a brownish submarginal and marginal fascia. Head, thorax, and abdomen concolorous with wings.

Expanse of wings: 45 mm.

One ♀ from Oinainisa, Timor, November 1891 (W. Doherty).

Family *URANIIDAE.*

22. **Stesichora apicipuncta** sp. nov.

Like *S. quadripunctata* Warr., but the dots at base of costa very small; the blotch at apex much larger, more greyish black, and extending to and along the hindmargin. Hindwings entirely white. Underside of both wings white, but the apex of forewings with a smoky black triangular mark.

Expanse of wings: 28—34 mm.

Four ♀♀ from Humboldt Bay, New Guinea, September and October 1892, collected by Doherty.

ab. **bipunctata** ab. nov.

A single ♀ from Biak, Geelvink Bay, New Guinea, collected also by Doherty, agrees with *apicipuncta* in most respects; but the apical blotch of forewings is more restricted, and has a minute dark dot below it, while the anal angle is marked by a distinct dark spot.

FAMILY *EPIPLEMIDAE*.

Chaetoceras gen. nov.

Forewings: with costa sinuous, convex near base and apex, concave between; apex bluntly subfalcate; hindmargin excised from apex to vein 4, where there is a bluntly bidentate projection at veins 4 and 3; thence again slightly excised to anal angle, which is square.

Hindwings: elongate, the apex rounded; hindmargin rounded below apex and straight to anal angle, which is slightly produced.

Palpi very short, not reaching front of face; antennae of ♂ strongly pectinated; legs short and stout; hind tibiae swollen, with four long and stout spurs.

Neuration: forewings, cell not half as long as wing; discocellular vertical; first median at three-fourths, second and third from lower end of cell; lower radial from top end of cell, whence also the stalk of 6 and 7; the stalk of 8, 9, 10, and vein 11, both from near base. Hindwings with two subcostals and last two medians from ends of cell.

Type: *Chaetoceras simplex* sp. nov.

23. **Chaetoceras simplex** sp. nov.

Forewings: lilac-grey, dusted slightly with vinous red; the lines vinous red; first at one-third, oblique and slightly curved, touching the blackish cell-spot; second at two-thirds, slightly curved and partially interrupted; costa marked with vinous red, and beyond the outer line with three or four ochreous spots; some reddish scales above anal angle; a ferruginous marginal line; fringe rufous, with dark dots at end of veins below middle, altogether dark along the excision.

Hindwings: with red antemedian and postmedian lines and red-edged ocelloid cell-spot; marginal area thickly irrorated with red.

Underside of forewings dull grey; of hindwings whitish ochreous, with a dull fuscous cloud at anal angle. Face dark brown; vertex very pale grey; antennae, thorax, and abdomen pale grey tinged with red.

Expanse of wings: 22 mm.

One ♂ from Amboina, February 1892 (W. Doherty).

Chaetopyga gen. nov.

Forewings: with costa gradually curved; apex depressed; hindmargin toothed at veins 4, 6, 7, slightly excised between, and oblique to anal angle, which is strongly marked; inner margin strongly sinuate, lobed in basal half, and excised before anal angle.

Hindwings: with costa sinuous, excised in middle, fringed with hair on both sides of the excision; hindmargin toothed at 4, 6, 7, the tooth at vein 7 acute; inner margin restricted, with a fold containing a tuft of hair.

Forewings beneath with a large bed of flat scales on inner margin at base. Palpi long, porrect, third joint as long as second; tongue present; antennae simple, lamellate; hind femora and tibiae with thick tufts of hair, the tibiae with four spurs; anal segment of abdomen with enormously developed tufts of hair, the penultimate segment beneath also with thick curled tufts.

Neuration: as in *Epiplema*.

Type: *Chaetopyga horrida* sp. nov.

24. **Chaetopyga horrida** sp. nov.

Forewings: fawn-colour, dotted with fuscous; traces of a wavy darker line near base; a darker brown central fascia, broad on costa and inner margin, constricted towards the middle, its edges dark brown; a slightly darker diffuse submarginal shade, and a narrow marginal band from apex to tooth at vein 4.

Hindwings: tinged with ferruginous; a ferruginous postmedian line, sinuous from costa to vein 4, where it is acutely angled and joined by a dark ferruginous streak from the base.

Underside, especially of hindwings, paler, without markings, but with coarse fuscous atoms. Face and palpi dark brown; head, thorax, and abdomen fawn-colour. Tufts of anal segment pale shining ochreous; of penultimate segment dark fuscous; those of the legs rufous.

Expanse of wings: 36 mm.

One ♂ from Port Mackay, Queensland.

The only example is unfortunately much wasted, and the fringes are gone.

25. **Dirades hepaticata** sp. nov.

Forewings: dark purplish grey; the two lines very slender, ochreous; first at one-third, forming a right angle on the median, with a blackish shade on its outside; second line at two-thirds, straight, inwardly edged with dark; a dark marginal patch opposite the cell; marginal line thick, blackish; fringe paler.

Hindwings: with both lines bent in middle, the first sharply angled, the second bluntly produced; a ferruginous tint before the teeth and a lustrous pearly marginal line.

Underside duller, without markings. Head, thorax, and abdomen all concolorous.

Expanse of wings: 15 mm.

Three ♀♀ from the Khasias.

26. **Dirades latibrunnea** sp. nov.

Forewings: brownish fuscous, dusted with dark fuscous; first line at one-third, strongly but bluntly angled in midwing; second line from costa at three-fourths to just before anal angle, irregularly waved; the first line edged outwardly, the second inwardly, with dark red-brown, the space between them below vein 3 filled up with dark brown; outer line followed by linear series of blackish striae, which expand into a blackish apical blotch; a row of black white-tipped dots from before apex to below middle of hindmargin; fringe concolorous, with a fine dark basal line.

Hindwings: with a wavy black mark on inner margin at one-third; a dark brown postmedian line, bluntly angled on vein 4, edged with whitish and followed on inner-marginal half by a patch of whitish scales; some indistinct submarginal black dots edged with white.

Underside of forewings dark brownish grey, with the margin blackish; hindwings paler. Palpi and face black; fillet and base of antennae white; thorax and abdomen brownish grey.

Expanse of wings: 26 mm.

One ♀ from Lifu.

The hindmargin of forewings is vertical to vein 6, thence curved to anal angle; inner margin strongly sinuous. Hindwings strongly toothed at veins 4 and 7, with a smaller tooth at vein 6.

27. **Dirades seminigra** sp. nov.

Forewings: grey-brown with a rufous tinge, with numerous fine and close transverse darker striae; first line not expressed, only indicated by the curved margin of the slightly darker basal area; second line rufous, edged outwardly with paler and then with grey, from costa at three-fourths, running straight outwards to third median, where it is bluntly angled, then inwards to inner margin at two-thirds, where it is followed by a dark brown-black triangle with curved edges; submarginal line pale, rufous-tinged, from just before apex to anal angle, having on its outer edge black spots on the veins; fringe concolorous.

Hindwings: brown-black; the basal half varied with rufous grey scales, and with a broadish streak of the same colour from base along middle of wing; an antemedian curved row of three or four black-brown blotches; an angulated rufous grey postmedian line, the inner edge of which on the marginal half is black-brown; a fine pale submarginal line curving with the hindmargin; fringe black-brown.

Underside cinereous, more rufous in forewings. Face and palpi black-brown; fillet white; thorax rufous grey; abdomen black-brown, the first segment with a velvety black ring.

Expanse of wings: 28 mm.

One ♀ from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

Dysrhombia gen. nov.

Forewings: with costa strongly curved; apex sharp; hindmargin with four excisions and prominent teeth at ends of veins 2, 3, and 6; inner margin slightly sinuate.

Hindwings: elongate, running out to a prominent tooth at vein 4; the hindmargin oblique and straight from the tooth to apical and anal angle; distance from base of wing to tooth greater than from base of forewing to its apex.

Antennae of ♂ thick, short, and lamellate; palpi porrect, short; hind tibiae swollen, with four spurs; costa of hindwings fringed with hair except for a short space just beyond middle.

Neuration: forewings, cell one-third as long as wing; first median at seven-eighths, second just before angle of cell, third from angle; lower radial from upper angle; upper radial and last subcostal stalked from upper angle; first and second free; third and fourth stalked. Hindwings with the two subcostals from upper angle, the last two medians on a short stalk.

Type: *Dysrhombia longipennis* sp. nov.

28. **Dysrhombia longipennis** sp. nov.

Forewings: purplish fuscous; costa streaked with dark fuscous and paler; the lines indistinct and diffuse, blackish mixed with ferruginous scales; first at one-third, angled in midwing; second from middle of costa to middle of inner margin, outcurved in middle; submarginal line irregularly wavy; fringe concolorous.

Hindwings: with the basal area diffusedly purplish; exterior line from costa at three-fourths, ferruginous edged with paler, running parallel to hindmargin and angled like it in the middle; its inner arm marked with a blotch of dark purplish and ferruginous scales; veins towards hindmargin pale; hindmargin on each side of tail with a dark streak intersected by the veins.

Head, thorax, and abdomen concolorous with wings; antennae ochreous. Underside dull cinereous, paler towards the margins.

Expanse of wings: 20 mm.

One ♂ from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

29. **Epiplema ambusta** sp. nov.

Forewings: reddish ochreous, more or less suffused with grey-brown or purplish brown, and slightly irrorated with darker; costa dotted with dark fuscous; first line at one-third, dull ferruginous, angled in cell and on submedian fold, the basal area within it clouded with grey-brown; outer line from costa about middle, dark ferruginous, obliquely bent outwards to middle of wing, then, much finer, inwards to inner margin at two-thirds, where it is followed by a dark ferruginous mark; the line is succeeded by a broad greyish purple fascia which leaves the margin of the ground-colour; a dark ferruginous curved submarginal line from just before apex to below middle, beyond which the extreme margin is again greyish purple; marginal line dark brown; fringe concolorous, mottled with darker.

Hindwings: wholly suffused with dark purplish grey, mixed in the middle with ferruginous; a twice-angulated basal line; a triangular pure white discal spot; outer line dark ferruginous, wavy, obtusely bent in middle, and edged externally with ochreous; a ferruginous submarginal line from upper tooth to anal angle, edged with yellowish, and with a yellowish streak into the lower tooth; fringe dark.

Underside purplish cinereous, darker in forewings; hindwings with a dark curved postmedian line. Head and palpi black; thorax and abdomen cinereous.

Expanse of wings: 18 mm.

One ♂ from Banda, August 1892 (W. Doherty).

Forewings bluntly rounded, with a slight sinus opposite the cell; hindwings toothed at veins 4 and 7, crenulate between 4 and 6, and 6 and 7.

30. **Epiplema clathrata** sp. nov.

Forewings: pale greyish fawn-colour, speckled with darker; the two lines pale, angulated in the middle of wing, the inner line followed and the outer preceded by brown blotches between the paler veins; marginal line blackish, preceded by two subapical black dots, and a fine, slightly waved, black mark before the excision; fringe pale, darker at apex, elbow, and anal angle.

Hindwings: the same, but the ground-colour smoother, not varied with

darker: the inner line *acutely* angled, and joined by a brown central line from base; some lustrous scales along hindmargin.

Underside pale grey, unmarked. Face and palpi dark brown; thorax and abdomen grey.

Expanse of wings: 20 mm.

One ♂ from the Khasia Hills.

31. **Epiplema curvilinea** sp. nov.

Forewings: reddish grey, with numerous reddish and fuscous striae; costa dotted with dark brown; first line reddish, indistinct, at one-third, curved; second from before two-thirds, sinuous, brown-black, faint between median and submedian, and forming a blotch at inner margin; a fine curved brown line from below apex to above anal angle, the marginal space included rufous; fringe concolorous.

Hindwings: with acutely angled basal line, from the angle of which a dark brown line runs along the middle of the wing touching a broad brown discal blotch; outer line bluntly angled and sinuous, dark brown edged with pale; a sinuous dark brown line from upper tooth to below lower tooth, with a white dash through it at the lower tooth, and a white dash before it between the teeth.

Underside reddish grey, freckled with darker, the outer line distinct. Face and palpi black; head, thorax, and abdomen concolorous with wings.

Expanse of wings: 18 mm.

One ♂ from Amboina, August 1892 (W. Doherty).

32. **Epiplema fulvata** Warr., Nov. Zool. III. p. 307.

The type from which the description above referred to was made is a ♂. The ♀, which I have now seen, differs slightly, as follows:—

Expanse of wings: 19 mm., against 16 mm. in the ♂. Forewings with *two distinct* black subapical spots. Hindwings with an obscure dark wavy submarginal line from apex to lower tooth, and with blackish scaling between the dark post-median line and hindmargin. All else as in the ♂.

33. **Epiplema fuscifrons** sp. nov.

Like *E. bicaudata* Moore, but rather larger; the marginal area beyond outer line suffused as in that species with greyish purple, but the suffusion always leaves an apical costal blotch and another from middle to anal angle *white*. In the hindwings the ferruginous outer fascia is followed by another ferruginous shade, not, as in *bicaudata*, by a fuscous line. Face and palpi wholly dark fuscous; in *bicaudata* the face is white both above and below, with a dark central bar.

Two ♀♀ from Sikkim.

Hitherto confounded with *bicaudata* Moore; but an examination of the type now in the British Museum Collection, proves the two species distinct.

34. **Epiplema nana** sp. nov.

Forewings: whitish; costa strongly spotted with dark fuscous; basal area clouded with grey and fuscous; a central purplish fascia, its inner edge strongly inangulated, the outer waved and followed first by a white, then by a dark grey line;

apex narrowly fuscous; a large fuscous and ochreous spot on middle of hindmargin, traversed by a line of four or five black spots; fringe dark.

Hindwings: with basal two-thirds mottled with fuscous and purple, and bounded by a curved shade, followed by a straggling fuscous cloud running to hindmargin below lower tooth; a row of three or four blackish spots from costa before apex; a fuscous dark-edged shade along hindmargin from apex to below lower tooth, where it is cut by a whitish dash.

Underside whitish, in the forewings mottled with fuscous. Head wanting; thorax and abdomen dark grey; metathorax with a white blotch.

Expanse of wings: 11 mm.

One ♂ from the Tenimber Islands, July 1892 (W. Doherty).

Akin to *E. quadristrigata* Wlk. and *lituralis* Warr., but not half the size.

35. **Epiplema oculifera** sp. nov.

Forewings: ochreous, tinged with rufous grey; first line brown, at one-third, indistinctly marked; second line at two-thirds, obliquely curved and bent outwards to midwing near hindmargin, where it is angled, then oblique inwards and obsolescent to a brown patch on inner margin at three-fourths; a straight brown line from just before apex to below middle of hindmargin; fringe concolorous.

Hindwings: with a reddish brown-edged discal ocellus; outer line pale, with dark edges, the inner edge broadest, running out into a broad prominence before second tooth; a curved brown line from tooth to tooth, and a brown blotch with a white dash above it below lower tooth; fringe greyish ochreous, with paler base.

Underside dull ochreous; a dark spot before lower tooth of hindwings. Face and palpi brown-black; thorax and abdomen ochreous.

Expanse of wings: 22 mm.

Three ♂♂ from Dili, Timor, May 1892 (W. Doherty).

36. **Epiplema perpolita** sp. nov.

Very close to *E. lilacina* Moore, from which it differs by the almost entire absence of darker striae and irrorations, which gives the insect a smoother appearance; outer line of forewings more strongly denticulate opposite the cell, the lower arm forming a single curve to inner margin, where it ends in a thickened line, not preceded, as in *lilacina*, by a fuscous blotch. Hindwings with the fuscous mottlings of the inner-marginal half obsolete; the dark brown blotch on the inner edge of the postmedian line towards inner margin reduced to a streak.

Two ♂♂ from Banda, August 1892 (W. Doherty).

The antennae are, as in *lilacina*, uniserrate, the teeth close and curved.

37. **Epiplema rufimargo** sp. nov.

Forewings: white; costa spotted with rufous grey, and sometimes the basal two-thirds; first line marked by three dark spots across wing; second line shaped as in *bicaudata* Moore, but rufous grey with hardly darker edges; the whole of the marginal area filled up with rufous, except a small white spot beyond the second line on costa and inner margin; some blackish spots towards apex and a blackish cloud at anal angle; fringe wholly rufous.

Hindwings: with rufous curved antemedian line; angulated rufous postmedian

band with hardly darker edges, followed by a fuscous line which is thickened towards hindmargin; marginal area rufous; fringe rufous, with a paler line along base, most evident between the teeth; a small black spot before lower tooth, sometimes also visible on forewings.

Underside like that of *bicaudata* Moore, but the forewings not so dark and the hindwings more discoloured. Palpi and face dull white below, fuscous above; vertex *rufous*; thorax white; abdomen white towards base, tinged with grey and rufous behind.

Both sexes from Sikkim, April and May (Pilcher *leg.*).

38. **Epiplema unangulata** sp. nov.

Forewings: brownish grey, mottled with darker; the costa with dark strigulations; first line nearly vertical, from costa just before middle to middle of inner margin, ferruginous; second line at two-thirds, angled outwards in midwing, concave on each side of the angle; a submarginal row of fine black dots from before apex to below middle; fringe dark, with a paler base.

Hindwings: with a postmedian curved and wavy ferruginous line; a fine interrupted black line before hindmargin; fringe concolorous; a small tooth at end of vein 3, above which the margin is irregularly excised.

Underside pale grey, irrorated with fuscous. Face and palpi brown; vertex and antennae whitish; thorax and abdomen concolorous with wings.

Expanse of wings: 24 mm.

One ♀ from Batchian, March 1892 (W. Doherty).

39. **Eversmannia diversipennis** sp. nov.

♂. *Forewings:* grey, dappled and irrorated with darker; lines very obscure; the first forming a double dark mark on the cell, and another slight mark below it; the outer marked by a dark brownish triangle on costa at two-thirds and a blotch opposite the cell; fringe grey, mottled with darker.

Hindwings: tinged with rufous, whitish towards inner margin, with a few blotches; faint traces of a basal and postmedian line and ocelloid cell-spot.

♀. Darker grey, especially in hindwings, and more reticulated.

Underside uniform grey-brown, somewhat paler in the ♂. Face and palpi black; fillet and antennae whitish; thorax and abdomen concolorous with wings.

Expanse of wings: 24 mm.

Three ♀♀, one ♂, from Amboina, February 1892 (W. Doherty).

The costa of forewings is sinuous, especially in the ♀; hindmargin excised from the bluntly rounded apex to vein 4, and between veins 4 and 3, then oblique to anal angle. The hindwings of the ♂ are narrow, with the hindmargin rounded throughout; in the ♀ they are broad; the hindmargin vertical from apex to vein 7, then straight and oblique to vein 3, between which and the anal angle there is a deep excision, much as in *Thymistada tripunctata* Wlk.

40. **Gathynia pernigrata** sp. nov.

Forewings: with the costal half of wing whitish, the inner-marginal half rufous, the whole densely covered with fine dark atoms and striae; the costa grey, with white spots towards base and apex; a broad oblique purplish central fascia, darker on costa

and inner margin, speckled with white in the middle, its edges irregularly brown-black; basal area with a diffused blackish blotch; marginal area with a diffuse oblique cloudy fascia, and some black dashes and teeth from costa before apex to middle of hindmargin.

Hindwings: wholly suffused with dark purplish fuscous, with a white blotch at end of cell, followed by a dark antemedian line; a dark curved postmedian line and a strongly dentate submarginal line; fringes dark.

Underside dark cinereous, with darker striae; inner half of forewings rufous-tinged. Face black; collar rufous grey; thorax and abdomen purplish mixed with rufous; inner margin of hindwings and tuft pale ochreous.

The specimen above described appears to be a pale form; in another example the white markings are greatly reduced, the central fascia being dark throughout, and the whole forewing suffused with dark; the hindwings without any white blotch at end of cell.

Expanse of wings: 28—30 mm.

Two ♂♂ from the Khasias.

41. **Gathynia vinosa** sp. nov.

Forewings: vinous red-brown; the costa darker, fuscous-tinged; traces of a dark line near base; second line brown, from costa at two-thirds, oblique outwards to middle, then sharply incurved to the top of an ill-defined brown triangular blotch on inner margin beyond middle; the line and blotch edged with ferruginous; a fine straight blackish line from just before apex to anal angle; fringe concolorous with wings.

Hindwings: with a curved and slightly elbowed brown paler-edged line at two-thirds; some black spots along hindmargin.

Underside dull reddish ochreous. Face and palpi brown; thorax and abdomen brownish grey, the latter becoming paler at end, like the pale inner margin of hindwings.

Expanse of wings: 18 mm.

Three ♂♂ from Dili, Timor, May 1892 (W. Doherty).

Lobogethes gen. nov.

Forewings: with costa straight for three-fourths; hindmargin oblique, hardly curved; inner margin straight.

Hindwings: with costa sinuous only, not excised, fringed with hair towards base and apex; hindmargin excised below apex; in the ♀ with a blunt hook at end of third median, and thence rounded to inner margin; in the ♂ with a rounded bulge from middle of cell to second median, beyond which there is an incision and the inner-marginal area ends in a broad lobe. At the base of the hindwing below the median vein is an elongated oval hyaline space, the upperside of which is clothed with a tuft of spatulate scales.

Antennae thick, lamellate; palpi inclined upwards, as long as face; hind tibiae of ♂ thickened, with four spurs.

Neuration: forewing, first median from near base, second a little before end of cell; discocellular angulated and apparently all but obsolete below; the lower radial from the angulation; 6 and 7 on a *long* stalk; 8 and 9 stalked. In the hindwings

the first median rises from the base, and the hyaline fovea lies between it and the median nervure.

The insect rests with the wings folded and rolled as in *Gathynia* Wlk.

Type: *Lobogethes interrupta* sp. nov.

42. **Lobogethes interrupta** sp. nov.

Forewings: dark grey, speckled with fuscous, this colour being confined to the costa, the inner margin, and the space immediately below the median; the intervening areas dull ochreous, broad on hindmargin and narrowing to a point near base; a dark grey blotch on costa at three-fourths, preceded by a smaller one on the subcostal and another at one-third; fringe grey, with dark basal line.

Hindwings: with the dark areas narrower and the pale ones in proportion wider; traces of an angulated postmedian line, and a row of iron-grey lunules along the hindmargin from apex to middle. The pale spaces are not so conspicuous in the ♂♂, in which sex the whole of the hindwings above the third median is dark grey.

Underside dull cinereous. Face and palpi dark brown; vertex, thorax, and abdomen pale grey, the latter more or less tinged with dark in the middle.

Expanse of wings: 22—28 mm.

Several of both sexes from Coomooboolaroo, Duaringa, North Queensland (A. S. Meek).

Macrostylodes gen. nov.

Forewings: with costa rather strongly curved throughout; apex broadly rounded; hindmargin rounded, and slightly indented above anal angle.

Hindwings: with hindmargin rounded, and minutely toothed at veins 4 and 7.

Palpi short, porrect; antennae of ♂ flattened and thickened, uniserrate, the teeth close and curved.

Neuration: forewings, discocellular invisible, apparently absent; first median at one-sixth of wing; second and third on a long stalk, separating at five-sixths; the two radials and last subcostal stalked, the lower radial leaving beyond middle, the other two separating at five-sixths; veins 8 and 9, 10 and 11, stalked. Hindwings with the two subcostals separating at two-thirds, the last two medians at about one-third; radial absent.

Type: *Macrostylodes deformis* sp. nov.

43. **Macrostylodes deformis** sp. nov.

Forewings: white, irregularly varied with transverse fuscous striae; costa thickly dotted with fuscous; first line obscure, at one-third; second at two-thirds, sinuous and nearly vertical, preceded on inner margin by denser fuscous strigae and a brown erect streak from middle, above which is a brown spot; marginal area more densely striated, especially above anal angle, and with two blackish subapical spots; marginal line brown.

Hindwings: with the two lines distinct; the second bent outwards before lower tooth; an indistinct row of dark lunules from tooth to tooth.

Underside whitish, in the forewings wholly suffused with fuscous, in the hind-

wings with only the apex fuscous. Face and palpi dark brown; thorax and abdomen whitish, mottled with fuscous.

Expanse of wings: 12 mm.

Two ♂♂ from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

Paradirades gen. nov.

Forewings: with costa sinuous, slightly incurved in middle; hindmargin sinuous, strongly incurved below apex, then bulged and oblique at anal angle; inner margin straight.

Hindwings: with costa straight, not excised nor tufted; hindmargin sinuate, as in forewings.

Antennae thick, lamellate; palpi short; forewings of ♂ with a very large double fovea at base, the lower half inflated, the upper depressed; hindwings with no fold and tuft of hair on inner margin.

Neuration: forewings, lower radial from well below the upper angle of cell; 6 and 7 stalked; 8 and 9 stalked; 10 and 11 stalked; 11 anastomosing with 12.

Type: *Paradirades assimilis* sp. nov.

44. **Paradirades assimilis** sp. nov.

Forewings: pale grey, speckled with fuscous; a dark blotch on costa at middle, one on the discocellular, and another at middle of inner margin represent the curved first line; a costal blotch at three-fourths and a smaller one on inner margin before anal angle indicate the second line; before the apex is another small blotch, and one on the hindmargin at middle; fringe dark.

Hindwings: the same, with an antemedian and postmedian line of interrupted blotches.

Underside dull grey. Head, thorax, and abdomen all dull grey.

Expanse of wings: 16 mm.

Three ♂♂ from Cedar Bay, Cooktown, Queensland (*type*) (A. S. Meek); and one ♂ from Humboldt Bay, New Guinea.

The insect bears a superficial resemblance to *Epiplema irrorata* Moore.

Family *GEOMETRIDAE*.

Subfamily OENOCHROMINAE.

Oenochlora gen. nov.

Forewings: elongate; the costa strongly arched from base to apex; apex somewhat produced; hindmargin oblique, curved at anal angle.

Hindwings: with apex and hindmargin rounded.

Antennae three-fourths of wing, in ♂ regularly pectinated throughout. Palpi upcurved in front of face; second joint squamous, just reaching above forehead; third joint small, blunt. Tongue present; frenulum present. Hind tibiae somewhat thickened, with a pencil of hairs and four spurs.

Neuration: forewings, cell quite half the length of wing; discocellular slightly

inangulated; first median at two-thirds, second just before the end, third from the end of cell; lower radial from centre of discocellular; upper from upper angle; last four subcostals stalked from shortly before the angle of cell, the extremity of the subcostal nervure being bent inwards from the origin of the stalk, as is that of the median nervure from the second median nervule; first subcostal from cell, soon anastomosing with the costal, as does the second also. Hindwings with discocellular straight, the radial rising from its centre; costal running close alongside of subcostal for half the cell; first subcostal nervule and second median each from just before angle of cell.

Type: *Oenochlora imperialis* sp. nov.

The costal neuration of the hindwing forbids this genus being referred to the subfamily *Geometrinae*, as the green coloration of the type-species would obviously suggest; while the presence of a radial in the hindwing similarly prevents its admission to the *Ennominae*. I cannot, however, identify it with any of the genera of the *Oenochrominae* as given by Mr. Meyrick.

45. **Oenochlora imperialis** sp. nov.

♂. *Forewings:* dark apple-green, the costal region with short transverse purple striae; the lines darker green; first at one-third, curved and wavy; second at three-fourths, parallel to hindmargin, crenulated; cell-spot purple; fringe green.

Hindwings: like forewings, without first line, and with the costal region broadly pale rosy, the inner margin white.

Head, thorax, and abdomen green; tips of palpi rosy; antennae ochreous. Underside dull orange-grey, with a broad purple submarginal fascia, the margin itself becoming whitish green; cell-spots purple.

In the ♀ the cell-spots are absent; the lines hardly visible; and the forewings have a pale yellow oval spot edged with red between the second and third medians; while the abdomen bears a purple blotch in the middle.

Expanse of wings: 40 mm.

One ♂, one ♀, from Cedar Bay, Cooktown, Queensland (A. S. Meek).

46. **Oenochroma decolorata** sp. nov.

Forewings: grey, with fine darker irroration; inner line reddish and only distinct on costa; cell-spot dark grey, indistinct, followed by an obscure oblique central shade; outer line pale ferruginous, edged internally with whitish; fringe purplish.

Hindwings: with an antemedian purplish line, and a median line ferruginous with paler internal edge, as in forewings, the ferruginous tint passing into purplish towards apex, which is itself tinged with purplish.

Underside whiter, the outer line marked by vein-dots; the purple spot on inner margin much smaller than in *vinaria* Guen.; hindwings white along inner margin; the hindmargin broadly tinged with ferruginous. Face, thorax, and abdomen grey, the latter paler.

Three examples from Cedar Bay, Cooktown, Queensland (A. S. Meek).

Besides the difference in coloration, the present species differs from *O. vinaria* Guen. in having the hindmargin of hindwings distinctly curved and the apex obtuse, whereas in *vinaria* the margin is straight and the apex produced.

47. **Physetostege miranda rufata** subsp. nov.

A ♀ from Cedar Bay, Cooktown, and a ♂ from Geraldton, Cairns, differ considerably from the type-form, *miranda* Warr., from Humboldt Bay. They expand only 28 mm., are much brighter red, and towards the costa of hindwings before the outer line are marked with a black blotch.

48. **Sarcinodes compacta** sp. nov.

Forewings: reddish fawn-colour, quite sparsely dusted with fuscous; a faint reddish spot on costa at one-fourth and a black dot on the median vein indicate the first line; a small reddish cloud at middle of costa; a straight deep chestnut line from costa before apex to inner margin beyond middle, followed on third median by a round red-brown spot; fringe chestnut.

Hindwings: with the dark line central, the base pale, with an obscure line at one-fourth.

Underside with the margins flushed with deeper red, and with indications of a central line; the oblique line marked by dark vein-dots; a white subapical and apical costal blotch. Head, thorax, and abdomen somewhat paler than the wings; tips of palpi and frontal tuft blackish. Antennae of ♂ with the uniserrate pectinations long.

Expanse of wings: 52 mm.

One ♂ from Amboina, February 1892 (W. Doherty).

Related to *S. subfulvida* Warr., but smaller, more uniform in tint both above and below; the oblique line entirely dark.

Zeuctophlebia gen. nov.

Forewings: with costa slightly curved and faintly inbent in middle; apex produced, subacute; hindmargin sinuous.

Hindwings: with rounded hindmargin.

Face smooth; palpi porrect, squamous, the third joint indistinct; antennae of ♂ strongly bipectinate to five-sixths; hind tibiae with four spurs.

Neuration: forewings with cell half as long as wing; first median at five-sixths, second before end of cell, third from end; lower radial from middle of discocellular; upper from upper angle of cell; last three subcostals stalked; first and second coincident, anastomosing with costal, the second afterwards anastomosing with the stem of third and fourth. Hindwings with first subcostal rising before end of cell.

Type: *Zeuctophlebia rufipalpis* sp. nov.

49. **Zeuctophlebia rufipalpis** sp. nov.

Forewings: greyish ochreous, finely dusted with fuscous atoms, more thickly along costal region; costal edge towards base reddish; first line at one-third, slightly curved below costa, then straight, with some dark scales externally; second line from costa beyond middle, running straight outwards below costa, then sharply angled and slightly curved to middle of inner margin, pale, with brownish edges, met at the angle by a ferruginous oblique streak from apex; a submarginal row of double black points; a marginal row of black dots; fringe glossy, rufous grey, with paler base: a black cell-dot.

Hindwings: the same, without first line.

Underside reddish, thickly mottled with blackish; the two outer lines and cell-spots blackish. Palpi, face, and forelegs bright red; vertex, thorax, and abdomen pale grey, with dark atoms; collar dark grey.

Expanse of wings: 26 mm.

One ♂ from Toowoomba, Queensland.

Subfamily ORTHOSTIXINAE.

50. **Bociraza latiflava** sp. nov.

Forewings: golden yellow; the costa narrowly black at base, the streak thickening to the middle; a broad black fascia from the middle of costa to anal angle, its inner edge curved, its outer edge nearly straight; apex and hindmargin black, leaving a broad yellow fascia from costa to near hindmargin; fringe black.

Hindwings: yellow, with black marginal fascia from anal angle to apex, where it is wider.

Underside the same. Palpi yellow, externally fuscous; face and vertex yellow, sometimes tinged with grey; collar fuscous; thorax and abdomen yellow.

Expanse of wings: 36—42 mm.

Two ♂♂, two ♀♀, from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

51. **Celerena triflava** sp. nov.

Forewings: yellow, with the costa black from base to middle, whence a black bar runs at right angles towards anal angle, which it does not quite reach; the costal streak and the cross-bar both diffusely edged internally; hindmargin from anal angle narrowly black, the inner edge waved, and bent above third median to costa at two-thirds; the apical black area so formed contains an oblique yellowish blotch; fringe black.

Hindwings: yellow, with narrow black border with wavy edge.

Underside the same, except that the cross-bar of forewings is much broader than above, angled outwards in the submedian interspace and joined along inner margin with the marginal border. Face, thorax, and abdomen yellow; palpi black; collar fuscous.

Expanse of wings: 64 mm.

One ♀ from Biak, Geelvink Bay, New Guinea, collected by Doherty.

52. **Eumelea degener** Warr., ab. **umbrata** nov.

In this form the space between the outer line and the row of submarginal spots is wholly clouded with brown in the forewings of the ♀, the spots themselves becoming absorbed; in the hindwings the brown shade does not reach the spots; in one ♀ the yellow ground-colour of the entire wing is suffused with pale brown.

In the ♂ the whole of the wings is thickly suffused with brown and covered with fuscous striae, the markings being rendered indistinct; the underside yellower, with dark purple fuscous mottlings and markings.

Three ♂♂, one ♀, from Lifu.

53. **Eumelea feliciata sangirensis** subsp. nov.

Forewings: dull yellow, olive-tinged, covered uniformly with dull rosy striae, which are much finer and longer than in the type-form of *feliciata* Guen.; the usual three lines very indistinct and narrow, the curved central one in particular being almost linear; fringe and marginal lunules bright rosy.

Hindwings: the same.

Underside brighter yellow, with the lines thicker and rosier. Head, thorax, and abdomen concolorous.

Expanse of wings: 58 mm.

Two ♂♂ from Sangir (W. Doherty).

54. **Eumelea ludovicata atomata** subsp. nov.

Forewings: blood-red, the yellow area, which is restricted to the cell and space beyond and to the submedian fold, being more or less obliterated by coarse spore-like red blotches; cell-spot and vein-spots marking the course of the submarginal line deeper red; a yellow spot at apex.

Hindwings: the same, but the central line darker and denticulate; fringe of both wings red.

Underside with all the red markings dull brown-red. Face blood-red; vertex red, with yellow scales; thorax and abdomen red.

Expanse of wings: 50 mm.

One ♂ from South Java, 1500 feet, 1891 (Fruhstorfer).

55. **Eumelea ludovicata biflavata** subsp. nov.

Forewings: wholly irrorated and suffused with deep orange-red, leaving only two round pale yellow spots before the submarginal shade, one opposite the cell, the other on the submedian fold; these spots on the hindwings almost obliterated by rosy strigulae; apex of both wings narrowly yellow.

Expanse of wings: 52 mm.

One ♂ from Nias; one ♀, nine ♂♂, from Pulo Laut, S.E. of Borneo (*type*), May 1891 (W. Doherty).

Consistently smaller than the typical form of *ludovicata* Guen.; the ♀ not yellow, but concolorous with ♂.

56. **Eumelea ludovicata fumicosta** subsp. nov.

Wings less brightly coloured than in *ludovicata* Guen., somewhat blurred; the costa and apical region and part of the hindmargin in the forewings darkened with dense fuscous striae; both wings without any trace of lines.

Expanse of wings: 58 mm.

One ♂ from the Bismarck Archipelago (*locality erroneous?*); two ♀♀ from New Georgia and Alu (*type*), Solomon Islands, respectively.

57. **Eumelea ludovicata insulata** subsp. nov.

Wings with the yellow ground-colour uniformly irrorated with orange-red, the pale yellow spots beyond cell and on submedian fold not conspicuous; central

fascia of forewings *straight*, not curved inwards towards the costa; coloration of the two sexes similar.

Expanse of wings: 58—60 mm.

One ♂, two ♀♀, from the Loochoo Islands.

58. **Eumelea ludovicata rubrifusa** subsp. nov.

♂. *Forewings:* almost wholly suffused with deep orange-red, much more so than in *biflavata* Warr., leaving, as in that subspecies, only two yellow spots, which are more conspicuous owing to the deeper red of the rest of the wing; a yellow spot on discocellular, and a few yellow scales before the middle of the hindmargin.

Hindwings: with the two yellow spots still smaller; a yellow spot on the discocellular; apex yellow.

♀. Orange-yellow, irrorated with darker, with the spots marking the lines dull rosy; three spots marking the antemedian line; a spot on discocellular; an interrupted curved postmedian line and blotched submarginal line most distinct towards costa. Hindwings with the cell-spot large, rosy, and a very large rosy blotch on the middle of costa.

Expanse of wings: 65 mm.

One ♂, one ♀, from Kina Balu, North Borneo.

59. **Eumelea praeusta** sp. nov.

♂. *Forewings:* bright yellow, with orange striae and suffusion; costa thickly streaked with fuscous purple striae; traces of a curved line at one-fourth, formed by two or three orange tawny blotches; a broad ferruginous orange slightly curved fascia just beyond middle; space between the two thickly covered with orange-red striae along costal half; a large purplish red apical blotch, its edge curved from three-fourths of costa to near middle of hindmargin, containing a small yellow spot at apex; some orange-red striae and blotches at anal angle.

Hindwings: with costal region covered with orange-red striae; the second line of forewings continued, but narrower and straighter, across centre from middle of costa to two-thirds of inner margin; apex and anal angle orange-red, the former with a yellow spot at tip.

Underside like upper, but the dark markings all tinged with purple. Face and palpi orange-red; thorax and abdomen yellow.

Expanse of wings: 65 mm.

One ♂ from Batchian (*type*), March 1892, taken by Doherty; and two ♂♂, one ♀, from Ternate.

The ♀ is duller yellow, with dull purple-brown markings instead of the bright orange-red of the ♂; the middle fascia is narrower, zigzag, and interrupted in the middle; the apical patch is formed only of some scattered dull purplish scales. But on the underside the difference between the two sexes is not so striking.

60. **Ozola marginata** sp. nov.

Forewings: whitish ochreous, uniformly dusted with blackish; first line at one-fifth, dark brown, distinct only towards costa, below which it is angled and becomes more or less obsolete; a dark cell-spot; marginal third, from costa at two-thirds to

inner margin before anal angle, purplish brown, leaving the apex and a roundish spot in middle of hindmargin pale; fringe purplish brown, chequered with ochreous over against the hindmarginal blotch.

Hindwings: with dark cell-spot and a broad uninterrupted purplish brown marginal fascia from apex to anal angle; fringe concolorous.

Underside exactly the same. Head, thorax, and abdomen ochreous.

Expanse of wings: 32 mm.

Five ♂♂, two ♀♀, collected by Doherty; four ♂♂ from Yamma; one ♂ from Humboldt Bay, New Guinea (*type*); the two ♀♀ from Gani, Halmaheira, and Salawatti respectively.

Occurs also in Amboina.

61. **Rambara colorata** sp. nov.

Forewings: bluish white, with all four series of spots ochreous, the discal spots large and with a fulvous centre.

Hindwings: the same.

Underside pure white.

Expanse of wings: 12 mm.

Several from the Tenimber Islands, June and July 1893 (W. Doherty).

Distinguished not only by its minute size, but by the marginal series of dots being ochreous, like the rest, not black.

Subfamily PSEUDOTERPNINAE.

62. **Actenochroma discolor** sp. nov.

Forewings: bright ochreous, suffused with pale brown and with dark brown and fulvous markings; a fulvous patch on costa at base; first line at one-third, strongly waved; second from two-thirds of costa, much excurved beyond cell, wavy and denticulate to inner margin at middle, where it closely approaches the first line; this outer line is marked with brown-black on costa, opposite the cell, and in the submedian interspace; the inner half of the central fascia included between the first and second lines is dull grey-brown, extending along the costa from line to line; an interrupted oblique red-brown shade starting from a triangular red-brown costal blotch follows the exterior line; submarginal line represented by interrupted red-brown blotches which run into the margin; fringe ochreous, broadly mottled with dull red-brown.

Hindwings: like forewings, but with the whole basal area to exterior line greyish tawny with darker striae; the lines with dark brown blotches opposite the cell; both wings with obscure brown cell-spot.

Underside of forewings bright yellow as far as outer line, which is bent and dark brown with reddish scales intermixed; cell-spot large, blackish, followed by a white blotch; a broad reddish submarginal band, varied with black and separated from outer line by a white band constricted in middle; marginal area reddish and black, leaving a whitish blotch at apex and middle of hindmargin. Hindwings yellow from base to outer line, which is broadly blackish and straight; no cell-spot; marginal third blackish, with a white spot on hindmargin at middle, and separated from outer

line by a wedge-shaped white costal mark; inner margin and fringes wholly yellowish white. Head, thorax, and abdomen ochreous mottled with darker.

Expanse of wings: 48 mm.

One ♂ from Korrido, Dutch New Guinea, captured by Doherty.

63. **Actenochroma ochrea** sp. nov.

Forewings: pale ochreous, with olive-grey and rufous mottling; costa dotted with rufous; the lines starting from rufous costal blotches; first at one-third, slightly wavy and oblique outwards, reddish brown; second beyond two-thirds, slightly excurved and dentate to inner margin before anal angle; discal blotch rufous grey, connected with a rufous subcostal spot above it; the space between the lines washed more or less with rufous, especially towards the edges, a semicircular space on inner margin often remaining pale; a rufous grey blotch beyond cell extending to hindmargin, showing two teeth of the submarginal line, which is else unexpressed; some reddish clouds above anal angle; fringe pale ochreous, marked with rufous opposite the cell and above anal angle.

Hindwings: with the markings often very obscure; the basal area sometimes shaded with darker; a curved dentate postmedian line, the teeth showing red-brown, and sometimes some reddish clouds towards margin beyond cell.

Underside brighter ochreous; the discal spot large, black, tinged with red; the lines both distinct, curved, red-brown, joined along the submedian interspace by a broad crimson streak; marginal area varied with fuscous and reddish. Hindwings with dark reddish cell-spot and curved outer line, and a cloudy crimson submarginal fascia.

Face, head, thorax, and abdomen all ochreous; face with a narrow crimson bar; palpi externally dark red-brown.

Expanse of wings: 40 mm.

Three ♀♀ from Port Mackay, Queensland.

64. **Hypochroma subornata** sp. nov.

Forewings: pearly grey, with a pink tinge, and dusted with dark grey atoms; first line at one-fourth, dark grey, slightly curved and minutely denticulated; second line at two-thirds, curved and minutely denticulated, the teeth on second and third median nervules more prominent; submarginal line pale, wavy, with darker edges; discal spot large, pearly grey, with a darker centre; a row of black marginal spots at the ends of the veins.

Hindwings: the same, but the central space much varied with rufous and black scales; the basal area of both wings with tufts of rough whitish scales.

Palpi and lower three-fourths of face dull rufous; top of face, vertex, and thorax grey; abdomen whitish. Underside of forewings with basal two-thirds in ♀ deep orange, in ♂ rosy, with an orange subcostal streak; a small white spot preceding and a larger one following the large black cell-spot; marginal third black, with a row of white spots down the centre, beyond which the black becomes discoloured; hindwings the same, with no cell-spot; the extreme margin whitish.

Expanse of wings: 48 mm.

One ♂, one ♀, from Cedar Bay, south of Cooktown, Queensland.

65. **Terpna crassistriga** sp. nov.

Forewings: dull olive-green, thickly and coarsely speckled with dark purplish fuscous; the lines of the same colour; a short mark close to base; first line at one-fourth, outwardly oblique and slightly toothed in cell; second at two-thirds, thick and curved to vein 4, where it is bluntly angled, then lunulate and inwardly oblique to inner margin at three-fourths; marginal area more densely speckled, especially above anal angle; an oblong dark cell-spot; a row of dark spots at ends of veins; fringe olive, with a paler line at base.

Hindwings: densely speckled with fuscous and reddish; a dark cell-spot and denticulate postmedian line; submarginal line indicated by blackish blotches above anal angle and opposite cell.

Underside whitish, with slight striation; cell-spot of forewings large, blackish; of hindwings small; marginal third of both wings blackish, rufous-tinged; in the hindwings with the margin itself paler. Face deep brown; palpi green; vertex and collar pale ochreous; thorax and abdomen cinereous green, with dark specks.

Expanse of wings: 46 mm.

One ♀ from Bunguran, Natuna Islands, October 1894 (Ernest Hose).

Subfamily GEOMETRINAE.

Acrortha gen. nov.

Forewings: with costa arched at base, then straight for four-fifths, where it is abruptly elbowed and again runs straight to apex; apex rounded; hindmargin obliquely curved.

Hindwings: with hindmargin produced to a blunt point at third median; apex rounded; margin sinuate to the point, thence straight to anal angle.

Palpi short, porrect; second joint roughly scaled beneath; third smooth. Tongue present. Antennae of ♂ pubescent. Frenulum invisible.

Neuration: forewings, cell one-third of wing; discocellular vertical, the lower two-thirds hardly visible; first median at three-fourths; second and third stalked; lower radial from above centre of discocellular; upper from upper angle of cell; the five subcostals stalked from the angle; first and second coincident and becoming coincident with the costal, which reaches costa at the elbow. Hindwings with the discocellular oblique; the two subcostals and last two medians stalked.

Type: *Acrortha flexicosta* sp. nov.

66. **Acrortha flexicosta** sp. nov.

Forewings: pale green, the fringe paler; first line whitish, edged outwardly by a deeper green shade, bent below the costa, then slightly oblique inwards; second from the elbow, faintly bent near costa, then parallel to hindmargin to inner margin at three-fourths, edged with darker green internally.

Hindwings: with a curved whitish postmedian line, and dark green cell-spot.

Face, vertex, thorax, and abdomen green; fillet white. Underside pale silvery green.

Expanse of wings: 20 mm.

One ♂ from Kandy, Ceylon.

67. **Agathia disconnecta** sp. nov.

Forewings: apple-green; base dark brown on costal half; costa ochreous, with grey speckles; first line before middle, formed by three disconnected brown spots, one below costal streak, one on inner margin in middle, the third on median vein, angled outwards; second line at three-fourths of costa, formed by two pairs of brown spots lying in an oblique line on veins 7 and 6, and 4 and 3; and two smaller spots lying on veins 2 and 1, near to hindmargin; brown marginal spots at end of veins, that at the apex being square and prominent, that at the angle on vein 4 conspicuous; fringe yellowish white, with a brown spot at vein 4, and discoloured at anal angle.

Hindwings: with the outer line as in forewings, only that each pair of spots is coalescent and forms a blotch with its inner edge straight; the last spot, on the internal vein, is much nearer base of wing; marginal tooth wholly filled up with dark chocolate-brown, with a pale whitish band across the base; marginal spots at veins 6 and 7 conspicuous; fringe yellowish white, brown round the tooth and at vein 6.

Underside pale green, with the markings vinous and tending to become connected into fasciae. Face and palpi pale ochreous below, brown above; vertex, thorax, and abdomen green; the latter with patches of greyish red with darker red centres on each segment.

Expanse of wings: 36 mm.

Two ♂♂, three ♀♀, from Geraldton, near Cairns, North Queensland (A. S. Meek), and a pair marked North Queensland only. The red-brown markings become in the ♀ more ferruginous, as in all the allied species; in both sexes the spots are more or less edged with yellow; in some examples, especially in the ♀♀, the spots of the central fascia tend to become united above.

68. **Agathia rubrilineata** sp. nov.

Forewings: green, with an olive tinge; base narrowly red-brown on lower two-thirds; costa grey, with darker specks, edged beneath by a fine red line, the grey streak starting fine at base and broadening to the central fascia; this runs nearly straight from the costal edge at one-third to the inner margin at two-thirds, whitish with irregular red edges, which are slightly broadened and uneven at the veins; marginal one-fourth reddish grey, edged inwardly by a broad, slightly irregular, inwardly white-edged, red-brown line, which forms two small teeth outwardly on veins 4 and 5; in this area is a subapical subquadrate green patch, the inner edge rounded, the outer straight and parallel to hindmargin, which it nearly touches, and having above and below it a round whitish spot adjacent; area above anal angle yellowish; marginal line thick, brown; fringe ochreous, with a darker central line.

Hindwings: green, the inner margin narrowly red; marginal area as in forewings, containing an irregularly oval green patch from veins 4 to 7; the red-brown line that edges it having an additional tooth on vein 3; a red-brown semicircular spot on lower part of the marginal tooth edged with ochreous; fringe as in forewings, but reddish brown at the tooth.

Underside pale green, washed towards base with dull rufous; marginal fasciae dull red-brown; middle fascia of forewing brighter red. Palpi and face below ochreous;

palpi above, upper part of face, fillet, and antennae brown; crown of head, shoulders, and base of patagia green; rest of patagia, thorax, and abdomen ochreous mixed with reddish scales; metathorax green; basal segment of abdomen with a pair of dark spots.

Expanse of wings: 40 mm.

One ♂ from Mt. Mulu, North Borneo, 1000—4000 feet (Charles Hose).

Anoplosceles gen. nov.

Forewings: with costa arched throughout; apex produced; hindmargin obliquely curved.

Hindwings: kite-shaped; the hindmargin tailed in middle, curved slightly above the tail, straight below to anal angle, which is very strongly developed.

Antennae of ♂ lamellate, thick, subdentate; palpi with second joint stout, squamous; third almost as long, narrower, and blunt, with appressed scales; middle tibiae with only a pair of spurs; hind tibiae swollen, with a groove and pencil of hairs, but with no spurs. Frenulum present.

Neuration: forewings, cell one-third as long as wing; first median at two-thirds; second and third short-stalked; lower radial from above the centre of discocellular; upper from top angle; last four subcostals stalked from upper angle; first free, anastomosing with the costal. Hindwings with the two subcostals on a short stem; the last two medians on a very long one.

Type: *Anoplosceles nigripunctata* sp. nov.

Shape of wings as in *Thalerura* Warr.; distinguished by the lamellate antennae and the spurless hind tibiae.

69. **Anoplosceles nigripunctata** sp. nov.

Forewings: pale green, the costa dotted with fuscous towards the apex; the lines dark green, strongly denticulate; the first at one-third, indistinct; the second at two-thirds, parallel to hindmargin; marginal line red-brown, broadly interrupted by ochreous spots at ends of veins; fringe ochreous at base, with grey tips; cell-spot distinct, black.

Hindwings: like forewings; no first line; second line forming a strong projection in middle opposite the tooth; the dark green line on both wings ends on inner margin as a dark red-brown spot.

Thorax and abdomen green; face, palpi, and antennae red-brown; vertex white. Underside whitish green, with the outer line of forewings dark.

Expanse of wings: 30 mm.

One ♂ from West Java.

70. **Chrysochloroma electrica** sp. nov.

Forewings: very deep emerald-green, in certain lights shading into blue, and towards base to yellow; lines very obscure, slightly paler and faintly lustrous; first curved, at one-fifth; second at three-fourths, parallel to hindmargin; a small cell-spot and the fringe deep violet-brown.

Hindwings: like forewings, with the cell-spot much larger; the outer line alone present, bent in middle.

Head, thorax, and abdomen paler, more yellowish green ; face bright ferruginous ; palpi above brown-red, whitish below. Underside uniform electric-blue ; the fringes dark brown.

Expanse of wings : 42 mm.

Two ♂♂ from Roon Island, New Guinea.

The absence of one of the median spurs of the hind tibiae of the ♂, recorded as one of the characteristics of the genus, Nov. Zool. III. p. 288, does not appear to be constant. The present species has all four spurs.

71. **Chrysochloroma subalbida** sp. nov.

Forewings : apple-green, slightly varied with whitish, the costa narrowly pale ; the lines paler ; first at one-third, slightly curved ; second at three-fourths, straight, parallel to hindmargin ; cell-spot ferruginous.

Hindwings : with outer line curved ; cell-spot much larger than in forewings, elongated, ferruginous, with darker brown centre. Fringe in both wings white, with a fine ferruginous basal line.

Face and palpi ochreous below, rufous above ; vertex white ; antennae whitish ; thorax and abdomen green, the latter with small white dots on back at the edge of the segments. Underside pale green, the costa of both wings broadly whitish.

Expanse of wings : 44 mm.

One ♂, one ♀, from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

Distinguished from *C. meeki* from Fergusson Island by the different coloured underside.

72. **Chrysochloroma subalbida rubritincta** subsp. nov.

A single ♀ from Humboldt Bay, New Guinea, must be regarded as, at least, a subspecies. In this example the discal spot of hindwings is a very large oblong ferruginous blotch ; the apical angle of hindwings is marked with a large brown-red blotch ; the dark brown basal line of fringes is much more developed, especially in the forewings, where the lunules that form it encroach upon the ground-colour of the wing, that above the anal angle forming a narrow brown-red blotch ; the whitish fringes are tinged with red-brown opposite the veins.

Chrysomphe gen. nov.

Forewings : triangular ; costa straight from base, curved before apex, which is produced and subfalcate ; hindmargin faintly sinuous, with an almost imperceptible elbow at end of second median ; anal angle rectangular.

Hindwings : with inner margin elongated ; the hindmargin bluntly elbowed at the third median, above which it is faintly sinuous.

Antennae of ♂ subserrate, ciliated ; face slightly prominent ; palpi short, obliquely porrect ; second joint squamous beneath, third short, blunt ; tongue present ; hind tibiae of ♂ rather thickened, with four short spurs. Frenulum present.

Neuration : forewings, cell not half as long as wing ; discocellular angulated, the lower arm oblique, the upper bent in middle ; first median at three-fourths ; second and third shortly stalked ; lower radial from the bend in the upper arm of discocellular ; upper radial stalked with last four subcostals from end of cell ; first

subcostal free, just before their stalk. Hindwings with last two medians and two subcostals stalked; radial as in forewings. Abdomen marked with three raised drops of golden scales; wings with semihyaline patches near base.

Type: *Chrysomphe venusta* sp. nov.

73. **Chrysomphe venusta** sp. nov.

Forewings: dull mealy green, bluish-tinged, paler yellow-green at base along inner margin; costa broadly ochreous straw-colour, the extreme edge whitish, speckled with reddish; a reddish blotch at base, and a reddish oblique streak at one-third indicating the origin of first line, which is only distinct again on inner margin as an olive-orange spot; a pale yellowish blotch beyond base reaching to beyond middle of wing, forming a sinus outward between the first and third medians, and not touching the inner margin; cell-spot dark green; second line at three-fourths, olive-orange, oblique and slightly curved; marginal area narrowly paler green, sometimes lemon-yellow; fringe lemon-yellow, with a very fine orange line at base, and a red spot at apex of wing.

Hindwings: like forewings, but with a round pale yellowish blotch close to base.

Face, palpi above, fillet, and shaft of antennae red; palpi below white; vertex, thorax, and abdomen green; the abdominal tufts golden. Underside silky whitish green, with the pale patches yellowish; costa of forewing yellowish, with fuscous speckles and a red dash at apex; anal angle of both wings and apex of hindwings with the fringe dark olive mixed with reddish, above and below.

Expanse of wings: 30—36 mm.

Five ♂♂ from Cedar Bay, south of Cooktown, Queensland.

74. **Comostolodes deliciosa** sp. nov.

Forewings: bright blue; costa yellowish, with red and fuscous atoms; hindmargin with a row of bright rosy lunules, edged internally with yellowish white, and with a brilliant steely dot in the centre of each lunule on the hindmargin; fringe yellow.

Hindwings: the same.

Underside pale silvery blue, with the margins dull reddish. Face, palpi, vertex, and collar reddish; thorax blue; abdomen blue, with a broad reddish dorsal stripe.

Expanse of wings: 19 mm.

One ♀ from Bunguran, Natuna Islands, October 1894 (E. Hose).

Euxena gen. nov.

Forewings: with costa well curved; apex rectangular; hindmargin strongly crenulate, vertical above, oblique below.

Hindwings: with inner margin lengthened, hindmargin crenulate; a deeper excision between veins 4 and 6.

Antennae of ♂ quite simple; palpi porrect, reaching slightly in front of face, terminal joint short; tongue present; frenulum present; hind tibiae of ♂ with four spurs, hardly thickened; abdomen without tufts.

In forewings the first subcostal approximates to the costal, and again to the

second, but does not anastomose; the last four subcostals stalked, the second rising before the fifth.

Type: *Euxena crypsichroma* sp. nov.

Distinguished from *Chlorodontopera* Warr. by the simple antennae of the ♂ and the absence of abdominal tufts.

75. **Euxena crypsichroma** sp. nov.

Forewings: dull olive-green; the costa red, dotted with black; the lines faintly darker, denticulated; first at one-fifth, very obscure; second from two-thirds of costa to two-thirds of inner margin; submarginal half-way between second and hindmargin; fringe concolorous.

Hindwings: like forewings; both with an oval reddish grey ocellus, strongly edged with brown-black and pointed at the costal end.

Underside bright fulvous; forewings with a shining cinereous space below the median; a dentate curved thick postmedian line dark fuscous; a dark fuscous marginal fascia, with the submarginal line clearly marked by fulvous lunules between the veins; hindwings the same, but without the postmedian line. Palpi and face black-brown; head, thorax, and abdomen olive-green.

Expanse of wings: 50 mm.

One ♂ from Mt. Mulu, North Borneo, 1000—4000 feet (Charles Hose).

76. **Hemithea ornata** sp. nov.

♂. *Forewings:* dull green; the costa and hindmargin broadly dull yellow; the costa speckled throughout with purplish brown atoms; the hindmargin with a row of broad similar-coloured dashes, interrupted at the veins, the fringe beyond yellow; both lines very fine and undulating, whitish, at one-third and two-thirds.

Hindwings: with the outer line only; cell-spot darker green.

Underside gilded green. Face and palpi dull reddish; vertex white; thorax and abdomen green, the latter with red scales on back.

♀. With the yellowish border swollen across apex and at anal angle, its yellow ground-colour much freckled with brown throughout; the underside with a dark brown blotch at anal angle of forewings and apex of hindwings.

Expanse of wings: ♂, 20 mm.; ♀, 26 mm.

Two ♂♂, two ♀♀, from Adonara, November 1891 (W. Doherty).

77. **Hemithea** (?) **punctifimbria** sp. nov.

Forewings: pale green (faded to yellow), with numerous paler strigulae; no trace of lines; fringe paler, with dark grey spots along the basal half opposite the veins.

Hindwings: the same.

The underside is unmarked, whitish green. Face and palpi reddish; thorax and abdomen green, the latter with red scales on the middle segments.

Expanse of wings: 20 mm.

One ♀ from Bombay.

The type being a ♀, the genus is doubtful; I place it in *Hemithea*, because the first subcostal of forewings is free, and the abdomen is marked with red. The hindmargin of hindwings is only bluntly elbowed in middle, and the general aspect of the insect reminds one strongly of *N. solidaria* Guen.

78. **Hemithea quadripunctata** sp. nov.

Forewings: dull yellowish green, subtransparent; costa ochreous, dotted with fuscous; first line at one-third, outcurved in cell and again below it, indicated by small dark dots on veins, the line itself threadlike and scarcely visible; second line at two-thirds, incurved in cell and on first median, the vein-dots linear; fringe concolorous.

Hindwings: the same, without the first line, and with a dark cell-dot.

Underside of both wings dull gilded yellow. Palpi green, with the tip brown; face pale ferruginous; head, thorax, and abdomen concolorous; second and third segments of abdomen each with a pair of red-brown dots, those on the fourth the larger, surrounded by a fuscous patch.

Expanse of wings: 32 mm.

One ♂ from Oinainisa, November 1891 (W. Doherty).

Nearly related to *H. subflavida* Warr.

The antennae have rather strongly developed fascicles of cilia.

79. **Hemithea subflavida reducta** subsp. nov.

Like the type above, but smaller in size, the ♀ expanding only 26 mm.; on the underside the hindwings are marked with a broad blackish submarginal fascia, which is non-existent in *subflavida* Warr.; the black blotch at anal angle of forewings is present in both forms.

One ♂, one ♀, from Cedar Bay, south of Cooktown, Queensland.

80. **Metallochlora dotata** sp. nov.

Forewings: pale apple-green; the costa yellowish, with a few reddish spots; a red-brown cell-spot; two slightly darker dentate shades, one in middle of wing, the other at three-fourths, forming the edges of a central fascia; the outer edge of the exterior shade is marked on the upper radial by a red-brown linear spot; the yellow fringe has a row of minute reddish dots at base at end of the veins, and a small reddish blotch at anal angle.

Hindwings: similar, but without the red dot at the edge of the fascia.

Underside pale green. Palpi above and face dark brown; vertex, thorax, and abdomen green; the abdomen, instead of the metallic drops of *M. flavimbria* Warr., is marked with shining red-brown spots.

Expanse of wings: ♂, 26 mm.; ♀, 28 mm.

A pair from Port Mackay, Queensland.

The darker edges of the central fascia, which are well expressed in the ♀, are scarcely perceptible in the ♂.

81. **Metallochlora flavifimbria** sp. nov.

Forewings: bright apple-green; the costa finely yellow, with a few black dots; a minute brown-red cell-spot; fringe yellow.

Hindwings: the same, with the cell-spot crimson.

Underside pale yellowish green. Face and palpi above ferruginous; thorax and abdomen bright green; the drops silvery, edged with white scales.

Expanse of wings: 22 mm.

One ♂ from Geraldton, near Cairns, Queensland (A. S. Meek).

In this species the hindmargin of forewings is straight and oblique, of the hindwings obtusely angled.

82. **Metallochlora tenuilinea** sp. nov.

Forewings: olive-green; the costa broadly grey-green, with fine black dots at its edge; before the hindmargin is a fine curved silvery line, preceded by a very obscure dark green shade; a marginal line of black dashes between the veins; fringe metallic grey.

Hindwings: the same; discal spot dark green.

Underside hoary green, tinged with pinkish; a curved submarginal fascia on both wings, and an apical blotch on hindwings, black. Head, thorax, and abdomen green; the dorsal drops deep red.

Expanse of wings: 32 mm.

One ♂ from Humboldt Bay, New Guinea, October 1892, taken by Doherty.

83. **Microloxia (?) coerulea** sp. nov.

Forewings: blue-green, the fringe concolorous; the lines white and broad; first at one-third, oblique inwards, slightly curved; second from costa at five-sixths to inner margin at two-thirds, straight and oblique; cell-spot indistinctly whitish.

Hindwings: with the outer line of forewings produced as a postmedian line, slightly curved inwards; cell-spot white.

Thorax and abdomen green; face, palpi, forelegs, and antennae bright ferruginous. Underside pale blue-green.

Expanse of wings: 24 mm.

One ♂ from Songive Valley, Lake Nyassa.

The position of the radials shows this species to belong to the *Geometrinae*; but in the hindwings the costal anastomoses for half the length of cell with the subcostal. In the forewings the first subcostal rises free, but soon becomes coincident with the costal; the other four subcostals are stalked from just before the end of the subcostal nervure, which is then depressed, the upper radial rising from the end.

Probolosceles gen. nov.

Forewings: with costa nearly straight, convex before apex; hindmargin obliquely curved.

Hindwings: with hindmargin rounded; apex rounded; inner margin produced; anal angle well marked.

Antennae of ♂ pectinated; palpi longer in ♀ than ♂; frenulum present; hind tibiae of ♂ with four approximated spurs, and a long process from the end.

Neuration: forewings, cell hardly half as long as wing; last two medians from lower angle of cell; upper radial from upper angle; last four subcostals stalked, the fifth starting before the second. Hindwings with both subcostals and last two medians stalked.

Type: *Probolosceles biplaga* Wlk.

To this genus must be referred the species placed by Hampson under *Nemoria*, Sect. I. B. b., viz. *Geometra detenta* and *dissessa* Wlk., *Comibaena quadrinotata* Butler, and *Comibaena integranota* Hmpsn.

84. **Probolosceles attenuata** sp. nov.

Like *P. biplaga* Wlk., but with the spots of quite different shape and larger in size; the inner edge of each sinuous (in *biplaga* it is straight); that in the forewings reaching to the third median, where it is attenuated and has a larger round blotch contiguous to it between veins 4 and 5; both blotches wholly brown, without pale centres.

One ♂ from Mt. Mulu, North Borneo, 1000—4000 feet (C. Hose).

This is the insect which Walker, after describing his typical *biplaga*, which was a ♀, suggests may be the ♂ and a variety of that insect. All his specimens were from Sarawak. Hampson in *Faun. Brit. Ind.* Vol. III. p. 504, at the end of his description of *integranota*, adds, "The ♀ has a black submarginal patch on forewings above vein 4." The ♀ in the British Museum Collection comes from Burma and belongs, I think, here.

85. **Thalerura (?) decorata** sp. nov.

Forewings: dull olive-green; the costa very minutely dark-dotted, and with a short fine red line just before apex; no distinct lines; a faint reddish spot on inner margin before middle denotes the first line, and a very obscure series of darker green blotches between the veins at four-fifths indicates the second; fringe white, tinged with reddish at apex and anal angle; hindmargin with a fine red line.

Hindwings: green, with a bright red cell-dot, and the red marginal line thicker and more diffuse; the tail wholly red; fringe white, reddish black round the tail, with a black tuft at base of the tail on both sides.

Underside pale green; fringes likewise, except round tail of hindwings, where they are blackish. Face and palpi pale ochreous; top of palpi and face and two dots at base of face bright orange-red; vertex and antennae white; thorax and abdomen green.

Expanse of wings: 26 mm.

♀ from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

SUBFAMILY STERRHINAE.

Anisephyra gen. nov.

Forewings: with costa straight, convex just before apex; apex slightly produced; hindmargin sinuous.

Hindwings: with well-rounded hindmargin.

Forehead protuberant; palpi porrect, broad, squamous beneath, third joint small; antennae of ♂ strongly pectinated to four-fifths, of ♀ simple; hind tibiae with four spurs.

Neuration: cells half as long as wings; discocellulars vertical; in forewings the stalk of 10 and 11 anastomoses with that of 7, 8, 9, to form the areole.

Type: *Anisephyra rufaria* sp. nov.

In this genus will come also *albiannularia* Wlk.

86. **Anisephyra albiannularia incorrupta** subsp. nov.

Differs from the type-form with its variations in being entirely devoid of darker atoms or suffusion, both wings with their fringes being yellow; the ocelloid cell-spots distinct; in the forewings there are slight traces of a darker outer line, which in the hindwings is marked by dark dots on the veins.

Underside of both wings somewhat strigulated with darker, especially in the forewings; outer line rather more distinct.

A long series, all exactly alike, from Dili, Timor, May 1892 (W. Doherty).

87. **Anisephyra rufaria** sp. nov.

Forewings: reddish testaceous, covered with fine short transverse darker striae, the striae more fuscous in the ♂; lines at one-third and two-thirds, in the ♀ deeper red, in the ♂ blackish, starting from costal blotches of the same colour, and both more or less obsolete between the median and submedian veins; fringe concolorous.

Hindwings: with the whole costal half fuscous, the reddish tinge confined to the inner margin and less intense; a dark curved postmedian line not reaching costa.

Underside dull grey, with a pinkish tinge. Palpi, face, thorax, and abdomen greyish, reddish-tinged, the thorax in ♀ quite reddish.

Expanse of wings: 26 mm.

One ♂, one ♀, from Ajmere, Rajputana.

The forewings are narrower, in proportion to the size, than those of *A. albiannularia* Wlk.

88. **Chrysocraspeda croceomarginata** sp. nov.

Forewings: wholly deep rosy, except a narrow uniform marginal space which is pale yellow; the red colour forming a minute tooth into the yellow at vein 3, but not reaching the fringe; fringe yellow; a very minute dark cell-dot.

Hindwings: the same; the cell-dot white.

Underside paler. Head, face, thorax, and abdomen all rosy.

Expanse of wings: 22 mm.

One ♀ from South Java, 1891, 1500 feet (Fruhstorfer).

89. **Chrysocraspeda gibbosa** sp. nov.

Forewings: brownish grey, purple-tinged, the grey predominating along costa and hindmargin; the cell yellow, with ferruginous speckling and a black linear cell-spot; base of wing ferruginous; inner line indistinct, marked by blackish dots on veins; outer line indicated by a curved row of brown dots on veins, followed by an obscure pale yellowish line, succeeded by two dull reddish brown blotches, one opposite the cell, the other on vein 3; hindmargin red-brown; fringe yellow from apex to middle, then broadly red-brown at base with yellow tips.

Hindwings: pinker, becoming red-brown towards margin, with a paler waved submarginal line and traces of two dark median lines on inner margin; cell-spot white; fringe yellow throughout.

Underside dull rosy grey, with cell and submarginal line on both wings yellowish. Palpi red; antennae pinkish; thorax pinkish grey; face damaged; abdomen wanting.

Expanse of wings: 26 mm.

One ♂ from Tezpore, Assam.

Distinguished from all others of the genus by its peculiarly gibbous hindmargin, the inner margin being quite as long as the costal, the apex minutely produced; hindwings broad, with hindmargin nearly straight.

90. **Craspedia aequidistans** sp. nov.

Forewings: ochreous, thickly irrorated with very fine fuscous atoms; the lines dull fuscous, ending on inner margin at one-fourth, one-half, and three-fourths respectively; the first at one-third of costa, bent on the subcostal; central shade diffuse, from costa at three-fifths, incurved below middle; outer line darker, irregularly waved and bent, but without distinct denticulations; marginal line fine, dark fuscous, interrupted by the paler veins; fringe ochreous, dusted with darker; a small dark cell-spot.

Hindwings: with a diffuse antemedian shade, followed by the obscure cell-spot; submarginal and marginal lines as in forewings.

Underside whitish, the outer and marginal lines very distinct. Face and palpi fuscous above, ochreous below; thorax and abdomen pale ochreous.

Expanse of wings: 30 mm.

One ♀ from Oinainisa, Dutch Timor, December 1891 (W. Doherty).

91. **Craspedia nigristellata** sp. nov.

Forewings: greyish ochreous, slightly pink-tinged, and finely dusted with blackish atoms; the lines shown by deep black vein-dots; first line represented by three dots placed in a curve; outer line of dots approximated to hindmargin; the upper three oblique outwards; the fourth, on the lower radial, displaced basewards; the remaining four in a curve parallel to hindmargin; marginal dots black; cell-spot black, followed by an oblique curved grey shade.

Hindwings: the same, but the grey shade antemedian; the outer row of dots farther from the hindmargin; a pale submarginal line between two dark greyish shades.

Underside whitish, the forewings suffused with grey. Face and palpi dark brown; vertex white; thorax and abdomen ochreous.

Expanse of wings: 24 mm.

One ♂, four ♀♀, from Batchian, May 1892 (W. Doherty).

92. **Craspedia subdecorata** sp. nov.

Forewings: glossy, bone-colour, sparsely irrorated with coarse fuscous atoms; the lines indicated by blackish scales and darker vein-dots; first line at one-fourth, curved above and vertical below; outer line at three-fourths, forming small dark teeth on the veins and strongly incurved opposite the cell; cell-spot obscure, ochreous, followed by a curved ochreous central shade; submarginal line of the pale ground-colour, with an ochreous waved fascia on either side; marginal spots large, black; fringe pale ochreous.

Hindwings: the same; cell-spot minute, black, preceded by the ochreous shade.

Underside glossy, more whitish; the forewings suffused with grey from base; the central shade and a waved fascia beyond outer line dark grey: cell-spot and marginal spots distinct; hindwings with the markings fainter. Face and palpi brown; thorax and abdomen concolorous with wings.

Expanse of wings: 28 mm.

One ♀ from Mt. Mulu, North Borneo (C. Hose).

93. **Craspedia subtincta** sp. nov.

Wings ochreous, with a reddish tinge, and dusted with grey, especially on basal half of hindwings; lines as in *addictaria* Wlk.; outer line of forewing dull ferruginous, followed in ♀ by a greyish fascia; marginal line wavy, rarely interrupted.

Underside rufous ochreous in forewings, the costa brownish; the outer lines brownish; hindwings paler.

Expanse of wings: 22 mm.

A long series from the Tenimber Islands, July 1892 (W. Doherty).

Distinguished from the allied forms by the rufous tint.

Dizuga gen. nov.

Forewings: with costa straight, rather strongly arched at base and convex before apex; apex blunt; hindmargin obliquely rounded.

Hindwings: with hindmargin crenulate, and with a deeper distinct excision opposite the cell.

Palpi as in *Perixera*; antennae of ♂ pectinated; hind tibiae of ♂ with four spurs.

Neuration: forewings, cell not quite half as long as wing; discocellular straight; first median at one-half, second before, third from, end of cell; radials normal; all the five subcostals stalked from middle of cell, the fifth rising well before the end of cell. Hindwings with the two subcostals and last two medians from ends of cell.

Type: *Dizuga parva* sp. nov.

Distinguished by the four spurs of hind tibiae of ♂.

Anisodes illepidaria Guen. probably should be referred here.

94. **Dizuga parva** sp. nov.

Forewings: ochreous, slightly dusted with dark fuscous; first line formed by three black dots on veins; a black discal dot, with a smaller one before it in the cell; a faintly darker central shade, much outcurved beyond cell; exterior line formed by dots on veins, also much outcurved beyond cell; submarginal line of dots regularly curved, the dots between, not on, the veins, the second and fifth from the costa obsolete or very faint; a marginal row of dots between the veins; fringe ochreous.

Hindwings: the same, with a dark dot at base, and the dots towards inner margin enlarged.

Palpi externally bright rosy; face ochreous below, rosy above; vertex, thorax, and abdomen ochreous, the last with a dark spot on second segment. Underside of forewings bright rosy; of hindwings ochreous, tinged with rosy.

Expanse of wings: 22 mm.

Two ♂♂ from Cedar Bay, Cooktown, Queensland.

95. **Leptomeris (?) uniformis** sp. nov.

Forewings: rather glossy, pinkish grey, dusted with brown-red scales; marginal line of deep red dashes between the veins; fringe concolorous; cell-spot darker; lines hardly visible; traces of an inner line on inner margin at one-third, and of a slightly curved outer line at two-thirds, sinuate slightly inwards above inner margin; submarginal line denoted by small dots on veins.

Hindwings: like forewings, but with no lines visible.

Underside paler, in the forewings tinged with pink. Face reddish (damaged); thorax and abdomen concolorous.

Expanse of wings: 26 mm.

One ♀ from Mackay, Queensland.

A very obscure-looking insect, whose position, in the absence of the ♂, must remain doubtful.

96. **Lycauges mollis** sp. nov.

Forewings: uniform flesh-coloured ochreous, without dusting; cell-spot darker; the only line distinct is the denticulate outer one from near apex to inner margin beyond middle; submarginal line pale, between two slightly darker flesh-coloured bands; fringe concolorous.

Hindwings: with costal region whitish; a brownish cell-dot and three curved flesh-coloured submarginal lines.

Underside paler. Palpi ochreous; face dark brown; thorax and abdomen concolorous with wings.

Expanse of wings: 19 mm.

One ♂ from the Khasias.

97. **Mesotrophe nephelospila** (Meyr.).

Perixera nephelospila Meyr., *Tr. E. S.* 1889. p. 487 (♀).

Mr. Meyrick, who made his description from a single ♀, at the end of it remarks that the dark anal blotch is probably variable. The examination of five examples, three ♂♂, two ♀♀, from Cedar Bay shows that Mr. Meyrick's surmise was right, and also enables me to refer the species to its right genus. Only one ♀ example answers the description precisely; two others, a ♂ and ♀, have the dark tints at the anal angles much reduced; while in the remaining *males* there is no trace of any dark blotches at all. In the type-form the basal segment of abdomen is also black. The structural peculiarity remarked by Meyrick in the bar between veins 1*a* and 1*b* of forewing holds in both sexes. As his description was made from a ♀ not in good condition, I append one made from a ♂.

♂. *Forewings:* ochreous buff, thickly speckled with black atoms; the lines grey; first twice curved and marked by black specks on veins; a faint oblique grey annulus,

with a minute black dot at each end; an obscure curved greyish central shade; exterior line grey, with black dots on veins, nearer hindmargin than usual, followed by a cloudy grey shade forming blotches at anal angle, below middle, and apex; a marginal grey shade; a double marginal row of dots, those on veins smaller than those between; fringe pale ochreous.

Hindwings: like forewings; the cell-spot small, oval, of raised white scales.

Face and palpi rosy brown, beneath whitish; vertex, thorax, and abdomen ochreous; sides of abdomen rosy towards base. Underside ochreous, much suffused with rosy; costa of forewings marked with fuscous.

98. **Organopoda olivescens** sp. nov.

Forewings: dull reddish, almost wholly suffused with olive-fuscous scales; the costa, base, hindmargin, and all the lines olive-fuscous: first at one-fourth, curved and wavy; central shade diffuse, outwardly denticulate; exterior line irregularly denticulate, nearer the hindmargin than usual; submarginal line edged outwardly with paler reddish; fringe reddish, with a fuscous line along hindmargin, interrupted at ends of veins by slightly paler dots; extreme costa pale ochreous; cell-spot large, blackish.

Hindwings: the same.

Palpi bright rosy, pale beneath; face deep red-brown; thorax and abdomen like wings. Underside of forewings wholly dull rosy, with an ochreous subcostal streak and the inner margin whitish; of hindwings yellowish ochreous, tinged with rosy.

Expanse of wings: 28 mm.

Two ♂♂ from Cedar Bay, Cooktown, Queensland (A. S. Meek).

Smaller and duller than either of the Indian species.

99. **Perixera confiniscripta** sp. nov.

Forewings: ochreous, finely irrorated with rosy; first line marked by three vein-dots placed in an oblique line outwards; cell-spot small, blackish, followed by an obscure obliquely curved central shade; outer line close to hindmargin, taking the place of the submarginal, marked by blackish dots on veins, that on vein 5 large and cloudy and strongly displaced towards base; a row of dark marginal dots between the veins; fringe ochreous.

Hindwings: similar.

Underside paler; costal half of forewing suffused with rosy towards base. Palpi ochreous below, bright rosy above; face ochreous below, dark fuscous above; thorax and abdomen ochreous.

Expanse of wings: 22 mm.

One ♂ from the Tenimber Islands, July 1892 (W. Doherty).

Distinguished by the position of the outer line, as well as by its much smaller size.

100. **Perixera (?) erubescens** sp. nov.

Forewings: wholly dull rosy red; with the cell-spot, a central shade, and the outer line slightly deeper red: the latter marked slightly with dots at the veins; fringe pale, with no trace of dark marginal spots or line.

Hindwings: the same, the cell-spot minute, white, and oval.

Underside wholly dull reddish. Palpi whitish beneath, red above; face wholly red; fillet white; thorax and abdomen deep red.

Expanse of wings: 40 mm.

One ♀ from Mt. Mulu, North Borneo (C. Hose). Another example, likewise a ♀, from Sandakan, North Borneo, has the basal half of costa broadly brown.

101. **Perixera (?) flavirubra** sp. nov.

♂. *Forewings:* dull yellowish, but so densely dusted and suffused with brick-red as to appear red, the yellowish ground-colour only showing through in patches between the lines; first line very obscure, marked by black dots on veins; cell-spot minute, white, with a black edge; a cloudy straight dark central shade beyond it; second line marked by a sinuous row of dark dots on veins at five-sixths; submarginal line hardly denoted; fringe concolorous, with dark dots at ends of veins.

Hindwings: similar; the cell-spot larger.

Underside whitish, tinged with red in the forewings. Palpi white, bright rosy above; face white, with a rosy bar at top; antennae, vertex, thorax, and abdomen red.

The ♀ is wholly suffused with red, the yellowish ground-colour being quite obliterated; all the dark spots more prominent; the submarginal line with a double black blotch on each side of it opposite the cell in the forewings, and in the hindwings with the whole anal angle black. These black markings are, however, most probably, not sexual.

Expanse of wings: 32 mm.

One ♂, one ♀, from Cedar Bay, Cooktown, Queensland (A. S. Meek).

Similar black markings to those occurring in this ♀ are mentioned by Meyrick in his description of the type of *porphyropis*, also a ♀; but that insect is pale ochreous, not suffused with red.

The hindlegs of the only ♂ are wanting, so that I have been obliged to query the genus.

102. **Perixera furcata** sp. nov.

Forewings: bone-colour, finely dusted with rosy atoms; first line curved, indicated by dots on veins; second at four-fifths, evenly curved, finely reddish, with dots at the veins; basal and apical fourth of costa dark red-brown; from the apical blotch a broad diffuse oblique red-brown fascia runs to middle of inner margin; from hindmargin opposite cell a similar streak runs horizontally to the oblique fascia, and is continued narrowly along the median vein half-way down the cell, where it throws out a blotch across the cell to the subcostal; a row of reddish brown marginal dots between the veins; fringe bone-colour.

Hindwings: with a fine curved basal line, dotted on veins; a central thick red-brown fascia containing a blackish linear cell-spot; a curved outer line as in forewings; the horizontal blotch so swollen as to occupy the whole apical area.

Underside bone-colour, with a dull reddish tinge; cell-spot, oblique fascia, and outer line indicated, but more obscurely than above. Face and palpi bone-colour, dull reddish above; vertex, thorax, and abdomen bone-colour; collar red-brown; anal segments of abdomen dull red-brown, corresponding to the red-brown central fascia of hindwings.

Expanse of wings: 30 mm.

One ♀ from Moroka, British New Guinea, October 1895, 3500 feet (Anthony).

103. **Perixera pallida** Moore ab. **ampligutta** nov.

Among a long series of this species, all from Cedar Bay, Cooktown, several exhibit a marked difference from the type-form in having the discal spot of the hindwings developed into a long sinuous mark, edged with black, and filled up with shining whitish scales; in two ♂♂ the whole of this space is coal-black. In all other respects they agree with the usual form.

104. **Perixera pallida** Moore ab. **perscripta** nov.

In this form the wings are not obscured by grey clouds, as in the type-form; but all the markings, especially the zigzag central line, are distinctly and concisely black, while the red dusting is very conspicuous.

Two ♂♂ from the Khasias, caught in December.

105. **Perixera roseofusa** sp. nov.

Forewings: ochreous, dusted with very fine rosy atoms; all the markings rosy, viz. the cell-spot, an indistinct shade beyond it, a dentate wavy outer line, and an obscure submarginal one; a double row of rosy marginal dots, those between the veins twice as large as those at the ends; fringe pale.

Hindwings: exactly the same, but with the cell-spot pale, triangular, edged with red.

Underside of forewings suffused with pale rosy, except the hind and inner margin; the cell-spot and two outer lines distinctly darker rosy; hindwings paler, with the two lines rosy. Face and palpi whitish, rosy above; head, thorax, and abdomen like wings.

Expanse of wings: 36 mm.

One ♂, one ♀, from Mt. Mulu, North Borneo, 1000—4000 feet (Charles Hose).

106. **Pisoraca sordidata** sp. nov.

Forewings: dull ochreous, dusted and suffused with grey; first line denoted by three black vein-dots; outer line at five-sixths, also formed by vein-dots, slightly connected by a darker shade; submarginal faintly paler, waved; a row of black dots at the ends of the veins; fringe concolorous; the hindmargin is strongly crenulate and very oblique in its lower half.

Hindwings: with a strong black cell-spot, followed by an obscure straight dark grey line; otherwise like forewings.

Underside of forewings dull brick-red, the inner margin whitish; of hindwings greyer red. Palpi ochreous below, bright red above; face ochreous below, brown above; vertex white; collar and thorax pale ochreous; abdomen greyer, with darker rings towards base; legs red.

Expanse of wings: 34 mm.

One ♂ from Humboldt Bay, New Guinea, taken by Doherty, October 1892.

Plocucha gen. nov.

A development of *Perixera*, with which it agrees generally; distinguished by having the costa of forewings in ♂ folded over flat and scaled, from one-fourth to three-fourths, much as in the genus *Bardanes* Wlk.

Type: *Plocucha irregularis* sp. nov.

107. **Plocucha irregularis** sp. nov.

Forewings: yellowish ochreous, suffused with darker and dotted with pink; first line very fine, threadlike, marked by dark red dots on veins, strongly angulated outwards in the submedian interspace; a dark discal dot at the upper angle of cell, preceded by another on the fold within the cell; an obscurely waved and denticulate darker central shade; outer line threadlike, marked by distinct dark red vein-dots; these are placed somewhat irregularly; the fourth from the inner margin, on the third median, instead of being, as usual, in the same oblique line as the lower three, is situated vertically above the third, and the top three are strongly recurved to costa; submarginal line pale, with a cloudy space on each side; a row of dark marginal spots between the veins, and of almost imperceptible dots at the ends; fringe concolorous.

Hindwings: the same, but with a whitish dark-edged discal ocellus, and the marginal dots at ends of veins plain.

Underside, especially of forewings, suffused with rosy, more deeply towards the margins; lines and marginal spots deeper red. Head, face, thorax, and abdomen ochreous; palpi red; abdomen with red dorsal spots.

Expanse of wings: ♂, 28 mm.; ♀, 26 mm.

A pair from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

108. **Problepsis margaritata** sp. nov.

Forewings: dull white, dusted with coarse silvery scales; the markings very pale ochreous; these consist of a curved inner line, very faint; a thick postmedian line, followed by three other lines, all four being curved towards costa; cell-spot faintly darker; fringe white, with a fine dark grey marginal line.

Hindwings: the same.

Underside wholly dull white. Face brownish grey above, becoming whitish below; palpi pale ferruginous; thorax and abdomen white.

Expanse of wings: 46 mm.

One ♀ from Brisbane, Australia.

Distinguished by the entire absence of ocellus.

109. **Ptochophyle inornata** sp. nov.

Forewings: reddish grey, dusted with darker and clouded in places with fuscous; lines very indistinct, indicated only by dots on the veins, first at one-fourth, second at three-fourths, the latter outcurved in midwing; a comparatively large blackish cell-spot; a row of marginal black dots; fringe slightly paler.

Hindwings: the same.

Underside of forewings, except inner margin, dull rosy, with a faint pale submarginal fascia; inner margin and hindwing whitish; cell-spots dark in both wings. Palpi reddish; face and vertex white; thorax and abdomen reddish.

Expanse of wings: 22 mm.

Three ♂♂ from the Tenimber Islands, July 1892 (W. Doherty).

110. **Ptochophyle lineata** sp. nov.

Forewings: ochreous, densely irrorated with reddish striae; first line obsolete; second line at two-thirds, strongly curved in the upper part, to inner margin at three-fourths; fringe unicolorous, with no basal line or dots, but with reddish dots in the fringe opposite the ends of the veins; a small dark cell-spot.

Hindwings: the same, but with the cell-spot white with darker edge; hind-margin faintly crenulate.

Underside of both wings whitish, with a pink tinge, which is strongest along the margins. Face and vertex white; thorax and abdomen concolorous with wings.

Expanse of wings: 22 mm.

Three ♂♂, one ♀, from Dili, Timor, May 1892 (W. Doherty).

111. **Ptychopoda deflavaria** sp. nov.

Forewings: yellow ochreous, with fine dark dusting; the lines much as in *remotata* Guen., but the outer line not so dentate; marginal area clouded with grey; a marginal row of minute black dots; fringe concolorous.

Hindwings: the same, but the central line thickened; both wings with small black cell-spot.

Underside whitish ochreous; the forewings yellow-tinged along costal half. Palpi yellowish, with the last joint dark brown; face dark brown; thorax and abdomen like wings.

Expanse of wings: 22 mm.

Three ♂♂ from the Tenimber Islands, July 1892 (W. Doherty).

Distinguished at once by the strong yellow ground-colour.

112. **Ptychopoda nigranalis** sp. nov.

Like *actiosaria* Wlk.; pale bone-colour, dusted with darker, with the lines similar; distinguished by the outer line of both wings ending on inner margin in a small blackish blotch; the submarginal line also in the forewings dark on inner margin.

One ♂ from Dili, Timor (*type*); two ♀♀ from Wetter, May 1892 (W. Doherty).

113. **Ptychopoda pallidivestis** sp. nov.

Forewings: bone-colour; first line brown, indistinct, marked on costa by a dark spot; exterior line at three-fourths, concise, strongly denticulate, parallel to hind-margin, starting from a large dark brown costal spot; marginal area tinged with fuscous, the lower half darker, with fuscous lunules; fringe bone-colour, with a row of small dark dots at base; cell-spot large, black.

Hindwings: the same.

Underside like upper, but duller. Face and collar black; thorax and abdomen ochreous.

Expanse of wings: 12 mm.

One ♂ from East Java.

The antennae have very long ciliations.

114. **Rhodostrophia inornata** sp. nov.

Forewings: mouse-colour, with an undertone of reddish; basal area rather darker, edged by an obscure curved line at one-fourth; cell-spot round, black; a curved, uniformly broad, darker fascia beyond it; exterior line at five-sixths, dark brown, evenly curved and denticulate; fringe concolorous, with darker basal line.

Hindwings: the same, but the discal spot elongated and accompanied by two or three whitish dots.

Face and palpi dark brown-red; thorax and abdomen concolorous with wings; vertex and antennae paler. Underside paler; both wings suffused with rufous except along hindmargins.

Expanse of wings: 32 mm.

One ♂, one ♀, from Bandong, Java.

115. **Somatina rufifascia** sp. nov.

Forewings: greyish ochreous, olive-tinged; a deep red fascia at and beyond the centre, its edges waved, with a curved line down centre within which the red is deeper; the red tint fades into olive above the cell, only the edges remaining red and reaching the costa; submarginal line white, irregularly waved, preceded by a darker olive tint, containing two red-black blotches, one on each side of the upper radial, and two more above anal angle; a marginal line of curves, white, preceded and narrowly followed by olive, with two cloudy reddish blotches below apex and some red scales at anal angle; fringe glossy ochreous; a small dark cell-dot in the red fascia.

Hindwings: with the fascia olive, its inner edge diffusely reddish, and its outer only red at inner margin; submarginal and marginal lines as in forewings, but without any red blotches.

Underside milk-white, with black cell-dots and three or four black marginal dots towards apex of each wing. Palpi and face pale below, brownish above; fillet reddish brown; collar ferruginous; thorax cream-colour; abdomen cream-colour, tinged with reddish grey.

Expanse of wings: 32 mm.

One ♀ from Cedar Bay, Cooktown (A. S. Meek).

Somatinopsis gen. nov.

Like *Somatina* in all essential points, but the hind tibiae of ♂, as well as the tarsi, not abbreviated; the tibiae with a terminal pair of spurs; antennae shortly ciliated.

Type: *Somatinopsis nigridiscata* sp. nov.

116. **Somatinopsis nigridiscata** sp. nov.

Forewings: whitish, dusted with black scales; a large blackish cell-spot; an irregularly dentate dark exterior line at five-sixths, incurved opposite the cell; a blackish subapical costal blotch; a row of black dots between veins before the hindmargin; fringe concolorous.

Hindwings: similar; the cell-spot smaller; the exterior line more regularly denticulate.

Underside the same, but whiter and more glossy. Face and vertex blackish; palpi (?); thorax and abdomen like wings.

Expanse of wings: 36 mm.

One ♂ from South Java, 1891, 1500 feet (Fruhstorfer).

Stibarostoma gen. nov.

A development of *Perixera* Meyr., distinguished from it and all other of the allied genera by the remarkably developed palpi; in these the second joint is three times as long as the head and correspondingly stout, thickly clothed with hair beneath, porrect, towards the end becoming decumbent; third joint decumbent, short and blunt, smoothly scaled; the hind tibiae of ♂, as in *Perixera*, with two spurs; the hind femora simple.

Neuration: as in *Perixera*.

Type: *Stibarostoma griseata* sp. nov.

117. **Stibarostoma griseata** sp. nov.

Forewings: greyish ochreous, covered with pinkish atoms; the costa dark greyish; first line marked by three black dots on the veins, the lower portion also by a diffuse grey streak; a diffuse oblique and somewhat waved central grey shade; exterior line shown by black vein-dots on an obscure curved grey line; followed by a subterminal and marginal grey fascia, the former interrupted opposite the cell and below the middle; a marginal row of black spots at ends of veins and minute dots between them; fringe pale clear ochreous.

Hindwings: the same; no cell-spot on either wing.

Underside shining ochreous, tinged with flesh-colour; the central and two outer lines expressed; the marginal dots and dots of the exterior line purple, the latter with the three nearest the costa close together and distinct; cell-marks just indicated. Palpi whitish ochreous below, bright rosy above; face, vertex, thorax, and abdomen ochreous, the last dusted with darker, and with dark dorsal spots.

Expanse of wings: 30 mm.

Three ♂♂ from Cedar Bay, Cooktown.

Superficially resembling *P. pallida* Moore, but larger and without discal spots.

Subfamily TRICHOPTERYGINAE.

Coptogonia gen. nov.

♂. *Forewings:* with costa curved at base and apex, faintly incurved in middle; apex blunt, rectangular; hindmargin straight and vertical to below third median, then sharply but shallowly excised to above first median; the anal angle lobed; the inner margin sinuous; vein 1 running to middle of inner margin, and there followed by a round hyaline blister.

Hindwings: as in *Remodes* Guen., with three lobes.

Antennae lamellate, thickened; palpi porrect, twice as long as head, the second

joint long and hairy, the third slender and smooth; hind tibiae shortened and swollen, without spurs; hind tarsi also thickened at base; abdomen with tufts of hair.

Neuration: forewings, cell half as long as wings; first median at three-fourths, second half-way between first and lower end of cell; radials normal; the areole long; first subcostal from close to its end, the fifth from a little beyond the end, the other three separating near the costa. The hindwings of the only example are too much broken to admit of the neuration being made out.

Type: *Coptogonia turpipennis* sp. nov.

118. **Coptogonia turpipennis** sp. nov.

Forewings: olive-green, with a strong rufous tinge; traces of dull reddish fasciae, most distinct on costa; the first close to base, the second and third on each side of the middle, the last two submarginal and narrower, darker beyond the cell; traces of purplish spots at ends of veins from apex to middle; fringe rufous olive.

Hindwings: pale ochreous, the terminal lobe dark fuscous.

Underside greyish ochreous. Palpi ochreous olive; face brown; antennae blackish; thorax and abdomen olive ochreous.

Expanse of wings: 38 mm.

One ♂ from Batchian, March 1892 (W. Doherty).

The insect described is unfortunately somewhat worn, and an exact description is impossible.

Helminthoceras gen. nov.

Distinguished from *Sauris*, *Remodes*, and their allies by the formation of the antennae; these are lamellate and laterally flattened, the upper edge with four distinct curved swellings, each with short tufts of scales; palpi long, the second joint with loose scales, the third smooth.

Type: *Helminthoceras sinuaticornis* sp. nov.

119. **Helminthoceras sinuaticornis** sp. nov.

Forewings: very pale greenish, with diffuse transverse wavy fuscous lines, most distinct towards inner margin; the outer line dentate and angled outwards in mid-wing, preceded by fuscous scales, which in the lower half of wing reach the straight central line and form a more or less distinct dark central fascia, the dark cell-spot lying in the unsuffused greenish upper half; an indistinct fuscous submarginal line, joined by fuscous scaling opposite the cell to the outer line; apical space pale green, unclouded.

Hindwings: pale greenish grey.

Underside pale greenish grey. Face brown; palpi dull olive-green; thorax and abdomen green; antennae fuscous ochreous.

Expanse of wings: 26 mm.

One ♀ from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

120. **Remodes (?) angulosa** sp. nov.

Forewings: pale greyish green, olive-tinged, the markings dull purple; a wavy dark purple line near base, followed by two broad zigzag olive-green shades; then a pale dentate fascia with a central dark line, followed by a double dentate purplish line forming the inner edge of the central fascia; discal spot oblique, purple, touching the inner edge of fascia; outer edge formed of two deeply dentate purplish lines, oblique outwards below costa and excurved round cell; then an olive fuscous externally dentate fascia broad on costa and becoming a line on inner margin, the teeth filled up with purplish; next a pale curved fascia with dark green central line; a dark green fascia with strong purple wedge-shaped marks between the veins; the submarginal line pale green and dentate; another purplish fascia before margin; a row of dark dots at end of veins; fringe green.

Hindwings: fuscous grey.

Underside dull grey. Palpi and antennae black; vertex and thorax olive-green; abdomen cinereous.

Expanse of wings: 34 mm.

Two ♀♀ from Amboina, February 1892 (W. Doherty).

Distinguished especially by the strongly dentate character of all the lines. Though I have placed it under *Remodes*, I am by no means sure of its proper place in the absence of the ♂.

SUBFAMILY ASTHENINAE.

121. **Bardanes flavata** sp. nov.

Forewings: yellow; costa purple-brown, with yellow intervals; in ♂ wholly ferruginous; the markings ferruginous, the only distinct line being one just beyond the middle of forewings; all the usual waved lines more or less obsolete, especially in the ♂.

Hindwings: with the line central and often broken; fringes of both wings yellow, sometimes with ferruginous dots at end of veins.

Face, vertex, and collar ferruginous; fillet white; thorax and abdomen yellow. Underside duller yellow, with the central line dull rosy brown.

Expanse of wings: 26—30 mm.

Two ♂♂, four ♀♀, from West Java.

122. **Bardanes nigricosta** sp. nov.

Forewings: greyish ochreous, slightly pink-tinged, with fine rosy irroration; a small brown blotch on costa near base; first line strongly angled, marked only by dots on veins; one on costa just beyond the subbasal blotch, a small one obliquely outward on subcostal, and a third beyond it in cell; the fourth at the base of first median nervule, and the fifth on the submedian near base; outer line at four-fifths, indicated by black dots on veins, the upper two being included in a large brown-black costal blotch; the costal fold strongly marked with brown-black; a row of black marginal dots between the veins, and minute points at the ends; fringe concolorous; cell-spot large, brownish.

Hindwings: the same; cell-spot lunulate, edged with brown, and followed by an obscurely darker central shade, which can also be faintly discerned on the forewings.

Underside whitish, tinged with rosy towards costa in both wings; the outer line marked with dark vein-dots in the costal half. Face, vertex, thorax, and abdomen pinkish grey; palpi dull red above.

Expanse of wings: 30 mm.

One ♂ from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

Cleptocosmia gen. nov.

Forewings: with costa nearly straight, slightly curved at base and just before apex, which is somewhat produced and acute; hindmargin obliquely curved, bent in the middle, the lower part more oblique than upper and slightly excised above anal angle.

Hindwings: kite-shaped, the hindmargin with a prominent elbow in middle.

Antennae of ♂ lamellate, finely pubescent; palpi very short; tongue present; hind legs of ♂ fully developed; the tibiae with four spurs, the two outer ones long and hairy, the tibiae themselves also hairy; a very long straggling tuft of hair from base of hind tibiae. Forewings of ♂ with a rather large hyaline fovea, and with the basal half of wing clothed with erect furry hair.

Neuration: as in *Chrysocraspeda*, the five subcostals on one stalk.

Type: *Cleptocosmia mutabilis* sp. nov.

123. **Cleptocosmia mutabilis** sp. nov.

♂. *Forewings:* yellowish, overlaid with dull red and crossed by wavy diffuse reddish grey lines, which are only visible towards the hindmargin, the basal half being covered, except just at base of costa, by the fulvous furry hair; fringe yellow beyond a reddish, slightly crenulated, marginal line.

Hindwings: with the cross-lines visible throughout.

Underside dull rosy. Fillet and base of antennae white. Face, vertex, thorax, and abdomen dull ferruginous.

Expanse of wings: 24 mm.

One ♂ from Cedar Bay, Cooktown (A. S. Meek).

124. **Hydrelia pallidula** sp. nov.

Forewings: pale ochreous, with traces of waved brown lines across the wing; cell-spot ferruginous; a row of ferruginous spots at end of veins; fringe ochreous.

Hindwings: similar.

Underside whitish, the costa of forewings ferruginous at base. Palpi and face ochreous, ferruginous above; thorax and abdomen ochreous.

Expanse of wings: 26 mm.

One ♀ from South Java, 1891, 1500 feet (Fruhstorfer).

I leave this at present in *Hydrelia*; but the neuration is peculiar. Veins 10 and 11, and 7, 8, 9 are stalked; 10 and 11 first anastomose with the stalk of the other three, and subsequently 8 and 9 abruptly leave 7 and anastomose again with 10. In both wings the cell is very short, vein 3 rising before the lower end; the two subcostals of hindwings are shortly stalked.

125. **Psilocambogia semirubra** sp. nov.

Forewings: yellow, with the base, the costa, a large postmedian costal blotch, reaching below the median and there bilobed, and a smaller narrower subapical streak, all blood-red; fringe yellow.

Hindwings: wholly yellow, deeper towards the fringe.

Underside pale yellow, with the markings brown. Face, vertex, and shoulders deep ferruginous; fillet and antennae snow-white; collar yellow; thorax and abdomen reddish mixed with yellow.

Expanse of wings: 18 mm.

One ♂ from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

SUBFAMILY HYDRIOMENINAE.

126. **Anticlea canaliculata** sp. nov.

Forewings: whitish grey, finely dusted with dark grey; a chestnut basal patch edged by the curved and inwardly oblique basal line; first line treble, starting from a chestnut blotch on costa before middle, at first angled inwards, then running outwards to the median vein, then again sharply angled and becoming obsolete to the inner margin at middle; outer line double, at two-thirds, also starting from a chestnut costal blotch, running at first obliquely outwards nearly to hindmargin, then strongly bent inwards to the end of cell, where it meets the angulations of the first line, thence to inner margin describing four long reddish teeth; submarginal line from a large costal blotch, wavy to the median, then strongly dentate, and approximating to the outer line; hindmargin greyer; all the lines are slightly chestnut-tinged, especially the submarginal, and the veins beyond the middle are also reddish; in the pale space between the basal patch and central fascia are two or three faint undulating grey lines, and between the central fascia and the submarginal line is a single fine line; cell-spot linear, oblique; an interrupted dark reddish grey marginal line; fringe grey, tinged with red; the inner margin between the edges of the central fascia is filled up with grey.

Hindwings: white; a very faint curved grey submarginal line; fringe white, slightly tinged with grey towards anal angle, and preceded on margin by two or three pairs of dark dots.

Underside whitish, in the forewings tinged with dirty rufous, especially towards apex; face and palpi chestnut; collar, thorax, and abdomen mixed grey and chestnut.

Expanse of wings: 36 mm.

One ♂ from Sikkim (Pilcher *leg.*).

The costa of forewings at base is rough-haired.

127. **Coenocalpe (?) legalis** sp. nov.

Forewings: with ground-colour whitish ochreous, but so much suffused and dusted as to appear red-brown; crossed by numerous minutely dentate red-brown lines; costa dotted pale and dark; two or three dark sharply angulated lines close to base, followed by a red-brown fascia with pale edges before the central fascia, of which the inner edge is angled in the cell and on the submedian fold; outer edge from just beyond middle of costa to middle of inner margin, curved and minutely waved and

denticulated; the space between the edges black-brown; outer edge margined with pale and followed by four or five exactly similar red-brown lines separated by pale intervals; submarginal line obscure, waved, preceded by a curved red-brown shade which narrows downwards; hindmargin and fringes reddish; marginal line crenate, black; the veins beyond the middle are dotted dark and light.

Hindwings: like forewings, but with no dark central fascia.

Underside white, with the costa and cell of both wings yellow; forewings with three or four vertical black streaks across the middle, the outermost angled in middle and followed by a pale band, beyond which the whole margin is blackish except a small spot at apex and middle of hindmargin; hindwings with indistinct cross-lines, except the outermost, which is broad and angled. Head, thorax, and abdomen all reddish grey.

Expanse of wings: 39 mm.

One ♀ from Lifu.

128. **Collix multifilata** sp. nov.

Forewings: reddish ochreous, suffused with fuscous, and crossed by numerous fuscous lines, all more or less strongly denticulate; the costa more reddish; the line limiting the basal patch and those edging the central fascia thicker and forming costal blotches; submarginal line double, its outer arm formed of thick double lunate blotches, the inner with black dots on veins; two lines close to base, and a line before and beyond the central fascia; the latter, like the outer line of fascia itself, marked with dark dots on the veins; a dentate line within the fascia preceding the outer edge; marginal area with a dark dentate line, joined to marginal line by black dashes; fringe dark fuscous, with bright ochreous dashes opposite the veins; a large black cell-spot of raised scales.

Hindwings: the same.

Palpi reddish ochreous, externally black; face black below, mixed with ochreous above; front of head and thorax and base of patagia blackish; rest of patagia ochreous; abdomen reddish ochreous, ringed and spotted with blackish. Underside grey, with the cell-spots and two outer fasciae thick and blackish.

Expanse of wings: ♂, 26—28 mm.; ♀, 32 mm.

In large numbers from Cedar Bay, south of Cooktown, Queensland.

129. **Collix subligata** sp. nov.

Forewings: reddish grey, with dark fuscous markings; two or three dark curved lines at base; a dark central fascia, its edges formed of two or three wavy lines, more or less coalescent below, but leaving a paler central space above in which lies the sinuous black cell-spot; submarginal line reddish ochreous, wavy, preceded by a broad fuscous fascia which is interrupted between veins 3 and 4; margin brown; the veins paler, with dark horizontal dashes between them; marginal line black; fringe reddish.

Hindwings: the same.

Underside glossy whitish; the cell-spots large; two postmedian thick purple-black velvety curved lines which are partially interlaced. Palpi reddish grey, the tips blackish; face dark; head, thorax, and abdomen dark cinereous.

Expanse of wings: 36 mm.

One ♀ from Lifu.

130. **Gonanticlea multistriata** sp. nov.

Forewings: pinkish brown, with deeper brown lines and fasciae; the edge of basal patch and the edges of the central fascia formed by dark velvety brown fasciae traversed by blackish lines; edge of basal patch sinuous, the patch crossed by three dark brown lines; inner edge of central fascia sinuous, incurved below costa and above inner margin: space between basal patch and central fascia pinkish brown, traversed by two dark brown lines; its extreme edge marked by a slightly lustrous grey line; inner brown band of central fascia traversed by three dark blackish brown lines; outer band also by three lines; the narrow central space pinkish brown, traversed by one brownish line; outer edge of central fascia wavy, followed by a lustrous dark-edged line, which is succeeded by a darker brown minutely waved line, from which an oblique dark brown blotch runs into the apex; submarginal space pinkish brown, with three darker lines; the extreme margin darker, with two or three lunules above anal angle; the last four lines are dentate below the costa; fringe dark brown, with a blackish line at base.

Hindwings: bright coppery orange, tinged with blackish along inner margin and hindmargin; fringe dark brown, with black line along base.

Head, face, thorax, and abdomen reddish brown, the thorax mixed with paler, the abdomen with darker segmental rings. Underside of forewings dull orange, with the apex fuscous; of hindwings dull orange, speckled all over with fuscous, with two curved fuscous lines and a black cell-spot.

Expanse of wings: 42 mm.

One ♀ from West Java.

131. **Perizoma rubridisca** sp. nov.

Forewings: dull rust-colour; the basal area, costa, apical area, and a small blotch above anal angle purplish grey; the grey basal blotch is crossed by three or four curved darker lines; the costa is marked with dark grey; the outer line, shaped as in *seriata* Moore, is denoted only by double dark dots on the veins; the submarginal line in the apical blotch is margined with blackish; marginal line composed of pairs of dark spots; fringe rust-coloured, but dark grey along the apical blotch.

Hindwings: fuscous, with marginal line as in forewings.

Underside dull dark grey, rufous-tinged in forewings. Head, thorax, and abdomen purplish grey.

Expanse of wings: 26 mm.

One ♀ from Sikkim (Pilcher *leg.*).

132. **Perizoma seriata** Moore ab. **fulvistriga** nov.

Differs from the type-form in having the submarginal line fine and evenly waved throughout, instead of being broken up into round spots; and instead of the large white (or rufous) blotch at middle of hindmargin, a horizontal yellow streak from outer line to margin.

One ♀ from Darjiling (Pilcher *leg.*).

133. **Polyphasia calamistrata** Moore ab. **albimedia** nov.

Differs from the type-form in having the dark median fascia broken up by white scaling, the upper part sometimes being wholly white with the black cell-spot prominent in the middle. The hindwings pure white, whereas in *calamistrata* they are always more or less tinged with grey.

Several examples from Sikkim.

134. **Polyphasia cinereata** Moore ab. **flavifusa** nov.

Like *cinereata* Moore, but with the greyish white tints of the middle area replaced by dull yellowish. The form is analogous to the European *comma-notata*.

Several from Sikkim.

135. **Polyphasia dentifera** sp. nov.

Forewings: pale dull yellowish; basal area greyish, with the lines blackish; outer edge of median band velvety black, edged with white below the costa, and strongly toothed in its lower half; the submarginal line forming a velvety black wedge-shaped mark on the submedian vein at anal angle.

Hindwings: yellowish grey.

Face and thorax yellowish grey; abdomen cinereous.

Expanse of wings: 42 mm.

One ♀ from Darjiling (Pilcher *leg.*).

A very large form and very distinct from any other.

136. **Triphosa acutipennis** sp. nov.

Forewings: dull grey, with numerous darker indistinct wavy cross-lines; the veins spotted blackish and pale; first line at one-third, curved and irregularly wavy, starting from a blackish spot on costa, which is followed closely by another blackish spot connected with the black cell-spot; second line at two-thirds, wavy, and darker towards costa, angled below veins 7 and 4, then slightly incurved; marginal area darker grey; the submarginal line not expressed; fringe grey; the hindmargin subcrenulate.

Hindwings: paler grey, without markings, except on inner margin above anal angle, where traces of three or four dark wavy lines are present; the veins spotted dark and light; fringe grey.

Underside shining dull pale grey, with traces of the darker markings showing through. Face and palpi dark fuscous; thorax and abdomen grey.

Expanse of wings: 52 mm.

Three ♂♂ from Kumaon (Pilcher *leg.*).

Resembling the grey form of the European *T. dubitata*, but distinguished by the more pointed forewings.

137. **Triphosa pallescens** sp. nov.

Forewings: whitish grey, suffused with darker grey and with blackish markings; the base dark grey; first line at one-third, angled below costa, then oblique and slightly wavy inwards, followed by a similar line which passes through the dark

cell-spot ; second line at two-thirds, bluntly angled below costa and forming a strong acute angle below vein 4 ; the line is preceded by a blackish suffusion, especially towards costa ; three blackish costal spots before apex ; veins obscurely marked with pale and dark ; submarginal line very faint, indicated by pale spots, one larger and more distinct towards anal angle ; marginal line black, crenulate, interrupted by a small pale dot at ends of veins ; fringe grey.

Hindwings : pale grey, darker towards margin ; a distinct regularly waved dark postmedian line, with traces of a central line ; veins dotted dark and pale.

Underside duller grey, with the markings indistinct. Face and palpi black ; thorax and abdomen dark grey.

Expanse of wings : 45 mm.

One ♂ from Kumaon (Pilcher *leg.*).

138. **Xanthorhoë farinata** sp. nov.

Forewings : grey, with very fine dark irroration ; the lines blackish ; first near base, angled in cell and preceded by a finer line ; second line beyond one-third, angled on the subcostal, then oblique inwards and waved to inner margin before middle, followed by a similar finer line, the two marked with black on the median ; outer line at two-thirds, angled on vein 6, bidentate below median, then incurved and wavy, preceded by a similar finer line ; submarginal line pale grey, denticulate, with a darker grey shade on both sides ; fringe grey, slightly mottled with dark, with no dark basal line ; in the pale spaces before and beyond the central fascia, and in that fascia itself, traces can be seen of darker transverse lines ; the space between the double lines forming the edges of the central fascia is filled up with blackish from the costa to the angulation.

Hindwings : paler grey, with traces of a sinuate still paler submarginal fascia with a dark line through it.

Underside grey, with the outer line blackish. Head, thorax, and abdomen all grey ; forelegs blackish, with white joints.

Expanse of wings : 26 mm.

Two ♂♂ from Wellington, New Zealand.

This insect has a somewhat furry appearance ; the costa is slightly shouldered at about one-sixth from the base. Distinguished from *cinerearia* Dbld. and *semisignata* Wlk., first by the uniform coloration of the wings, the veins of which are never dotted and spotted with dark and light ; and, secondly, by the entire absence of a dark basal line to the fringes. In *cinerearia* Dbld., which is smaller, the basal line consists of pairs of black dots ; in *semisignata* Wlk., which is a larger species, the veins are strongly dotted, and the fringe-line consists of black dashes.

139. **Xanthorhoë perviridis** sp. nov.

Forewings : dark greyish green, suffused with dull purple ; the first and second lines, at one-third and two-thirds respectively, double and sinuous, the whole wing crossed by fine wavy dark lines which are only distinct as dark spots on the veins, giving the wings a reticulated appearance ; fringe concolorous ; marginal line formed of small black interrupted dashes.

Hindwings : dark fuscous grey, becoming slightly rufous towards base ; traces of a paler double submarginal line towards anal angle.

Underside dull dark cinereous, with the outer lines and marginal area dull blackish. Face rufous ochreous; palpi dark green; thorax and abdomen dark green, the former slightly, the latter considerably, varied with rufous ochreous; antennae dark green.

Expanse of wings: 36 mm.

In some numbers from Newcastle, Jamaica.

Though apparently common, I have not been able to find a description of this species.

Subfamily TEPHROCLYSTINAE.

140. **Chloroclystis leucopygata** sp. nov.

Forewings: red-brown, suffused in parts with fuscous; basal patch small, followed by a curved pale fascia, with a dark central line; inner edge of central fascia curved, wavy; outer edge irregularly wavy, angled on vein 4, and edged by a pale line, followed immediately by a dark one; this central fascia is darkest on the costa and towards its outer edge, and is traversed by three or four waved paler lines; cell-spot black; submarginal dentate, finely whitish, preceded by blackish blotches at costa, opposite the cell, and above inner margin; fringe concolorous, with some finely paler dark-edged markings at base; veins throughout spotted, dark and light.

Hindwings: similar, but the submarginal line whiter, with one distinct white tooth below vein 4, and preceded by a distinct denticulate black line.

Underside whitish, blotched with dark fuscous; cell-spot and a broad strongly angulated outer line blackish; marginal area blackish, with submarginal pale spots. Head, thorax, and abdomen red-brown, the last with the anal segment white.

Expanse of wings: 30 mm.

Two ♂♂ from the Khasias, November 1895.

The hindmargin of the forewings is slightly, that of the hindwings distinctly, crenulate.

141. **Chloroclystis semivinosa** sp. nov.

Forewings: whitish, with rufous fuscous markings; middle third of wing occupied by a fuscous fascia with darker denticulate edges, both curved, and the outer slightly angled, with traces of other denticulate lines between; the outer dark edge followed by a whitish line; marginal area suffused with rufous fuscous, through which a wavy pale submarginal line can be traced; marginal line dark, interrupted at the veins; fringe grey, with paler base, and yellowish dashes at end of veins.

Hindwings: suffused with vinous red, the base paler; a broad diffuse red central fascia, with the veins marked with coarse black scales, and edged externally by a red line, followed by a narrow pale fascia; marginal area reddish, mixed with grey, preceded by a reddish line; the submarginal line wavy, paler, with the teeth internally dark-edged.

Underside rufous cinereous. Head, thorax, and abdomen ochreous, the abdomen tinged with reddish grey.

Expanse of wings: 14 mm.

One ♀ from East Java, 1892.

Distinguished by the colour of the hindwings.

Chrysoclystis gen. nov.

♀. *Forewings:* with costa faintly curved; hindmargin well rounded.

Hindwings: with rounded hindmargin.

Antennae of ♀ simple, filiform; palpi three times as long as head, obliquely decumbent, laterally flattened; second joint squamous; third as long as second, narrow at base and apex, swollen between; forehead with a prominent cone of scales below; tongue present; hind tibiae of ♀ with four spurs.

Neuration: as in *Chloroclystis*; the first and second subcostals of forewing stalked, the first anastomosing with the costal, the second with the stem of the other three. In the hindwings the discocellular is oblique, the radial from the centre; the two subcostals short-stalked; the second median from before the end of cell. Scaling smooth, the markings oblique and metallic.

Type: *Chrysoclystis perornata* sp. nov.

142. Chrysoclystis perornata sp. nov.

Forewings: fulvous yellow, without striations; the costa broadly paler; a subcostal line of interrupted patches of red-brown and brilliant silvery scales; the lines oblique; the first from below costa before middle to inner margin near base, white, edged outwardly with red-brown and overlaid with brilliant silvery scales; second line from inner margin at two-thirds, oblique and straight to the third median, white internally, edged with red-brown and overlaid with silvery scales, retracted above the third median towards costa, and there only red-brown and silvery; a lustrous metallic marginal line starting on costa before apex, slightly interrupted just at apex and thrice interrupted above anal angle between the veins.

Hindwings: with the costal region broadly pale; the two lines produced across the wings, the first close to base, the second postmedian; marginal line uninterrupted from below apex; fringes of both wings concolorous.

Underside gilded yellowish; the apex of forewings broadly bronzy pinkish. Palpi yellow, tip of terminal joint dark; face and antennae yellow; collar and base of patagia metallic greenish white; rest of patagia yellow, with an orange band in middle; thorax and abdomen yellow; basal segment of abdomen metallic greenish white, edged with reddish brown, being a continuation of the first line of the wings.

Expanse of wings: 32 mm.

Three ♀♀ from Humboldt Bay, collected by Doherty in September and October 1892.

An insect of very striking appearance, with a superficial resemblance to *Plutodes*. The inner margin of the hindwings is scantily developed; the ♂ will probably exhibit sexual distinctions.

Eriopithex gen. nov.

Distinguished from *Chloroclystis*, of which it is a development, by the antennae of the ♂, which have the basal joint swollen, the shaft thickened and flattened, and clothed above with thick downy hairs for four-fifths of its length.

Type: *Eriopithex lunaris* sp. nov.

143. **Eriopithex lanaris** sp. nov.

Forewings: pale dull grey, the lines darker grey; three or four in the basal area; a thick dark line beyond one-third, angled below costa, then oblique inwards, with dark marks on veins; second line at two-thirds, oblique outwards, angled on vein 6, and again on vein 4, then oblique inwards, followed by whitish dots on veins and preceded by a dark shade which runs in along the veins; submarginal line fine and pale, preceded by a dark shade and a blotch opposite the cell; marginal line dark grey, interrupted at the veins; fringe concolorous.

Hindwings: whitish grey, with blackish cell-dot and postmedian line, the latter incurved opposite the cell. In both wings the paler interspaces between the lines are traversed by faint wavy darker lines.

Underside greyish white, with the outer line showing darker. Head, thorax, and abdomen cinereous.

Expanse of wings: ♂, 16 mm.; ♀, 14 mm.

A pair from the Khasias.

Micrulia gen. nov.

A development of *Chloroclystis*; distinguished by the hindwings of the ♂, which are triangular in shape, with the hindmargin nearly straight; the inner margin puckered above, and bearing beneath from the anal angle to the median vein tufts of thick hair.

Type: *Micrulia tenuilinea* sp. nov.

To this genus will belong also *Chloroclystis emarginaria* Hmpsn. and *recensitaria* Wlk.

144. **Micrulia tenuilinea** sp. nov.

Forewings: dark grey; first line beyond one-third, oblique outwards to the largish black discal spot, then sharply angled and oblique inwards, preceded by a darker grey shade; basal area with two or three obscure dark lines; second line at two-thirds, curved outwards below costa, regularly waved and curved to inner margin at two-thirds, pale, followed by a fine dark line and preceded by a thick dark grey shade; submarginal line fine and pale, regularly waved, preceded by a dark grey shade; marginal area dark grey; all the lines start from dark costal blotches; marginal line blackish, interrupted at the ends of the veins by small pale dots; fringe ochreous grey, rather glossy.

Hindwings: the same, with a dark diffuse blotch in disc before the postmedian line.

Underside whitish, with the cell-dots and curved fasciae dull dark grey; tufts of hindwing black, ochreous at their base. Face, palpi, and vertex ochreous; thorax and abdomen grey.

Expanse of wings: 18 mm.

Two ♂♂ from the Khasias.

The veins are often marked with black dashes.

Opistheploce gen. nov.

♂. *Forewings:* very broad; costa nearly straight; apex blunt; hindmargin long and strongly curved; inner margin convex beyond the middle.

Hindwings: small, narrow, puckered below towards hindmargin, and with the hindmargin convolute and folded over above.

Frontal tuft acute and prominent; palpi porrect, twice as long as head, rough; hind tibiae with three very long spurs, the single one from near the base.

Neuration: as in *Tephroclystia*.

Type: *Opistheploce cinerea* sp. nov.

Certainly related to Walker's genus *Mariaba*, but the hindwings are not produced to a point at apex.

145. **Opistheploce cinerea** sp. nov.

Forewings: dingy grey, with darker lines; one near base, indistinct; the second central, passing over the large black cell-spot; the third postmedian, broad, with the outer edge waved; submarginal broad, curved and waved, followed by a fine pale waved line and preceded by a pale fascia with a dark line along its centre; hindmargin dark, with a dark marginal line, interrupted by minute pale dots on veins; fringe grey, with paler base.

Hindwings: dull ochreous grey, without markings, becoming darker along hindmargin.

Underside whitish, with the bands all darker and clearer. Head, thorax, and abdomen grey.

Expanse of wings: 18 mm.

One ♂ from Batchian, March 1892 (W. Doherty).

Subfamily DELINIINAE.

146. **Aplochlora subflava** sp. nov.

Like *Aplochlora vivilaca* Wlk., but smaller, paler green above, and with the underside of both wings dull yellow.

Expanse of wings: 30 mm.

One ♀ from Humboldt Bay, New Guinea, October 1892, taken by Doherty.

147. **Bapta lucens** sp. nov.

Forewings: silvery white, dusted with fine olive atoms; costa bright yellow, broader towards apex; no inner line; exterior line at three-fourths, nearly parallel to hindmargin, yellowish, with olive scales; discal spot round, olive, edged with yellowish; fringe ochreous, greyer towards the apices.

Hindwings: the same, the discal spot hardly marked.

Palpi rufous; face dark red-brown; thorax and abdomen white, with fine olive atoms. Underside wholly pure white; the fringes white.

Expanse of wings: 36 mm.

One ♀ from West Java.

148. **Borbacha lineata** sp. nov.

Forewings: sandy ochreous, speckled and marked with dull ferruginous; the costa with smaller, more reddish atoms; no distinct inner line; exterior line at three-fourths, diffuse and partially double, not reaching costa or inner margin, irregularly

waved and dentate, accompanied by dark dots on veins, which are produced in places towards hindmargin as streaks on the veins; submarginal line near hindmargin, running into apex; a double straight oblique line mixed with greyish scales from inner margin at one-third to middle of hindmargin, running out into the fringe as a dark spot; a row of blackish marginal spots; fringe pale ochreous; cell-spot small, dark.

Hindwings: with the oblique double line of forewings continued across the basal region; an indistinct double postmedian line, becoming single and denticulate towards costa; followed by another line, distinct and denticulate also only towards costa; submarginal line straight and fine, from just above anal angle towards apex, before which it is curved to costa; cell-spot small, dark; fringe ochreous, with a dark spot at end of third median, as in forewings.

Palpi ochreous, blackish above; face ochreous, with a dull red bar at top; vertex pale ochreous, with a very fine red line across middle; thorax and abdomen ochreous. Underside very pale ochreous, with the markings as on upperside but dull brownish.

Expanse of wings: 38 mm.

Two ♂♂ from West Java (*type*), and one ♂ from Nias.

Distinguished from *B. pardaria* Guen., not only by the different coloration and markings, but by the outline of the wings: in *pardaria* the hindmargin of both wings is simply rounded; in *lineata* the forewings are bluntly elbowed at the third median; the hindwings are produced to slight points at veins 4, 6, and 7, being slightly excised between each, and straight from the end of 4 to anal angle.

149. **Parasynegia borbachodes** sp. nov.

Forewings: pale yellowish, with coarse spots of dull blood-red; the markings formed of dull purplish grey red-edged blotches; basal line obscure, but forming a squarish blotch in cell, and another obliquely below it basewards underneath the median vein; cell-spot dark brown; central shade entire, angled below costa, its inner edge regularly waved, its outer edge bluntly and irregularly toothed; outer and submarginal lines consisting of blotches, visible only at costa and opposite cell, and here confusedly running into each other and joined to the central shade; fringe yellowish, with purple-grey spots at end of veins.

Hindwings: with the blood-red spots clearer; a grey basal mark; a grey, largely lunate, central fascia, double on inner margin; a broad grey submarginal streak from inner margin above anal angle to apex, swollen in centre and there followed by a blotch which touches the margin; cell-spot brightly black.

Underside dull straw-colour, with the markings dull grey. Face and palpi yellowish below, ferruginous above; fillet yellow; thorax and abdomen yellow, dotted with blood-red; the latter with a dark grey band on basal segment.

Expanse of wings: 30 mm.

One ♀ from West Java.

Akin to *P. erythra* Hmpsn. and *suffusa* Warr.

The antennae are distinctly serrate. The markings bear a strong resemblance to those of *Borbacha*.

150. **Parasynegia nigrifasciata** sp. nov.

Forewings: straw-colour, suffused with fulvous, and with a few blackish atoms; costa with strong black striae; a black spot on costa at base; a square black spot on costa at one-fourth and one on inner margin at one-third denote the first line; cell-

spot round and large, black, connected above with a black costal spot; a broad black fascia from costa at three-fourths, ending at vein 2; its inner edge sinuous, with a fulvous margin and line of dark dots on veins; its outer edge strongly angled at vein 4, then excised, margined with paler straw-colour; a black blotch from its angle to hindmargin; fringe straw-colour.

Hindwings: with two black spots on inner margin, an indistinct antemedian line, small cell-spot, and blotched submarginal fascia, which is narrowed from middle to anal angle.

Underside similar, but with no fulvous suffusion. Face and palpi straw-colour; palpi black on sides; head and thorax fulvous-tinged; abdomen straw-colour, with black dorsal stripe; metathoracic tuft black.

Expanse of wings: 38 mm.

One ♂ from South Java, 1891, 1500 feet (Fruhstorfer).

Plectoneura gen. nov.

Forewings: with costa slightly curved; apex produced, but blunt; hindmargin obliquely curved.

Hindwings: with the inner margin lengthened, the hindmargin bluntly elbowed at vein 4, straight or nearly so on either side.

Antennae of ♂ subdentate, ciliated; palpi upturned and erect in front of face, third joint small; tongue present; hind tibiae not thickened, with four spurs; forewings without fovea; hindwings with frenulum.

Neuration: forewings, cell half as long as wing; discocellular straight; first median at two-thirds, second and third from lower angle of cell; lower radial from middle of discocellular, upper from upper angle; all five subcostals stalked from some way before end; the costal forked towards costa, and the first subcostal anastomosing with the lower fork; the submedian thickened and strongly sinuous near base. Hindwings with first subcostal from considerably before top end of cell.

Type: *Plectoneura albida* sp. nov.

This genus is related to *Leucetaera*, but is sufficiently distinguished by the neuration of the forewings.

151. **Plectoneura albida** sp. nov.

Forewings: milk-white, sparsely sprinkled with black scales; costa ochreous; lines faintly ochreous; first at one-third, angled below costa; second at four-fifths, parallel to hindmargin, regularly dentate; cell-spot black, ringed with ochreous; a narrow grey marginal blotch from below apex to middle of margin; fringe greyish ochreous.

Hindwings: similar, without the first line.

Palpi and face deep red-brown; collar dull greyish; thorax and abdomen white, fuscous-speckled. Underside white, suffused with reddish yellow.

Expanse of wings: 32 mm.

One ♂ from Moroka, British New Guinea.

Subfamily ABRAXINAE.

152. **Abraxas nigriclathrata** sp. nov.

Forewings: white; the costa black, broadening to the apex; a black spot at base and a smaller one at edge of fovea; first line from costa at one-third to inner margin

at one-fifth, blackish, composed of confused striae; a blackish blotch in middle of inner margin, with a crescentic blotch above it, almost connected with a short projection from the costal streak; outer line at three-fourths, curved and wavy, broad where it leaves the costal streak, narrow below middle, preceded by a row of black spots on veins, and followed by a series of wedge-shaped and lunular white marks before the broad black hindmargin; fringe black.

Hindwings: white, with a black basal streak; an irregularly curved and wavy outer line, preceded by small vein-dots, that on the inner margin expanded into a blotch; hindmargin narrowly black, touching a series of elongated blotches on the veins which do not quite reach the outer line.

Underside exactly the same. Palpi black; face yellow, with a black central bar; vertex yellow; thorax and abdomen yellow, spotted with black.

Expanse of wings: 52 mm.

One ♂ from Sukabumi, West Java, 1893 (2000 feet).

153. **Percnia albinigrata** sp. nov.

Forewings: white, tinged with grey, with six rows of black spots; first basal, of two spots; second subbasal, curved, of four spots, on subcostal, median, submedian, and inner margin respectively; third antemedian, straight, of three double spots, first on costa and subcostal vein, second on either side of the median, third on submedian and inner margin; fourth row postmedian, outcurved round cell, the curved part formed of six irregular-sized and confluent spots, with three spots below, one on the first median nervule and two confluent on submedian and inner margin; fifth row submarginal, of ten spots between the veins, the third and sixth small; sixth row marginal, between the veins, also of ten spots, large and round, except the apical and anal angle spots, which are flattened; fringe white; a large discal blotch.

Hindwings: with four rows; first antemedian, of three spots; second median, of seven spots, the second and third and the fourth and fifth confluent; third row submarginal, of seven small spots; fourth marginal, of eight spots; a large discal spot.

Underside like upper, but with the costal and hindmargins of forewings smoky grey; this tint is also visible on the upperside, but not so strikingly. Face, palpi, and antennae black; mouth parts whitish; collar, shoulders, patagia, thorax, and abdomen all white, with pairs of black spots.

Expanse of wings: 65 mm.

One ♀ from Niphon, Japan.

154. **Potera flavimacula** sp. nov.

Forewings: with basal and marginal areas brown-black, central area white; the black at the base extends to beyond middle of costa and nearly to middle of inner margin, its edge sinuous; its outer edge starts from three-fourths of costa, runs first obliquely outward, then vertical, again obliquely inward, and vertical to inner margin at three-fourths on one wing; on the other obliquely inwards to inner margin at two-thirds, so that the white fasciae of the two wings do not correspond in shape; the dark margin contains a hook-shaped yellow spot below apex with a small yellow dot below it and two diamond-shaped yellow spots above anal angle; these spots lie in the

intervals between the veins, and two very minute dots can be detected between the apical and anal spots; fringe black; an orange dot at base and one beyond it below the median.

Hindwings: with basal one-third black, and a black uniformly broad marginal fascia, containing three yellow diamond-shaped spots, one towards apex, the other two below the median; the inner edge of the marginal fascia on both wings is deeper black, edged by a faintly paler shade before the row of spots; the basal and marginal black areas are united along the costa of each wing, more broadly in the hindwing than in the forewing.

Underside the same. Face yellow; vertex, shoulders, and base of patagia orange; thorax and first segment of abdomen black; rest of abdomen orange, with broad black dorsal triangles on each segment and a pair of black spots at the sides; a series of lateral spots, and a double series of spots beneath; legs with the femora orange spotted with black, tibiae and tarsi black; tongue and palpi yellow; tips of palpi and antennae black.

Expanse of wings: 60 mm.

One ♀ from Cedar Bay, south of Cooktown, Queensland (A. S. Meek).

155. **Potera intervacuata** sp. nov.

Forewings: white, the base black along costa, median and submedian veins; a strongly curved thick black line at one-fourth, with a more irregular abbreviated curved line inside it; costa beyond first line *broadly* black, containing a small white spot touching first line, united with a square black cell-spot, from the lower end of which a thick black streak runs horizontally to the hindmargin; an exterior curved line of contiguous blotches, its outward edge dentated; hindmargin broadly and irregularly black, thickened at apex, middle, and anal angle.

Hindwings: the same, with a faint basal line; the postmedian more regular, with a blotch running from it to hindmargin opposite the cell; margin much narrower than in forewings.

Underside the same; hindwings with a black subbasal costal blotch. Face and collar pale yellow; front of thorax with a black bar; thorax and abdomen yellow, with black spots.

Expanse of wings: 50 mm.

One ♂ from Mt. Mulu, North Borneo, 1000—4000 feet (Hose).

Subfamily BRACCINAE.

156. **Bursada bistrigata** sp. nov.

Forewings: deep brown-black, with two orange patches from the costa; the first small, at one-fourth, oblique and reaching just below the median; in the ♂ it starts from below the costa; in the ♀ it is decidedly broader and paler, and starts from the costa; the second patch, also oblique, at two-thirds, somewhat bent, is directed towards the anal angle, but only reaches beyond the median, where it is swollen outwardly towards hindmargin; this, which is orange in the ♂, is yellow in the ♀, and twice as large, reaching nearly to the hindmargin; the costa of forewing is sinuous, being shouldered at the base, the shoulder containing a hyaline blotch, larger than that in *B. hyaloplaga*, and present in the ♀ as well as in the ♂.

Hindwings: orange, with a black border; on the inner margin this border runs up to the base and has a projection towards costa above the anal angle; the margin between veins 2 and 4 opposite the sinus is very narrow, the yellow ground in the ♀ almost touching the margin, while at the apex it is much broader, with two curved projections; fringe of hindwings black; of forewings black, with a white patch above anal angle and below apex, but much less strongly so than in *hyaloplaga* Warr.

Underside like upper; in the forewings the inner blotch runs, as above, from the costa, while in *hyaloplaga* it starts from the base. Head, thorax, and abdomen all black.

Expanse of wings: ♂, 24 mm.; ♀, 26 mm.

Two ♂♂, one ♀, from the Tenimber Islands, July 1892 (W. Doherty).

Nearly related to *B. hyaloplaga* from Humboldt Bay, New Guinea, but certainly distinct.

157. **Bursada hyaloplaga** sp. nov.

♂. *Forewings:* deep brown-black, the costa shouldered at base and with a semihyaline blotch within it; a small fulvous blotch in cell, more or less obscured by dark scaling; an oblique oval yellowish blotch from below two-thirds of costa towards anal angle, shaped as in *synestia* Meyr., but without any red tinge; fringe dark, with pale patch above middle and anal angle.

Hindwings: yellow, with all the margins black; a small black tooth on costal margin facing that above anal angle on inner margin; the yellow without any red tinge; fringe wholly black.

Underside the same, but the spot in cell of forewing clear yellow and narrowed to the base. Face, palpi, head, thorax, and abdomen all blackish; sides of abdomen yellow.

Expanse of wings: 28—32 mm.

In some numbers from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

Distinguished from both *fulvimacula* Warr. and *synestia* Meyr. by the absence of the red tint, and by the semihyaline space at base of costa in the ♂.

In a few cases the oblique blotch (which is considerably variable in shape and size) touches the costa; and in one example, where this blotch is more than usually developed, the obsolete basal patch has a yellow spot on costa above it.

158. **Bursada oppositata** sp. nov.

Bursada salamandra Kirsch, *Mitth. Dresd. Mus.* I. (1877), p. 133 (part), *nec* figure.

Kirsch appears to have confused two species: his description and figure apply exactly to Boisduval's *xanthomelas*; but he adds that some examples showed a tendency to throw off a black streak from the anal angle. I have before me both forms from Humboldt Bay; in this latter form, for which I propose the name *oppositata*, not only is the protuberance from the anal angle prominent, but there is a corresponding, though smaller, prominence from the costal black margin opposite. In the forewings the yellow basal blotch is more interrupted by the protrusion into it of the black inner margin, this protrusion having generally an irregular triangular form.

Two ♂♂, one ♀, from Humboldt Bay, October 1892 (W. Doherty).

In Walker's *B. quadripartita* from Aru (= *salamandra* Pagenst., *nec* Kirsch), which much resembles the present insect, the projection from anal angle lies higher up the inner margin, and runs to within the middle of costa instead of towards its apex; and in the forewings the outer yellow spot has a pointed lower end, while in *oppositata* the end is always bluntly rounded.

159. **Bursada pyrifera** sp. nov.

Like *B. xanthomelas* Boisd., but larger; the pear-shaped yellow basal blotch broader, its lower edge straight; the central black fascia, which varies in width, not so oblique; the apical yellow blotch larger and nearer hindmargin, so that the black marginal border is narrower.

Hindwings: yellow, with the black marginal border narrower.

Underside like upper. Head, thorax, and abdomen all black.

Expanse of wings: 30—34 mm.

Three ♂♂ from Korrido, Dutch New Guinea (W. Doherty).

160. **Craspedosis (?) bicolorata** sp. nov.

Forewings: velvety brown, with a broad whitish fascia from just beyond middle of costa towards anal angle, before which it stops, but throws off a dull pale line to inner margin; the inner edge of the white fascia is straight, the outer irregularly wavy.

Hindwings: brown, with two large contiguous yellow lunules from third median to hindmargin before anal angle; fringe of both wings brown.

Underside like upper, the yellow lunules of hindwings more developed. Head, thorax, and abdomen all brown, as well as the legs and underside, except the last four segments of abdomen, which are yellow with brown rings.

Expanse of wings: 58 mm.

One ♀ from Amboina, August 1892 (W. Doherty).

In the forewings the first and second subcostals are stalked, the second becoming coincident with third and fourth.

161. **Craspedosis leucosticta** sp. nov.

Forewings: dull blackish slate-colour; a straight white streak running obliquely from subcostal vein to first median, bordering the discocellular, varying in shape and development; above the anal angle is a faint trace of a pale grey submarginal line.

Hindwings: slate-colour, with a broad white central space, not touching the costa, the inner edge of which is straight and the outer sinuous, almost angled at vein 3; along the middle of the dark outer margin runs a curved dull slate-coloured fascia; fringes of both wings concolorous.

Underside like upper, but blacker, with no trace of submarginal band in either wing. Head, thorax, and first two segments of abdomen slate-colour; rest of abdomen yellow.

Expanse of wings: 54 mm.

In great abundance from Cedar Bay, south of Cooktown, Queensland.

162. **Craspedosis ovalis** sp. nov.

Like *C. semiplaga* Warr., but in the forewings, instead of the narrow sinuous white fascia, is an oblique oval white blotch. Hindwings with the base black; the inner margin narrowly, the hindmargin very broadly, black. Abdomen with first three segments orange above; head wholly black.

Expanse of wings: 42 mm.

Two ♂♂ from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

163. **Craspedosis schistacina** sp. nov.

Forewings: black, with a bluish slate-coloured streak from base to middle of cell; an oblique oval white blotch from near middle of costa towards anal angle, its edges marked with pale slate-colour; a similar-coloured submarginal line from anal angle diverging from hindmargin and ending diffusely at vein 6.

Hindwings: with base narrowly black, edged with slate-colour; a broad black marginal border, with a bluish slate-coloured distinct line through the middle; central area white, with its edges slate-colour.

Underside without the submarginal lines. Head, thorax, and first two segments of abdomen blackish varied with slate-colour; last five segments of abdomen yellow.

Expanse of wings: 52 mm.

One ♂ from Simbang, near Finschhafen, German New Guinea.

Extremely close to *C. aruensis* Pagenst., but with the white blotch straight, not rounded, above.

164. **Craspedosis semilugens** sp. nov.

Forewings: dark smoky slate-colour; a curved slightly paler slate-coloured fascia close to base, with darker margins; from centre of costa, but not quite touching it, a broad white fascia runs to inner margin before anal angle, its inner edge quite straight, its outer slightly curved and waved.

Hindwings: bluish slate-colour, with a paler curved line, inwardly dark-margined, from three-fourths of costa to inner margin above anal angle; fringe concolorous.

Underside of both wings paler, the markings as above. Head, thorax, and abdomen all pale slate-colour.

Expanse of wings: 48 mm.

Both sexes from Humboldt Bay, New Guinea, October 1892 (W. Doherty).

Stenocharta gen. nov.

Forewings: narrow, elongate; costa straight, with a slight shoulder at base, and curved before apex; hindmargin very obliquely curved.

Hindwings: narrow; the apex slightly produced; hindmargin and inner margin curving into each other.

Abdomen of ♂ very long and slender; the anal tufts exaggerated. Palpi with the second joint long and stout, suberect, the third short. Antennae of ♂ simple, lamellate, thickened beyond middle and ending in a point, as in *Cystidia* Hüb. Hind tibiae thickened, with a pencil of hairs and four spurs.

Neuration: forewings, cell quite half as long as wing; discocellular angulated, the lower arm oblique; first median at four-fifths, second just before end of cell; lower radial slightly above centre of discocellulars, upper from top end of cell; last four subcostals stalked, first anastomosing with costal, second with first. Hindwings with costal abruptly curved upwards at middle of cell; the first subcostal also similarly curved before the end of cell.

Type: *Stenocharta quadriplaga* Wlk. (*Nyctemera*).

Subfamily SELIDOSEMINAE.

165. **Petelia (?) inconspicua** sp. nov.

Forewings: dull reddish brown, much sprinkled and suffused with fuscous, the base, a broad diffuse fascia in middle, and the marginal area being darker and leaving two obscurely paler spaces between them; the inner edge of the marginal area is fairly distinct and obtusely bent at middle; submarginal line indistinctly indicated by slight patches of whitish scales between the veins; fringe concolorous, with a row of minute dark dots at the ends of the veins.

Hindwings: the same.

Underside pale ochreous grey, dusted with fuscous; a narrow central and broad dark marginal fascia. Head, thorax, and abdomen reddish grey-brown; fillet and antennae whitish.

Expanse of wings: 48 mm.

Two ♀♀ from Geraldton, Cairns, Queensland (A. S. Meek).

In the forewings vein 11 anastomoses strongly with 12, and then less strongly with the stalk of 8, 9, 10.

Subfamily BISTONINAE.

166. **Blepharoctenucha albescens** sp. nov.

Forewings: white, irrorated with fuscous grey; the lines oblique, blackish; first from costa at one-third, bent on subcostal, then obliquely curved to inner margin close to base, preceded by a similarly curved fascia of grey scales; a diffuse central shade, broad above, narrower and darker towards inner margin; the discocellular mark an irregular white lunule edged with dark; outer line from costa at three-fourths, wavy and vertical to the middle, then sinuous and oblique to inner margin beyond the middle, followed by a grey-scaled fascia; submarginal line pale, obscure, with a fascia of grey scales on each side, which is distinct only towards costa; a row of black marginal dashes between the veins; fringe white.

Hindwings: the same, with the antemedian line straight and thick.

Underside white; the cell-spots and marginal spots of both wings black; apex of forewings with a subapical costal blackish blotch curved to the hindmargin. Face and palpi whitish, face sometimes with dark streaks; thorax and abdomen white, irrorated with fuscous; shoulders and patagia with a dark bar towards apex; segments of abdomen dark.

Expanse of wings: ♂, 52 mm; ♀, 65 mm.

One ♂, two ♀♀, from South Java, 1891, 1500 feet (Fruhstorfer).

The forewings are elongate, with very oblique hindmargin; the antennae of the ♂ are ciliated, the cilia rising in short tufts from the shaft; in the type of the genus, *B. virescens* Butler, the cilia are strongly fasciculated.

167. **Buzura pustulata** sp. nov.

Forewings: ochreous, coarsely irrorated with black scales; first line black, curved, from one-fourth of costa to near base of inner margin, preceded by a yellow tinge and a black line from median to submedian; a black spot on costa before middle, from which an indistinct curved yellow central shade runs to middle of inner margin; cell-spot dull grey; outer line at three-fourths, black and sinuous, forming a blunt angulation outwards opposite cell and on submedian fold and a strong sinus inwards between, followed by a broad yellowish shade containing patches of black scales beyond the line, those opposite the cell and below vein 4 large and conspicuous; fringe yellow.

Hindwings: the same, without first line; the central yellow shade marked with black on inner margin.

Underside yellower, with fuscous irroration; the cell-spots black, that on the forewings large. Palpi and face yellowish below, black above; vertex yellowish; thorax and abdomen yellowish ochreous, irrorated with black scales; abdomen with a black band at base.

Expanse of wings: 64 mm.

One ♂ from Perak, Malay Peninsula.

168. **Cusiala fessa** sp. nov.

Forewings: bone-colour, with ferruginous and blackish dusting; first line at one-fourth, diffuse, consisting of black and ferruginous scales; an indistinct cloudy central shade; exterior line from three-fourths of costa to inner margin before anal angle, irregularly angled and waved; followed by a ferruginous fascia, separated by a pale submarginal line from the ferruginous hindmargin.

Hindwings: with a curved diffuse central line; exterior line straight from above anal angle to middle, then slightly bent and angled; followed by ferruginous scales traversed by the pale submarginal line.

Underside pale, without dusting; the cell-spots of both wings large and rusty. Face ochreous, with a broad brown central bar; antennae ferruginous; vertex, thorax, and abdomen bone-colour.

Expanse of wings: 52 mm.

One ♂ from Adonara, November 1891 (W. Doherty).

169. **Cusiala semialbida** sp. nov.

Allied to *C. semiumbrata* Warr., from Fergusson Island, with which it agrees in the markings and coloration of the forewings, except that the cell-mark is a distinct black lunule, not ocelloid.

The hindwings are entirely white, coarsely and sparsely speckled with fuscous; the outer line fuscous, forming a very strong sinus inwards from inner margin to beyond cell, where it is acutely angled; in the sinus formed by this line is a fuscous somewhat annular blotch; submarginal line obscure, fuscous, marked only towards inner margin.

Vertex, collar, and thorax whiter than in *semiumbrata*; the shoulders and patagia tipped with rufous.

Expanse of wings: 52 mm.

One ♂ from Batchian, March 1892 (W. Doherty).

Subfamily ASCOTINAE.

Carecomotis gen. nov.

Distinguished from *Chogada* Moore by the antennae of the ♀, which are strongly pectinated for three-fifths, as in the ♂; but whereas the pectinations in the ♂ are strongly pubescent, those of the ♀ are very slightly so.

Type: *Carecomotis perfumosa* sp. nov.

170. **Carecomotis perfumosa** sp. nov.

Forewings: pale grey, slightly tinged in parts and especially along the veins with pale olive-green; the markings purplish black; first line at one-third, wavy, preceded by a similar but less distinct one; the extreme base black, and a black spot below the median; cell-spot of leaden-grey scales, surrounded by blackish scaling and connected above with a black costal spot; exterior line from costa beyond two-thirds to inner margin at two-thirds, wavy and denticulated, followed immediately by a similar but fainter line, consisting of connected lunules; subterminal line formed by a series of broad wedge-shaped blotches; a submarginal line of smaller blotches connected laterally with a similar marginal line; marginal area beyond outer line tinged more or less with pale slate-colour, except a small pale spot on hindmargin below middle; fringe pale grey, with darker spots at end of veins; from the outer side of cell-spot a wavy central line runs to inner margin, nearly touching the outer line.

Hindwings: like forewings, but the exterior line more excurved in middle.

Underside whitish, suffused with smoky grey; the cell-spots large and black; a broad diffusely edged black marginal band, containing a small pale spot on hindmargin of both wings below the middle and at apex of forewings. Palpi dark grey; face, vertex, and patagia dull olive-yellow; thorax and abdomen bluish grey, the latter with a double row of black spots down the back and with black lateral markings; the first segment with a double yellowish grey tuft.

The form above described is the palest. Equally common is a very dark form in which the ground-colour is dull greenish grey, suffused and speckled with blackish and with all the markings darker, the basal area, the hindmarginal pale spot, and a blotch on inner margin beyond outer line being tinged with reddish. Head, thorax, and abdomen dark olive-grey, with markings obscure. Underside much darker than in the type.

Expanse of wings: 36—40 mm.

Three ♂♂, two ♀♀, from Cedar Bay, south of Cooktown, Queensland.

171. **Catoria camelaria carbonata** subsp. nov.

Differs from the type-form *camelaria* Guen. in the markings of the underside. Instead of a smoky black marginal fascia, there is a subapical blotch, *coal-black*, as

is the discal spot; the blotch below and that at the apex of hindwings is of the usual smoky fuscous tint. Both sexes from Lifu.

Examples from Dili and Oinainisa, Timor, agree entirely with the typical form from Australia.

172. **Chogada epistictis** Meyr. ab. **albibasis** nov

Forewings: with the central line thick and black, twice angulated; the basal line faint; basal area and marginal half beyond central line rufous grey, dusted with coarse blackish atoms, the outer line being fine and indistinct; space between basal and central lines white.

Hindwings: with base white to the thick black basal line; all the rest of the wing dull rufous grey with black atoms, the exterior line of forewings becoming central and blackish.

Underside wholly dull smoky cinereous.

One ♂ from Biak, Geelvink Bay, New Guinea, collected by Doherty. A very striking aberration.

173. **Dryocoetis cineracea** Moore ab. **subalbida** nov.

Marked above exactly as typical *cineracea*; but the underside, instead of being dark smoky cinereous, is nearly white, so that the upperside appears paler; and in the hindwings the space between the antemedian and postmedian lines *is* largely white.

Several from the Khasias, taken at the same time as the ordinary form.

174. **Ectropis dentilineata** Moore ab. **pulverosa** nov.

Forewings: dirty grey, confusedly irrorated with fuscous olive, and having all the markings more or less obscured; the base and costa are especially darker.

Hindwings: rather paler.

Underside dull whitish. Head and thorax dull grey; the abdomen a little paler.

Apparently common in the Kulu district.

Besides differing in coloration, this form is distinguished from the type by the more elongate forewings.

175. **Lassaba indentata** sp. nov.

Very much like *L. albidaria* Wlk., but smaller, less coarsely irrorated and with the lines finer and less evident; the exterior line not outcurved round cell; the submarginal line edged internally by an olive-grey diffuse fascia, abruptly bent in above third median towards the dark mark in the exterior line and darker beyond it, but not forming a second dark line as in *albidaria*; marginal area from apex to the bend suffused with grey and with a darker grey blotch before the bend, the marginal area within the sinus being conspicuously pale.

Underside of forewing with a blackish apical blotch beyond submarginal line as far as third median, including a square white spot at the apex; a slight grey submarginal continuous fascia on both wings.

One ♂ from South Java, 1891, 1500 feet (Fruhstorfer).

176. **Myrioblephara picta** sp. nov.

Forewings: pale green, suffused with darker green and varied in places with ochreous, and marked with blackish transverse striae; basal area varied with ochreous and blackish scales, then a pale fascia of ground-colour, followed by an antemedian curved fascia of blackish and ochreous scales; central space pale green, containing a small dark cell-spot connected with a darker costal blotch, which is produced as a central shade to inner margin; outer line just beyond middle, blackish and sinuous, to inner margin beyond middle, forming a short but decided prominence opposite the cell; space beyond varied with darker green and ochreous, traversed by a distinct, hardly waved, pale ochreous submarginal line; the veins beyond outer line yellowish; a row of dark marginal lunules; fringe pale ochreous grey, its basal half somewhat darker, with blackish streaks throughout from the ends of the veins.

Hindwings: paler towards base, with a broad submarginal fuscous band, the margin itself dull green.

Underside ochreous grey, with a broad submarginal grey band on both wings. Face, palpi, and thorax ochreous; abdomen greyish.

Expanse of wings: 26 mm.

One ♀ from South Java, 1891, 1500 feet (Fruhstorfer).

In the forewings veins 10 and 11 are coincident and anastomose for a considerable distance with the costal.

Although I have not seen a ♂, the resemblance of the single ♀ to the Indian species of the genus, as well as the neuration, induces me to refer it without much misgiving to *Myrioblephara*.

Pachyplocia gen. nov.

Forewings: with costa straight; apex rounded; hindmargin strongly rounded, slightly crenulate.

Hindwings: in ♀ with hindmargin crenulate in upper half only, straight towards anal angle, which is squared; in the ♂ strongly rounded throughout, with the inner margin greatly expanded so as to form a swollen lobe, generally folded over above, and with a tuft of long hairs from the base of wing.

Fovea of forewings large and prominent. Palpi stout, upcurved in front of face; antennae of ♂ with short even pectinations, of ♀ simple; hind tibiae of ♂ somewhat thickened, with four spurs.

Neuration: forewings, cell more than half as long as wing; first two subcostals coincident; last three stalked, from before end of cell; radials normal. Hindwings with cell two-thirds of wing, the discocellular oblique; the costal vein approximated to subcostal half-way along cell, then abruptly curved away.

Type: *Pachyplocia griseata* sp. nov.

177. **Pachyplocia griseata** sp. nov.

Forewings: fuscous grey, rufous-tinged and speckled with dark atoms; first line black, from costa at one-third, strongly curved to inner margin close to base, preceded by a dark cloud; outer line from costa at three-fourths to middle of inner margin, sinuous; submarginal line oblique, irregularly dentate, the space between it and outer line darker; the submarginal line is edged with paler; fringe concolorous, with

dark marginal line at base; cell-spot dark, a central line sometimes visible nearly touching it.

Hindwings: with darker antemedian, central, and postmedian lines, the last most distinct.

Underside dull grey, with the margins darker. Face and palpi dark grey; thorax and abdomen paler, the latter with darker segmental rings and a black ring at base.

Expanse of wings: 26 mm.

Both sexes from Cedar Bay, south of Cooktown, Queensland.

178. **Poecilalcis semiclarata** Wlk. ab. **albilinea** nov.

Differs from the type in having a small diffused whitish blotch occupying the subcostal angle of the outer line; a similar *whitish* blotch at middle of hindmargin instead of the larger ochreous one; and the submarginal line fine, waved, and whitish throughout.

Four ♀♀ only, from Darjiling (Pilcher *leg.*).

179. **Poecilalcis semiclarata** Wlk. ab. **fasciata** nov.

Ground-colour of forewings brownish ochreous with a rufous tinge; the inner line immediately preceded and the outer line followed by a dark brown-black shade; the submarginal line scarcely paler and indistinct; the blotch at middle of hindmargin slightly enlarged and without fuscous striation.

Four ♂♂ from Darjiling (Pilcher *leg.*).

Polylophodes gen. nov.

♂. *Forewings:* elongate; the costa shouldered and hairy at base, faintly insinuate beyond, and faintly curved to apex, which is blunt; hindmargin very obliquely curved; inner margin convex.

Hindwings: forming an equilateral triangle, the apical and anal angles broadly and bluntly rounded; the hindmargin slightly sinuate inwards in middle; the region of the anal angle beneath covered with a thick mealy efflorescence, mixed with long hairs along the hindmargin.

Abdomen with tufts of long silky hair from the sides of second and following segments; vertex with projecting scales; antennae pectinated, the pectinations stiff and ciliated; palpi short, hairy, decumbent; third joint minute; tongue well developed; frenulum present; forewings with a strong somewhat puckered fovea; hind tibiae broken; mid tibiae with a pair of long spurs clothed with hair.

Neuration: forewings, cell not quite half the length of wing; discocellular vertical; first median at two-thirds, second and third from end of cell; lower radial from centre of discocellular, upper from top angle of cell; last three subcostals stalked from a little before end; first and second coincident, anastomosing with costal above origin of fifth. Hindwings with cell quite half the length of wing; discocellular with lower arm oblique; first median at two-thirds; second considerably before lower angle; costal approximated to subcostal for half the length of cell; first subcostal nervule considerably before upper angle.

Type: *Polylophodes triangularis* sp. nov.

A genus of which the typical species is abnormal both in structure and appearance; it should probably be placed near *Myrioblephara* Warr.

180. **Polylophodes triangularis** sp. nov.

Forewings: pale green, suffused and irrorated with darker olive-green and fuscous; costa dotted with dark green and fuscous; first line at one-third, wavy and dark, starting from a larger costal spot; second line at two-thirds, dark and wavy, from a dark costal spot, incurved below middle, then outcurved to inner margin at two-thirds; the area between the two lines paler than rest of wing; cell-spot dark green, with a large costal blotch above it; submarginal line very pale greenish, distinct and denticulate below costa, where it is preceded by a dark olive-green patch; indistinct below and followed by two dark patches, one opposite the cell, the other half-way between first and anal angle; a row of dark green contiguous triangles along hindmargin; fringe pale greenish ochreous, with a darker central line, and strongly mottled with blackish opposite the veins.

Hindwings: with basal half ochreous white; an oblique pale greenish shade before middle, becoming dark green and distinct only on inner margin, where it is broad and edged outwardly with blackish; a wavy fuscous submarginal line, parallel to hindmargin, beyond which the margin is dull greenish fuscous in the costal half and olive-green mixed with dark fuscous and rufous towards anal angle, where a denticulate line is visible close to margin; fringe olive-green, varied with fuscous; fringe of inner margin white.

Face, palpi, and thorax olive-green, speckled with darker; abdomen ochreous and olive-green; the lateral tufts pale olive. Underside ochreous white for two-thirds; this space edged by a bent dark line, followed by a dark shade and pale fuscous marginal area; costa dotted and spotted with fuscous; hindwings the same; the efflorescence at anal angle pale ochreous, yellower above.

Expanse of wings: 30 mm.

One ♂ from Bandong, Java.

181. **Pseudocoremia flava** sp. nov.

Forewings: pale yellow, the costa and inner margin speckled with fuscous; a brown hourglass-shaped blotch on middle of costa extending to a little below the middle; a blotch on costa before apex, with a smaller one below it, and another on hindmargin below apex; a line of fuscous dashes along hindmargin between the veins; fringe yellow.

Hindwings: wholly yellow.

Underside dull yellow, the forewings suffused with brownish. Face and palpi yellowish, tinged with fuscous; antennae brown; thorax and abdomen yellow.

Expanse of wings: 38 mm.

One ♂ from Greymouth, New Zealand.

182. **Scotorythra rara** Butler ab. **brunnea** nov.

Differs from the type-form, in which the ♀♀ are dull fuscous and the ♂♂ blackish, with the stigma, especially in the ♀♀, large and dark, in being red-brown or reddish grey-brown in the ♀♀, and slightly darker in the ♂♂; the cell-spot almost obliterated, and all the lines obscure and marked only by dots on the veins.

Two ♀♀, one ♂, from Oloa, Hawaiian Islands.

SUBFAMILY FIDONIINAE.

183. **Callerinnys marginata** sp. nov.

Forewings: yellowish ochreous, tinged in parts with bright ferruginous, and thickly irrorated with dark brown transverse striae; first line at one-third, much curved and waved, forming a dark brown curved spot on the submedian fold; cell-spot dark brown; second line at four-fifths, sinuous, thick, brown-black, contiguous to a thick brown-black shade which opposite the cell is connected with hindmargin; the margin above and below this dark blotch is bright ferruginous; fringe yellow, chequered with black.

Hindwings: more tinged with ferruginous; a brown wavy central line; a postmedian line from costa just beyond central line to anal angle, sinuous, dark brown; marginal area beyond it ferruginous, with dark brown markings, most developed towards costa and hindmargin opposite cell.

Underside bright straw-colour, with the lines and marginal markings bright rich brown. Face and palpi deep yellow; thorax and abdomen yellow, mixed with ferruginous.

Expanse of wings: 36 mm.

One ♀ from Nias.

This is near *C. deminuta* Warr., from Padang Rengas, Perak.

184. **Fidonia albigrisea** sp. nov.

Forewings: whitish, the markings dark olive-grey; basal area irrorated with grey, limited by a double curved fascia, the two arms coalescing on the veins forming a series of ocelli; an oblique olive-grey fascia beyond middle, recurved at costa; its outer edge straight, its inner toothed along the veins, uniting with the linear discal spot, and nearly touching the curves of the basal fascia; a broad curved submarginal fascia, darker on the veins, its inner edge formed by an exterior lunulate line, the lunules containing a series of pale spots; marginal fascia dark grey; fringe white, mottled with grey opposite the veins.

Hindwings: whitish, speckled throughout with grey, the speckles hardly forming fasciae corresponding to those of forewings, except the central line passing over the dark cell-spot; fringe as in forewings.

Thorax and abdomen whitish, mixed with olive-grey; face whitish, with dark middle bar; palpi dark. Underside duller.

Expanse of wings: 26 mm.

One ♂ from West Java.

SUBFAMILY SEMIOTHISINAE.

185. **Acadra acutaria** Wlk. ab. **olivata** nov.

Markings less distinct than in the type; the outer half of both wings suffused with olive-fuscous; the basal half whiter; the subapical white spots and marginal markings of forewings and the submarginal line of hindwings *snow-white*.

Fairly common from the Khasias.

186. **Bulonga subcinerea distans** subsp. nov.

Forewings: with the outer line much nearer the hindmargin and often recurved towards the costa, the central area being thereby much broader than in the usual form.

In the hindwings also the marginal space is conspicuously narrower than in typical *subcinerea*.

Two ♂♂, two ♀♀, from Cedar Bay, Cooktown, Queensland.

These specimens differ also in colour, being dull brownish grey instead of silvery grey; but I am not sure if this is a natural tint.

The genus *Antibadistes*, under which I described *subcinerea*, Nov. Zool. III. p. 142, is identical with *Bulonga* Wlk., and must sink.

Bulonga schistacearia Wlk. has the fringes dark, whereas in *subcinerea* they are silvery white.

187. **Evarzia deformis** sp. nov.

Forewings: dull white, suffused with grey, irrorated and striated with fuscous; first line dark brown, fine and indistinct, excurved below costa, then vertical; cell-spot blackish; central line olive-yellow from costa beyond middle, very obliquely waved to inner margin at one-third, where it touches first line; outer line broad, black-brown, straight and oblique from four-fifths of costa to before anal angle, followed by a line of small brown blotches; a dark cloud towards the elbow; fringe grey, varied with fuscous, with an interrupted dark line along base.

Hindwings: paler, ochreous, unsuffused with grey as far as the outer line; a dark wavy antemedian line, followed by the dark cell-spot; marginal area blotched with olive-brown towards apex and with a round black blotch beyond outer line between the second and third medians; fringe ochreous yellow, with a strong black crenulate line at base.

Underside whitish, much mottled with blackish, and all the markings blackish; the outer line, which is much thickened on the hindwings, followed by a bright brown fascia, touching hindmargin of forewings above middle and filling up the apex of hindwings. Head, thorax, and abdomen ochreous grey.

Expanse of wings: 36 mm.

One ♂ from Batchian, March 1892, collected by Doherty.

The species is remarkable on account of the shape of the forewings; these are elongate, twice as long as wide; the hindmargin is bluntly elbowed at the third median, and thence curved obliquely into the inner margin, which is strongly convex, so that no real anal angle appears. The hindwings are strongly excised on hindmargin between veins 4 and 6, 6 and 7, the three teeth being prominent and acute. The abdomen of the ♂ reaches considerably beyond the hindwings.

188. **Gonodela olivescens** sp. nov.

Forewings: white, with fine olive-fuscous striae, and with greyish olive-fuscous markings, varied with minute dull yellow scales; first line curved from costa at one-fourth to inner margin near base; second line at two-thirds, angled below costa, then oblique to inner margin before the middle, thick and diffuse; a dark cell-spot; the entire basal area up to this line is more or less obscured by dull scaling; outer line

from costa at four-fifths, fine, angled outwards towards hindmargin, then oblique and double to inner margin at two-thirds; its costal arm closely followed on costa by an olive blotch, beyond which the apex of the wing is whitish and connected with the paler fascia between the second and outer lines; marginal area suffused with olive-fuscous; fringe pale olive-grey, with paler base, and dark patches at end of veins; margin of wing with a row of olive-fuscous triangles.

Hindwings: with ground-colour whiter; an olive-fuscous basal blotch, a broad antemedian and a double postmedian and submarginal fascia; cell-spot black; fringe and margin as in forewings.

Underside white, with all the markings grey-brown; the costa of forewings and all the veins ochreous. Head, thorax, and abdomen olive-fuscous.

Expanse of wings: 30 mm.

One ♀ from Kandy, Ceylon, April 1894.

189. **Gonodela perconfusa** sp. nov.

Forewings: whitish, thickly varied with dark fuscous; some dark marks close to base; a double curved very diffuse inner line before middle, indicated chiefly by dark blotches on costa and towards inner margin; a broad diffuse fascia beyond middle containing an oblique blackish costal blotch, an elongated black blotch below middle, and a blackish blotch on inner margin; marginal area with clouds of dark striae at apex, middle, and anal angle.

Hindwings: with obscure basal fascia; postmedian fascia broad, with large black central blotch.

Underside white, tinged in parts with ochreous yellow, and with the veins yellowish; both wings with dark fuscous cell-spot, thick curved outer line, followed by a broad fuscous fascia mixed with yellowish. Face and palpi dull ferruginous; thorax and abdomen fuscous and grey.

Expanse of wings: 28 mm.

One ♂ from Dili, Timor, May 1892 (W. Doherty).

190. **Gubaria albimedia** sp. nov.

Forewings: with the basal fourth and marginal half deep brown-black, with a broad pure white central fascia, not reaching costa; costa spotted with yellow, most thickly at top of white fascia; cell-spot linear, black; fringe black, with a minute white spot just below costa, and another at middle. The usual dark exterior line can just be traced, forming the edge to the white fascia as far as vein 2, then running into the dark marginal field and angled below costa; the usual dark costal blotch beyond the angulation blacker than the rest of the dark area.

Hindwings: with base brown-black from one-third of costa to two-thirds of inner margin; the white fascia very broad at costal end, containing a small black cell-spot; the dark marginal area varied with yellowish scales beyond the exterior line and with black blotches; a pure white blotch on hindmargin from vein 2 to 4; a black marginal line; fringe black, with white spots below apex, below vein 7, and along the white blotch.

Underside like upper; the dark parts wholly black, except the basal patch, which is varied with yellow scales. Head, thorax, and abdomen above brown-black; abdomen below and at sides yellow.

Expanse of wings: 40—44 mm.

A pair from South Java, 1500 feet, 1891 (Fruhstorfer).

Related to *G. niveostriga* Warr., but larger and much darker. Of the two examples recorded the ♀ is the smaller.

191. **Gubaria niveostriga** sp. nov.

♂. *Forewings:* purplish grey, tinged with fuscous; a snow-white central fascia narrowing towards inner margin, with the edges quite straight, the costal end narrowly fuscous with a few scattered striae below; the discal dot black; outer line thick, black, angled below costa, and forming, below the median, the outer edge of the white fascia, followed by a thick dark fuscous cloud; a darker spot on costa beyond it, followed by a small white spot towards apex below costa; fringe white at apex and below middle, the rest fuscous.

Hindwings: with the central fascia narrowing to a point before reaching inner margin; the black outer line which bounds it is followed by black blotches mixed with yellowish ochreous scales; a white blotch, varying in size, on hindmargin below the middle, the purplish fringe being white beyond it.

Underside of both wings with basal area yellow, edged by a dark brown line, which represents the inner edge of the white central fascia; outer area dark fuscous, with the small subapical spot of forewings and the marginal spot of hindwings white. Head, thorax, and base of abdomen purplish fuscous; anal half of abdomen with the sides, and all the underside and legs yellow.

Expanse of wings: 40 mm.

Three ♂♂ from Dili, Timor, May 1892, collected by Doherty; and two from Oinainisa, Dutch Timor.

192. **Gubaria amplata** sp. nov.

The forewings above are like those of *niveostriga* Warr., but in the hindwings the dark basal area barely reaches to half the costal and inner margins, and in consequence the central white band, instead of being narrowed to a point at two-thirds from the costa, as in *niveostriga*, becomes curved and very much wider than that of the forewings, while the marginal white blotch is much increased in size. On the underside the dark basal areas of both wings are hardly tinged with yellow, and the abdomen above is fuscous to the tip. The cell-spot of the hindwings is distinct, lying in the white fascia.

One ♂ from Dili.

193. **Luxiaria calida** sp. nov.

Forewings: brownish ochreous, dusted with dark atoms; a dark cloudy cell-spot, through which a faint curved darker first line can be traced; exterior line slightly sinuous, marked by dark dots on veins; preceded by a paler ochreous fascia, and followed by a fascia of the ground-colour, of which the outer edge is dentate, and bounded by the obscure submarginal line, the marginal space again being paler ochreous; a row of dark marginal spots; fringe paler.

Hindwings: like forewings, but the outer third darker than the basal area, and with traces of a dark central line; hindmargin strongly dentate.

Underside paler, with fuscous transverse strigae; the markings plainer; the outer line followed towards costa by a ferruginous fascia. Face and palpi dark brown; thorax and abdomen concolorous with wings.

Expanse of wings: 42 mm.

One ♂ from South Java, 1500 feet, 1891 (Fruhstorfer).

194. **Luxiaria punctata** sp. nov.

Forewings: straw-colour, dusted with ochreous and pale fuscous; first line near base, very indistinct, marked by spots on the veins; cell-spot large, brown, followed by an indistinct waved central line; exterior line at three-fourths, dull rusty, accompanied by dark dots on veins, with a small brown blotch on inner margin before it; submarginal line wavy, hardly paler, preceded by a slight brown cloud opposite the cell; a marginal row of black spots on the veins; fringe clear ochreous.

Hindwings: the same, the cell-spot small and dark, followed by a grey central line.

Palpi and face ochreous below, brown above; thorax and abdomen ochreous, dusted with darker; abdomen with dark dots along back. Underside paler, with the central and outer lines bright ferruginous, the latter followed on forewings by a bright ferruginous, dentate-edged cloud from costa to middle, which is fuscous-tinged opposite the cell; hindwings with a fuscous cloud on submarginal line opposite cell.

Expanse of wings: 34—36 mm.

Two ♀♀ from Bandong, Java.

The smaller of these examples, though more worn than the type, has the dots denoting the first and outer lines enlarged into a distinct series of brown spots, those on costa and inner margin swollen; the marginal spots and clouds on the submarginal lines are also darker and more conspicuous.

195. **Nadagarodes straminea.**

Luxiaria (?) straminea Warr., Nov. Zool. III. p. 303.

When describing the ♀ of this species from Fergusson Island I queried the genus. I have now met with a ♂ from Amboina (agreeing with the ♀ in all respects, except in not having the dark blotch beyond cell), which, having short pectinated antennae and non-crenulate hindwings, must be placed in *Nadagarodes*.

196. **Semiothisa angustimargo** sp. nov.

Forewings: whitish ochreous, semitransparent, rather thickly dusted with fine black atoms; the costa yellowish, more densely scaled; the lines pale fuscous; first at one-fourth, forming two outward curves; second just beyond middle, outcurved above median, and obtusely bent on the submedian fold; traces of a bent line immediately preceding it and passing over the black linear cell-spot; exterior line at four-fifths of costa, angled strongly below apex, then straight, oblique, and double, dark fuscous, to inner margin just before anal angle; the narrow marginal area fuscous grey; fringe grey, darker along the excision.

Hindwings: with a thick straight central line passing over the small black cell-spot; outer line and margin as in forewings.

Underside like upper, but the outer line diffusely thickened with brown, the marginal area beyond it whitish and glossy. Head, thorax, and abdomen concolorous.

Expanse of wings: 32—36 mm.

Three ♂♂ from Oinainisa, December 1891 (W. Doherty).

197. **Semiothisa fusca** sp. nov.

Forewings: dull fuscous grey, with darker specks and striae; first line very indistinct, at one-fourth; a thick vertical central shade beyond the dark cell-spot; outer line formed of regular grey lunules, followed by a slightly darker fascia edged with three brown spots at costa, and with some brown spots below the middle; fringe concolorous, with an interrupted dark line at base.

Hindwings: the same.

Underside clear white, strigulated with fuscous towards base, with all the marks very distinct and brown; the discal spots deep black. Head, thorax, and abdomen hoary grey.

Expanse of wings: 32—40 mm.

In some numbers from Cedar Bay, Cooktown, Queensland (A. S. Meek).

The forewings have the hindmargin entire, not excised below the apex, very faintly crenulate; that of the hindwings is strongly crenulate.

198. **Semiothisa subcastanea** sp. nov.

Forewings: whitish ochreous, densely dusted with fuscous atoms; the base and costa tinged with brownish; first line and cell-spot not marked; second line indistinct, at three-fourths, starting from a dark costal spot, angled below costa, then faintly waved; followed by a grey-brown fascia, edged on costa by an oblique red-brown blotch; marginal area greyish brown; two whitish subapical streaks, the lower one running in above vein 6 to its origin; marginal spots black; fringe ochreous, except along the subapical excision, where it is dark brown, as is the margin itself.

Hindwings: like forewings, but with a black cell-spot.

Head, face, palpi, thorax, and abdomen whitish, speckled with fuscous. Underside white, with blackish coarser speckles; the outer line darker; the outer third, especially the fascia, chestnut-brown; the veins ferruginous; apex of forewings and submarginal space on hindwings varied with white black-spotted blotches.

Expanse of wings: 36 mm.

One ♀ from Bandong, Java.

Tephrinopsis gen. nov.

Under *Tephrina* Guenée placed together species having simple antennae in the ♂ and species having them pectinated. I propose to separate the former, those with simple antennae, under the above name, with *Tephrinopsis parallelaria* Wlk. for type.

199. **Tephrina munda** sp. nov.

Forewings: whitish, thickly dusted with grey-brown striae; the costa ochreous, dotted with fuscous; inner line brown, curved, obsolescent towards costa; second line

at two-thirds, faintly sinuous and irregular, closely followed by a fuscous shade, with darker patches between the veins; a row of brown marginal dots between the veins; fringe pale; a blackish distinct cell-spot.

Hindwings: the same, without first line, and the submarginal shade very faint.

Underside with a yellowish tinge and a marginal cloud. Head, thorax, and abdomen whitish; collar, face, and palpi tinged with rufous.

Expanse of wings: 26 mm.

A pair from Sumba, October 1891 (W. Doherty).

200. **Tephrina subocellata** sp. nov.

Forewings: pale ochreous, dusted and suffused with olive-fuscous; costa dotted slightly with fuscous; three fasciae parallel to hindmargin; first at one-fourth, second at one-half, both fuscous-olive above median vein, brown-black and thickened below it; the lower part of the central fascia is twice as broad as the first; its upper half contains a pale darker-edged ocelloid cell-spot; third fascia sinuous, fuscous-olive throughout, edged inwardly by a twice-curved brown-black band which does not reach the costa; marginal area suffused with fuscous-olive strigae; marginal line brown; fringe ochreous.

Hindwings: with a central fuscous-olive streak containing the dark cell-spot and not reaching the costa; the exterior fascia diffuse externally and edged internally by a nearly straight brownish line.

Head, thorax, and abdomen ochreous. Underside pale ochreous, with the markings dull olive-brown.

Expanse of wings: 24 mm.

One ♂ from South Othman, Arabia.

201. **Thamnonoma insularis** sp. nov.

Forewings: dull straw-colour, dusted with ochreous and fuscous atoms; the three lines starting from three outwardly oblique brownish grey costal blotches, at one-fourth, one-half, and two-thirds respectively; all angled below costa and then inwardly oblique, but very ill defined; a dark curved mark before the subapical excision; fringe straw-colour, with dark spots at end of veins and along the excision.

Hindwings: with the two outer bands continued, one antemedian, the other postmedian; a black cell-spot.

Underside like upper, but the forewings suffused with pale ferruginous. Head, thorax, and abdomen concolorous.

Expanse of wings: 36 mm.

One ♂ from Lifu.

202. **Petrodava sordida** sp. nov.

Forewings: dull fawn-colour, speckled with dark fuscous; the first and central lines very indistinct, with a slightly darker shade before each; both angled below costa, the central also angled on the median and lower veins, and running obliquely inwards to inner margin at middle; exterior line dark brown, angled below the costa, and thence running straight and oblique but slightly wavy to inner margin at two-thirds; marginal area and fringe darker fawn-colour, the submarginal line indicated

by some still deeper clouds ; the area between the inner and outer lines slightly paler than the rest of wing ; cell-spot dark.

Hindwings: still paler, more ochreous ; a curved outer line brown, followed by a brown shade and an interrupted cloudy submarginal line ; fringe dark brown ; cell-spot distinct, black.

Head, face, thorax, and abdomen pale ochreous. Underside bright yellow, mottled with tawny ; a wavy indistinct central line and a distinct thick red-brown outer line on both wings ; marginal area fulvous, deeper on hindwings ; the lower part of hindmargin remaining yellowish ; apex of forewings dull whitish.

Expanse of wings : 48 mm.

One ♂ from Humboldt Bay, New Guinea, taken in September by W. Doherty.

Nearest to *P. khasiana* Swinh., but not so large, and more sombre-coloured above.

Xenoneura gen. nov.

Forewings: narrow ; costa straight, convex only just before apex ; apex blunt ; hindmargin obliquely curved into the inner margin, which is convex ; the anal angle rounded off.

Hindwings: broad ; hindmargin strongly crenulate in the upper half.

Abdomen of ♂ long and slender, the claspers strongly developed ; antennae of ♂ pectinated for two-thirds ; palpi porrect, the second joint thick and hairy, the third blunt ; tongue present ; hind tibiae of ♂ much swollen, with four short spurs ; fovea of forewing with a dark thickened scar.

Neuration: forewings, cell half the length of wing ; discocellular vertical for two-thirds, then shortly bent outwards and oblique ; first median nervule at one-half, second before end of cell, third from end ; lower radial from the angulation of the discocellular, and therefore below the middle ; upper radial from top end of cell ; last three subcostals stalked, first and second coincident.

Type : *Xenoneura tephrinata* sp. nov.

203. **Xenoneura tephrinata** sp. nov.

♂. *Forewings:* whitish ochreous, with numerous fuscous transverse striae ; costa dotted with dark ; the lines pale brown ; first at one-fourth, outcurved below costa ; second at three-fourths, also outcurved below costa ; marginal area rather darker ; submarginal line pale, indistinct, preceded on costa by a dull reddish cloud and by a fuscous cloud below ; basal line fine, dark ; fringe concolorous ; cell-spot blackish, followed by a thick brownish central shade.

Hindwings: like forewings, with no basal line, and the outer line waved ; the shade before the submarginal line distinctly reddish ; a fuscous marginal shade opposite the cell ; marginal line blackish, strongly crenulate ; fringe pale ochreous, with dark mottlings at the teeth.

Underside whiter, with the markings more expressed ; marginal shade of the hindwings blackish. Head, thorax, and abdomen concolorous ; antennae dark.

Expanse of wings : 32 mm.

One ♂, one ♀, from Geraldton, Cairns, and Cedar Bay, Cooktown, Queensland.

The ♀ is almost wholly suffused with brownish grey, with the markings obscured ; underside with the colouring very much brighter than in the ♂.

SUBFAMILY ENNOMINAE.

204. **Capasa viridifascia** sp. nov.

Forewings: greyish fawn-colour, without mottling or suffusion; a central fascia angled on the median; its costal third velvety black, the rest very delicate pale green, with a slightly darker olive-green centre; a dark brown triangular spot on costa at three-fourths; fringe concolorous.

Hindwings: with the green fascia narrower, slightly curved, and edged externally with deep black; costa broadly, inner margin narrowly, yellow.

Underside of forewings deep vinous red, becoming yellow towards costa; the costal spots brown; the fascia, inner margin, and hindmargin grey-brown. Hindwings deep orange-red, with a dark grey blotch at apex and anal angle, and a black fascia from upper angle of cell to anal angle; palpi bright orange, the tips and the tongue black; face dark brown-red; vertex, antennae, thorax, and abdomen concolorous with the wings.

Expanse of wings: 36 mm.

Six ♂♂ from Humboldt Bay, New Guinea, collected by Doherty, September and October 1892.

Akin to *C. incensata* Wlk., but smaller and paler.

Heterodisca gen. nov.

♂. *Forewings:* twice as long as broad; the costa arched for basal third, then straight, becoming convex only just before apex; hindmargin curved.

Hindwings: with both angles and the hindmargin rounded.

Palpi porrect, slightly upcurved, terminal joint short; tongue present; antennae of ♂ simple, thick, closely lamellate; hind tibiae much swollen, with four short spurs; hind tarsi very short; frenulum strong.

Neuration: forewings, cell about half as long as wing; discocellular angulated, the upper arm oblique outwards, the lower vertical; first median at three-fourths, second shortly before end, third from end of cell; lower radial from the angulation of the discocellular; upper radial stalked with the last three subcostals from end of cell; first and second subcostals stalked, anastomosing with costal at a point, the second afterwards anastomosing with the stalk of third and fourth. Hindwings without radial; the two subcostals and last two medians from the ends of cell.

Type: *Heterodisca scardamiata* sp. nov.

205. **Heterodisca scardamiata** sp. nov.

Forewings: orange-yellow, thickly dusted with reddish orange striae; first line at one-fourth, nearly vertical, red-brown, with lustrous leaden scales on it; a round brown cell-spot; second line from costa shortly before apex to two-thirds of inner margin, straight and oblique, edged outwardly by a line of lustrous leaden scales; a fine dark red-brown marginal line; fringe concolorous.

Hindwings: with a straight brown central line, edged with lustrous scales; traces of a much outcurved submarginal line, indicated by dark dots on the veins.

Underside dull ochreous yellow, with all the markings showing through indistinctly; forewings with a line of vein-dots beyond outer line, as in hindwings, but less strongly outcurved. Palpi, thorax, and abdomen reddish orange; face and collar brighter.

Expanse of wings: 34 mm.

One ♂ from Humboldt Bay, New Guinea, October, taken by W. Doherty.

206. **Hyposidra maculipennis** sp. nov.

Forewings: pale fawn-colour, slightly rufous-tinged in parts, and dusted with blackish atoms; a small dark cell-spot; a straight oblique rufous line from middle of costa to middle of inner margin; outer line very faint, wavy, and joining central line on inner margin; a macular submarginal shade of purple blotches, one on costa, another opposite the cell, and a large one at anal angle; a dark blotch on costa before apex; fringe concolorous. The hindmargin is bluntly rounded and protuberant, with slight projections at the veins, from apex to lower radial, thence obliquely curved.

Hindwings: with large round black cell-spot, *preceded* by the straight line and followed by a denticulate line nearly in the middle; the blotches of the submarginal line distinct on the inner half, faint towards apex; fringe concolorous; hindmargin strongly waved, with a blunt projection in middle.

Underside much darker, suffused and speckled with fuscous; face and palpi fuscous; thorax and abdomen concolorous with wings.

Expanse of wings: 84 mm.

One ♀ from the Solomon Islands (Capt. Cayley Webster).

207. **Hyposidra nigricosta** sp. nov.

Forewings: brownish ochreous, speckled with black; costa brown, mottled with pale ochreous; a broad subcostal black-brown stripe with indented lower edge, running through to apex and traversed by the pale submarginal line; the lines rich brown, first curved from costa at one-fourth to inner margin near base; discal spot blackish, lying in the broadest part of the subcostal stripe; a nearly straight brown central line to inner margin in middle; a dark brown wavy and dentate outer line from costa at three-fourths to inner margin just beyond central line, followed beneath costa by another brown line; submarginal line indistinct; a brownish cloud at anal angle; fringe brown.

Hindwings: dark brown, with a strongly dentate postmedian line, pale with dark edges; discal spot black; fringe dark brown.

Underside dark black-brown, becoming paler brown towards the margin; all the lines dark.

Expanse of wings: 60 mm.

One ♂ from Batchian, March 1892, collected by Doherty.

Akin to *infixaria* Wlk., but much larger.

208. **Hyposidra variabilis** Warr. ab. **tetraspila** nov.

Among several examples of this species from Humboldt Bay of Doherty's collecting, there occur two forms so strikingly different as to deserve describing. The form which I call *tetraspila* is of a rich pinkish fawn-colour; the inner and outer lines are

only slightly marked, but a broad straight deep brown central line is conspicuous just beyond the discal dot ; the apical black patch is strongly marked ; and beyond the exterior line of both wings below the median is a round black blotch. This aberration is a development of that described by me as *nubilosa* from Fergusson Island.

ab. **innotata** nov.

The other form is as inconspicuous as *tetraspila* is striking. Both wings are dull fawn-colour, speckled with dark fuscous dots, with no markings except the black cell-spots, and in the forewings some brown interrupted spots indicating the exterior line towards the costa. The short dark lines on the inner margin of hindwings above the anal angle are present, but very inconspicuous.

The two examples were taken in September and October 1893.

Ischalis Wlk. XXVI. p. 1750.

♂. *Forewings:* with costa shouldered at base, then straight, with a faint insinuation, to apex ; apex shortly produced ; hindmargin toothed at veins 4 and 6, indented between, oblique below the lower tooth to anal angle, but with a slighter tooth at vein 3.

Hindwings: with hindmargin rounded.

In the ♀ the hindmargin of hindwings is quite as strongly dentate as in forewings.

Palpi porrect, rather long ; forehead tufted ; antennae lamellate, thickened towards base, subserrate ; abdomen of ♂ very long ; inner half of hindwings of ♂ beneath clothed thickly with long furry hair.

Neuration: forewings, cell two-thirds of wing ; the median and subcostal veins both bent inwards at extremity ; first median at three-fourths, second before end, third from end of cell ; radials normal ; last three subcostals stalked, second anastomosing with the stem of third and fourth towards apex, forming a very long areole ; all three then separating together ; first subcostal free.

I have given this diagnosis of *Ischalis* here because Walker, who described the type-species twice, first as *Selenia gallaria* and afterwards as *Ischalis thermochromata*, had only ♀♀, while Mr. Meyrick, who described the genus afresh under the name of *Stratocleis*, did not describe or notice apparently the peculiarity of the underside of the ♂ hindwing. It is almost certain, judging from the description, that Guenée's *Epione incaria* is the same species, although he gives Tasmania, perhaps by an oversight, as habitat.

209. **Omiza columbaris** sp. nov.

Forewings: pale lilac-grey, with very fine dark transverse striae ; the lines purple ; first from costa at two-fifths to inner margin at one-fourth, slightly curved ; second from costa at four-fifths, acutely angled below apex, then faintly curved to inner margin before middle, the interval between the two lines there being narrow ; this space is filled in with deep green ; discocellular edged with purple ; a flattened pale grey costal spot before apex ; fringe rufous.

Hindwings: with costal area pale ; the basal one-third rufous olive, edged by a straight purplish line ; fringe and hindmargin rufous.

Underside of forewings yellow along costa to outer line, white along inner margin; the rest of the wing deep vinous red; the outer line and edge of ocellus darker; hindwings deep yellow, with a few large scattered specks and the discal spot red. Palpi and face olive; head, thorax, and abdomen pale grey; vertex and antennae whiter.

Expanse of wings: 38 mm.

One ♀ from South Java, 1891, 1500 feet (Fruhstorfer).

210. **Omiza subaurantiaca** sp. nov.

Forewings: dark purplish brown, strigulated with darker; the lines chocolate; first from just before middle of costa, oblique and somewhat irregularly curved, to inner margin at one-third; second from three-fourths of costa, angled outwards towards hindmargin, then oblique and irregularly waved to inner margin at middle; the central space therefore much narrowed below, as in *galbulata* Feld.; this space is slightly deeper coloured than the rest of the wing, and towards the costa sometimes varied with dark green; cell-spot annular, edged with chocolate; a dark smoky black blotch on inner margin before anal angle, much more obscure than that in *irrorata* Moore, and with a metallic lustre; fringe chocolate-brown.

Hindwings: with the fascia produced narrowly across the centre, the outer edge alone distinct; costal area pinkish, not so broadly red as in *abstractaria* Wlk.; towards the anal angle is a large blotch of shining scales.

Underside of forewings deep orange at base and along costa and inner margins, becoming deep brown-red from centre to hindmargin; hindwings bright orange, with some red-brown spots along costa and in apical region; fringes of both wings lustrous. Palpi orange; face brown; vertex, thorax, and abdomen olive-grey.

Expanse of wings: 36 mm.

Six ♂♂ from Dili, Timor, collected in May by W. Doherty.

Nearest to *O. abstractaria* Wlk., but quite distinct from any Indian form.

Polyacme gen. nov.

Forewings: with costa straight, curved at base; apex produced, minutely acute; hindmargin strongly dentate at vein 6, and bidentate at 4 and 3; then oblique and crenulate to anal angle, which is distinct.

Hindwings: strongly dentate at ends of all the veins.

Palpi with second joint upcurved, third short; antennae of ♀ simple.

Neuration: forewings, cell about half as long as wing; discocellular oblique outwards; first median at two-thirds; second and third from end of cell; radials normal; last four subcostals stalked; first anastomosing with costal. Hindwings with first subcostal and second median from before end of cell.

Type: *Polyacme dentata* sp. nov.

211. **Polyacme dentata** sp. nov.

Forewings: yellowish ochreous, varied with fuscous and ferruginous striae; costa dotted with brown; first line at one-fourth, irregularly curved, and indicated by small spots of black scales; the area within it sometimes brownish; an oblique diffuse ferruginous central shade, touching on its inner side the discal ring; marginal

two-fifths dark brown except along costa, the inner edge sinuous and preceded by a sinuous row of dots on veins; exterior line at three-fourths, marked by black dots above, and followed below by a blackish shade, curved outwards above middle and inwards below it; submarginal line similarly curved, and indicated by dark blotches, of which the two opposite the cell are prominent and black; fringe deep brown.

Hindwings: like forewings, but the central shade passes inside the cell-ring; submarginal line pale ochreous, edged inwardly with brown, bluntly angled opposite the cell.

Underside the same, except that the brown marginal area extends to the costa, leaving only a small apical blotch *white*; a greyish white blotch on hindmargin of both wings below the third median. Head, thorax, and abdomen all ochreous, dusted with dark atoms.

Expanse of wings: 38—42 mm.

Two ♀♀ from Lifu.

212. **Prionia excavata** sp. nov.

Forewings: reddish, much dusted with blackish; the costa dotted and spotted with black, the interspaces paler; first line diffuse and indistinct, oblique inwards from a costal blotch before middle, joined in midwing by a dark shade from a costal blotch at one-fourth; cell-spot dark, linear; exterior line from dark costal blotch at three-fourths, excurved and denticulate, incurved before inner margin, followed between the median nervules by two pale ochreous yellow patches; fringe dark red-brown.

Hindwings: orange-yellow, paler along costa; the hindmargin and inner margin diffusely edged with reddish and fuscous scales, the extreme inner margin remaining clear yellow.

Palpi reddish, the terminal joint dark fuscous; face dull reddish, with a small whitish dot at top; vertex whitish in front, reddish behind; thorax and abdomen reddish, mottled with grey; shaft of antennae white. Underside of forewings dull reddish, towards base tinged with orange, with the two yellow submarginal patches distinct; hindwings orange, with margin reddish.

Expanse of wings: 32 mm.

One ♀ from Nias.

The forewings have a strongly developed prominence below the middle of hindmargin, below which the margin is very oblique and incurved; the hindmargin of hindwings is strongly excised from anal angle to end of second median nervule; veins 10 and 11 of forewings are shortly stalked.

Allied to, but distinct from, *P. multidentata* Warr., also from Nias.

ON A NEW SPECIES OF *ACTINOPHORUS* FROM MADAGASCAR.

By JOHN W. SHIPP.

Actinophorus grandidieri sp. nov.

DARK fuscous, with a greenish tinge and reflection. Clypeus six-dentate; anterior margin reflexed; very thickly and closely punctured, the punctures being much coarser and run together round the margins; teeth rather pointed and impunctate. Two transverse carinae extend from the eyes towards the centre of the head, but disappear on disc. Head slightly raised on disc between the carinae, and a rather deep cleft separates the basal teeth of the clypeus from the others; a small patch of short pitchy brown hairs are situated in the lobes of the four front teeth.

Thorax very thickly and closely punctured with rather deep well-defined punctures, and with a slight trace of a longitudinal smooth line on disc, which, however, is sometimes quite obsolete. Lateral margins rounded; anterior angles sharply obtuse, posterior angles being almost obsolete; lateral margins deeply crenulated the whole length and furnished with a row of pitchy hairs; anterior margin finely and smoothly emarginate. Posterior margin crenulate the whole length, with the exception of a small portion adjoining the scutellary region; scutellary projection obsolete. Lateral cicatrices obsolete.

Elytra finely granulo-asperate, with some moderately large shallow pores scattered over the interstices. Elytra six-striate, with the striae composed of a number of shallow pores run together, giving the striae the appearance of being quite smooth. Sides rounded, scarcely cordate, rather depressed on disc; lateral margins strongly emarginate, bicarinate, and smooth. Humeral prominences not very distinct.

Pygidium emarginate, twice as wide as long, and very sparingly punctured.

Anterior and posterior femora smooth, with a few large punctures scattered over the thick portions and margins, the punctures being furnished with short light brown hairs.

Anterior tibiae four-dentate; disc impunctate, but with a raised crenulated carina which terminates in a short raised tooth at the base of the basal tooth, the carina being provided with a row of short porrect hairs. The indentations between the teeth on the exterior margin are scalloped.

Posterior tibiae long, curved, and fringed with short hairs; posterior coxae produced into a short sharp spine.

Abdomen almost impunctate on disc, rather finely punctured at sides.

Mesosternum almost impunctate, a small longitudinal depression on disc, and produced to an obtuse impunctate keel, which is thickly punctured on the sides and sparingly furnished with short pitchy hairs.

Mesothorax almost impunctate, with a number of fine long pitchy hairs on the lower surface.

Long. corp. 20—22 mm.

Hab. S.W. Madagascar.

Type in the Tring Museum.

Mons. Kunkel D'Herculais figures an *Actinophorus* in Grandidier's *Hist. Nat. de Madagascar* (Col.), Vol. II. Pt. I. Pl. 17. f. 1, which he calls *Ateuchus radama*. The above insect, however, differs from the poorly executed figure of D'Herculais in having four teeth on the exterior margin of the anterior tibiae and is of a much greener hue. As a large number of the *Coprophaga* figured in the above work are quite unrecognisable, I think it would be far more convenient and cause less confusion if D'Herculais' names were dropped altogether.

ON SOME NEW SUBSPECIES OF *PAPILIO*.

By THE HON. WALTER ROTHSCHILD.

1. **Papilio alcinous loochooanus** subsp. nov.

♂. This form combines in colour and structure the characters of the Japanese *alcinous alcinous* Klug and the Chinese *alcinous confusus* Rothsch. The front of the head is clothed with red and black hairs as in *confusus*; the submarginal spots to the underside of the hindwing are shaped as in *alcinous*, those between the discoidal and median veins being less arched than in the Chinese form. The colour of the spots varies from bright red to pale pink ; sometimes the spots are marked on the upperside. The harpe (see Nov. Zool. 1895. t. VI.) agrees with that of the Japanese form.

Hab. Okinawa, Loo Choo Islands.

2. **Papilio coon palembanganus** subsp. nov.

♂. *Upperside:* the subcostal and discocellular veins of the hindwing a little more broadly black than in *coon coon* F., the two white spots near the apex of the cell between veins 3 and 5 absent ; two submarginal spots only marked, one between veins 5 and 6, ovate, situated nearly 4 mm. from the margin ; the other between veins 4 and 5, lunate, 5 mm. from the margin of the wing ; the first and two last submarginal spots of *coon coon* are absent ; the marginal spots at the end of veins 2 and 3 yellow as in *coon coon*, somewhat smaller.

Underside: all the spots of the Javan *coon* present in the Sumatran form; the discal spot between veins 4 and 5 is minute ; the first and two last white submarginal spots are smaller than in *coon coon*, the last joined to the marginal spot by means of a thin line.

Hab. Upper Musi River, Palembang district, Sumatra; 103° E. Long., 3° S. Lat.

3. **Papilio euchenor novohibernicus** subsp. nov.

♂. Black spot at the inside of the first ochreous submarginal spot to the underside of the hindwing almost circular, diameter 5 mm.

♀. Markings of median band of forewing larger than in *P. euchenor depilis* Rothsch. except the last spot, which has a length of only 13 mm.; the last but one patch is 6 mm. long at vein 2, while the two preceding ones have a length of 19 mm. each. The postcostal black spot of hindwing still more rounded than in *male* and somewhat smaller.

Hab. Neu Mecklenburg (= New Ireland).

Easily distinguished from *P. euchenor depilis* Rothsch. from Neu Pommern (= New Britain) by the shape of the postcostal black spot mentioned in the above description, which in *depilis* is bar-like (width 3 mm.).

4. **Papilio aegeus keianus** subsp. nov.

♂. The subapical series of spots on the forewing is in all my specimens present, but the spots are small, anguliform, and sometimes partly obliterated; below, the grey scales in the apex of the wing are nearly absent.

The white band on the upperside of the hindwing stops at the lower median branch (while in *P. aegeus ormenus* Guér. it is extended beyond that vein); it varies in breadth as in *ormenus*, but the two last patches are shorter, and hence the marginal black area between the median nervules is broader than in that form; the orange-red anal spot is rather large (transverse diameter 3 mm. in *type*-specimen), or very small, but from not one of my specimens absent. Below, the submarginal row of reddish orange spots is complete (*type*), or the anterior spots are obliterated, in some specimens only the anal spot and the preceding one being marked; the anal mark is always large, diameters $4\frac{3}{4}$ and 5 mm. in *type*, in other specimens little less; there are usually three distinct blue subdiscal lunules marked (*type*), and an indistinct blue spot between veins 6 and 7; the grey lunules standing before them in *ormenus* are either absent (*type*) or slightly marked.

♀. Dimorphic, the forms corresponding to *ormenus* ♀-f. *polydorinus* and ♀-f. *amanga*, in Nov. Zool. p. 307 (1895).

a. ♀-f. *amaranta* f. nov.—The patch in the apex of the cell and the elongate discal patches purer white than in *aegeus ormenus*, more sharply defined, especially on the underside; the cellular patch varies in size from 8 to 4 mm. (longitudinally); the marginal markings are much larger than in any other form of *aegeus*, coming in size near those of the ♀ of *P. gambrisius*, the last but one, for instance, being 4 mm. broad and $1\frac{1}{3}$ long; there is in most individuals (*type*) a distinct trace of small buffish submarginal spots, which, if joined to the marginal ones, would produce a kind of nail-head-shaped mark as it is found in the *male* of *P. polytes* L.

The white discal area of the hindwing agrees with that of *ormenus* ♀-f. *polydorinus* as figured by Wallace, *Trans. Linn. Soc. Lond.* XXV. t. 3. f. 3, which is said to be from Waigeu, though in characters it agrees well with the Kei Island form; the submarginal and marginal spots are as large as in Wallace's figure

or somewhat larger, the marginal spots being at least twice as large as in other forms of *aegeus*. Below, there are in some specimens, besides the discal series of blue lunules, two reddish orange discal spots present, covered by the two last blue markings ; the additional orange mark which stands between veins 2 and 3 is joined by a broad bar to the respective submarginal spot.

b. ♀-f. *blanca* f. nov.—Forewing as in Wallace's fig. 4 of t. 3, *l.c.*, but the marginal spots more prominent. Hindwing as in the palest specimens of *ormenus*, but the black discal patches between the median branches midway between outer margin and cell, hence distinctly nearer the cell than in *ormenus* ♀-f. *amanga* ; the two anterior orange submarginal spots within the anterior black area are as large as in Wallace's fig. 4, *l.c.* ; the marginal spots as large as in the preceding ♀-form. Below, the first submarginal spot is joined along vein 7 to the marginal spot.

Hab. Kei Toeal (Little Kei Island), collected by Capt. H. Cayley Webster in January to March 1896.

Easily distinguished from the allied forms in the *male* by the band of the hindwing not being extended beyond vein 2, and in the *female* by the larger marginal spots to both wings.

The specimens from Goram, figured by Wallace, *l.c.*, seem to belong to this subspecies, not to *aegeus ormenus* Guér.

5. **Papilio castor formosanus** subsp. nov.

♂. *Upperside :* black. Hindwing produced into a short tooth (2½ mm. in length) at the first median branch, with a discal series of four spots between costal margin and vein 4 : the first rounded, diameter 2¾ mm. ; the second rounded basally, truncate exteriorly, length 6 mm., breadth 4½ ; the third 1 mm. short of cell, obliquely truncate exteriorly, having a length of 8 mm. at vein 6 and of 6½ at vein 5 : the fourth elongate-ovate, 5 mm. long and barely 2 mm. broad.

Underside : forewing with a minute white dot upon the second discocellular vein, and with extremely small white marginal spots between the veins. Hindwing with the first discal spot represented only by a few white scales; the other three spots stand farther away from the cell than above and are shorter, their respective length being 4, 6, and 4 mm. ; between veins 2 and 4 there are two more discal white spots of very small size (1 to 1½ mm.) ; the white marginal lunules small.

♀. *Upperside :* brownish black. Forewing with a minute white dot on the second discocellular vein ; marginal white spots larger than in *male*, those between the median branches measuring ⅔ mm. to 1 mm. in width. Hindwing with three discal creamy buff patches between veins 4 and 7, similar to those of the *male*, and a minute spot before and another behind them ; two indistinct submarginal spots between veins 6 and 8.

Underside : forewing with a distinct milky-white spot on the second discocellular vein, 1½ mm. long; the marginal spots as above; a series of indistinct, minute, white, submarginal dots, situated between veins 1*b* and 7 upon the internervular folds about 5 mm. from the margin. Hindwing with a series of seven discal spots, the four first situate exteriorly, larger than the three others, the third the largest ;

length of the spots $2\frac{1}{2}$, $3\frac{1}{2}$, $5\frac{1}{2}$, 4, $1\frac{1}{2}$, 1, and $\frac{1}{2}$ mm. ; two submarginal white lunules between veins 5 and 7, and another near angle ; tooth at vein 4, as in ♂.

Hab. North Formosa, hills near Kelung, 500 to 1500 feet, July 1896; one pair collected by Mr. Jonas.

6. **Papilio codrus toealensis** subsp. nov.

♂. *Upperside:* darker green than in *codrus codrus* Cram. and *codrus medon* Feld.; the median macular band consists of nine spots, which are of the same pale green colour as in *codrus codrus* ; the last spot is rounded posteriorly, and measures at the submedian vein $5\frac{3}{4}$ mm. in length; the length of the preceding spot is 6 mm. at submedian vein and 5 mm. at lower median branch ; the two next spots are equal in length (5 mm.). The hindwing is more prolonged than in *medon*, the first median vein (traversing tail) having a length of 34 mm.; the grey scaling of the basal half of the wing does not extend on the disc beyond the end of the cell, and the tip of the tail is whitish grey for $1\frac{1}{2}$ mm.

Underside: darker brown than in *medon*; the median band broader than above, the last four spots touching each other and having somewhat increased in length. Hindwing with a white mark behind the costal vein, situate 16 mm. from the base and 11 mm. from the end of the costal nervure ; the mark is rounded (diameter $2\frac{1}{3}$ mm.), and behind it there are some grey scales ; between veins 2 and 4 there are, near the outer margin of the wing, two small patches of grey scales.

♀. Agrees with the *male*, but the deep green gloss is absent from the upperside ; the tip of the tail is whitish grey to a greater extent (3 mm.), and there is a buffish white, minute, marginal spot at the end of the second median branch of the hindwing below.

The variation is very slight. The grey submarginal patches of scattered scales on the underside of the hindwing between veins 2 and 4 are sometimes absent ; in one of the *females* the dimensions of the costal mark of the left hindwing below are only 1 and $1\frac{1}{2}$ mm., while those of the right hindwing are 2 and $2\frac{1}{2}$ mm.

Hab. Kei Toeal (Little Kei Island), collected by Capt. H. Cayley Webster, January to March 1896.

Is easily distinguished from *P. codrus codrus* Cram. by the presence of a large pale green mark behind the submedian vein on the forewing; from *codrus gilolensis* Wall. by the deeper green colour of the upperside (in ♂), the longer hindwings, the larger and less rounded spots of the median band, and the costal mark on the underside of the hindwing standing nearer the end of the costal nervure; from *codrus medon* Feld. by the narrower median band, the less extended grey scaling on the upperside of the hindwing, and the very much smaller costal mark.

7. **Papilio eurypylus melampus** subsp. nov.

♂. Forewing longer and narrower than in the other Papuan races of *eurypylus*, vein 5 having a length of 10 mm., while the total length of the wing is 44 mm.

Upperside: median band nearly as in *P. eurypylus eurypylus* L., the last four spots measuring in length 5, $7\frac{1}{2}$, 8, and 8 mm. respectively; the last three not separated from one another; the preceding one is separated by the black vein ; cell with four

spots only, the second from base being absent; band of hindwing 7 mm. wide at subcosta ; submarginal spots very small.

Underside : submarginal spots to both wings small, those of the hindwings especially minute as compared with the spots of the other Papuan races ; the two additional linear spots near the second submarginal mark of the hindwing 1 mm. long; the red markings as large as in *eurypylus eurypylus* ; cell with a white and red spot in the apex; the subbasal white fascia extending, as in the Moluccan form, from the costal margin to the subcosta, and at the costa of $1\frac{1}{4}$ mm. breadth.

♀. Like the *male* ; median band posteriorly $\frac{1}{2}$ mm. wider ; cell (above) with three markings only, the two basal ones being absent.

Hab. Kei Tocal (Little Kei Island), collected by Capt. H. Cayley Webster. January to March 1896.

Varies in the number of markings present in the cell of the forewings; one of the specimens has only the comma-shaped spot marked on the upperside. The spot in the apex of the cell of the hindwing below is sometimes absent.

A very remarkable aberration from the same locality is the following one :—

ab. **rufinus** ab. nov.

On the underside of the hindwing there is, besides the costal red mark before the costal nervure, a heavy red bar between this spot and the subcosta, reminding one strongly of the red bar found in *P. sarpedon* L.

The Kei Islands form of *P. eurypylus* L. is distinguished from the New Guinean race by the much narrower median band of the wings, the larger red markings of the underside, the smaller submarginal spots, and the broader subbasal white fascia of the hindwing below; from *P. eurypylus eurypylus* L. from the Moluccas it differs in the absence of one or more cellular spots from the forewing above and in the small submarginal spots to the hindwing below.

ON MECHANICAL SELECTION AND OTHER PROBLEMS.

By KARL JORDAN, Dr. Phil.

[Plates XVI., XVII., XVIII., and XIX].

THE peculiar kind of variation I have to deal with in this paper concerns some accessory organs of the reproductive system of a group of insects, and bears closely upon Romanes's theory of Physiological Selection. It is *a priori* evident that the demonstration of the occurrence of an extensive variability in any part of those organs which are the most important for the preservation of animated nature must be of far-reaching consequence in respect to the origin of species. As the mere statement of the facts would be unintelligible to the general reader who has no special knowledge of the animals in question, I shall endeavour to interpret the facts. However, before I begin to give the details, it is necessary to come to an understanding about some questions of a general character, and this necessitates my entering, rather reluctantly, upon a ground which nowadays has so often been traversed, with and without success: I should not do so, if the facts I bring forth, and the conclusions I have to derive from them, did not put me in contraposition to a good many naturalists. Being surrounded by cabinets full of specimens, I shall, during this excursion on a theoretical ground, always be reminded that possibilities arrived at by general reasoning are often impossibilities in nature, in so far as what is *a priori* possible or even probable may be found not to occur in nature.

I.—INTRODUCTORY NOTES.

Everybody who is a little acquainted with the diagnostic works on Zoology or Botany will know sufficiently that a continuous question of contest amongst us species-makers is whether a given form of animal or plant is a "distinct species" or not; and he will also have become aware that in many cases the contending parties do not come to an understanding, because, though using the same term "species," the mutual conception of that term is widely different. And this is so not only amongst us species-makers, but we meet with the phenomenon also in the essays of a more philosophical kind which bear upon the theory of evolution. It would almost appear, in fact, as if a "species" is that which a respective author chooses to consider a "species." It is not necessary to give any illustration taken from systematic works, first, since we do not think it does much harm to the value of purely diagnostic articles whether the term "species" is always applied in the same sense by the same or various authors; secondly, because illustrations can be found in any volume containing descriptions of varieties and species. In natural philosophy, however, so far as it endeavours to explain by theories the diversities in animated nature, it is all important that an author has a fixed idea of that diversity which he in his writings calls a "species," and therefore we will give here an illustration of the before-mentioned phenomenon taken from this side of our science.

In a short article in which he claims priority over Romanes with regard to physiological selection, Dahl* proceeds to say that a separation of the varieties of one species into more species within the same locality is not possible, if the various

* *Zool. Anzeiger* 1889. p. 262.

varieties did not possess, besides the (morphological) distinguishing characters, either antipathy against mutual intercrossing, or mutual sterility, or both qualities; and he gives the following illustration :—

"The caterpillars of the two closely allied species of butterflies *Gonopteryx rhamni* and *G. cleopatra* became adapted to different species of plants, the one to *Rhamnus frangula* [and *cathartica*], the other to *Rhamnus alpina*, *i.e.* the apparatus of digestion became so modified that those species of plants could be made use of [physiologically] in the best possible manner. With the condition of the organs of digestion was associated, perhaps indirectly, a somewhat different yellow colour in the imago-state, and here the preference could begin to act. . . . Against a thousand butterflies adapted to *Rhamnus alpina* there occurred perhaps two which were prepossessed in favour of a deeper yellow colour, two which preferred a lighter yellow tint, while those thousand were indifferent [to the deeper or lighter tint of yellow]. The first-named [two] specimens copulated with individuals adapted to *Rhamnus alpina*, and gave birth only to fully fertile off-spring. The second group [two specimens] copulated with light-coloured individuals adapted to *Rhamnus frangula*, and gave birth to non-fertile intergraduates. Of the thousand specimens one half copulated with specimens adapted to *Rhamnus alpina*, the other half with specimens adapted to *Rhamnus frangula*; of the two halves, therefore, only the first gave birth to fully fertile offspring. . . . It is easily to be seen that the number of those individuals which were prepossessed in favour of closely allied specimens [in colour] would grow very quickly, and that the number of the others must very soon become reduced, even if this number at the beginning [of the selection] is still more preponderating [than in the above illustration]."

As the author expressly states that the divarication of species at the same locality is not possible if together with the "*development of the distinguishing characters* there did not take place *a development of dislike*," etc., we must take it as the meaning of the illustration that *Gonopteryx rhamni* and *G. cleopatra* have developed from a common ancestor into two species by means of psychological selection. Or, to put it figuratively, the species *A* developed into two varieties, A^1 and A^2, in consequence of the caterpillars becoming changed by the influence of the different food-plants; then psychological selection on the part of some females set in and modified those two varieties more and more, so that the varieties A^1 and A^2 became in the course of time two "species" *B* and *C*. Which characters does the author attribute to the two varieties A^1 and A^2 at the time when selection commenced to act? There were four distinguishing characters: (1) A^1 and A^2 were different in the chemistry of their body; (2) they were so different in colour that the *females* could perceive the difference; (3) A^1 produced only pale specimens, and A^2 only deeper-coloured specimens, *i.e.* they bred true; (4) the cross-products were not fit to propagate. Now, if forms so widely distinguished morphologically and physiologically as A^1 and A^2 are not "species," then we fear there are no species at all. The author apparently confounds the transmutation of one species into one other and the separation of a species into two or more. The illustration does not show how by means of psychological selection (or any other modifying factor) *G. cleopatra* and *G. rhamni* have in the same locality developed from one common ancestor into two species, but shows how the two "species" *cleopatra* and *rhamni* might become the one a paler and paler, the other a deeper and deeper yellow "species." At the time when selection set in in Dahl's illustration there were already two "species," and hence the specific distinctness of the two is not the outcome of psychological selection.

In order to avoid similar confusion we have to come to a conclusion which definition of the term "species" as opposed to the lower degrees of variation we will accept, before we discuss the variability of the genital armature within the limits of a "species."

As most of us pretend to be evolutionists, let us take it as an axiom, which we need not discuss here any more, that the great divergency exhibited in animated nature is the result of the development of the various forms of animals and plants from a common ancestor. Before Darwin brought forward his theory of evolution naturalists had to solve one question: which are the differences found to exist among the various forms of animals and plants? The question which is put to naturalists nowadays is, however, twofold: (1) which kinds of divergency do we find to exist in nature? (2) how has this divergency come about?

It seems to us to be a rather general assumption amongst naturalists, no matter whether they treat animated nature from the point of view of a philosopher, or whether they work with the individual specimens, that the variation of the individuals which belong to a complex called species is such that, with the exception of marked di- and polymorphism, we can draw up a series of specimens which form a continuous chain from one extreme variety to the other, the differences between the adjoining links being extremely slight. And it is almost natural that the assumption should be so general. The question which governs zoological work is one of specific differences on the side of us systematists, and one of the causes of the specific and non-specific characters on the side of the biologists, and over the consideration of "characters" it has been lost sight of that speaking of a specific character and the variability of characters means, in fact, speaking of *abstracta*, while our work must be based upon *concreta*, upon the individual specimens. The variation of an organ may be continuous; in a series of individuals a certain organ may even be constant; but that does by no means imply that the individuals as opposed to one of their organs form a continuous chain. An individual has many "characters," and these do not vary in the same manner and degree in the various specimens; some individuals may be almost identical in one or some characters, while they are widely different in other respects, and this will at once become manifest to everybody who actually tries to put together a "continuous" series of specimens. An illustration will bring the fact more closely to mind. *A*, *B*, *C*, *D* may represent individuals; *a*, *b*, *c*, three characters; a^1, a^2, a^3, a^4, etc., b^1, b^2, etc., c^1, c^2, c^3, etc., may be minute degrees of development of the characters. Now, if we arrange the individuals according to the gradual development of the character *a*, and thus have a continuous series in respect to this character, the chain of individuals will nevertheless be discontinuous, as in the following diagram:—

A	B	C	D	. . . .
a^1	a^2	a^3	a^4	. . . .
b^{10}	b^1	b^6	b^{15}	. . . .
c^1	c^2	c^7	c^3	. . . .
⋮	⋮	⋮	⋮	

If we further arrange the series according to the continuity of character *b* or *c*, not only will the individuals *A*, *B*, *C* . . . stand in other places within the new series, but also new individuals must be introduced to make the chain again continuous. Hence it will be sufficiently clear that, notwithstanding the variation of every organ of a species may be continuous, the individuals each being a sum of organs

form a discontinuous series. We can express this phenomenon in other words as the law of *independent variation* of organs as opposed to the *correlative variation* of organs.

There are many species in which not only the individuals form discontinuous series, but which exhibit also one or more discontinuously variable characters; and it is especially the appearance of such discontinuity which Bateson so amply illustrates in *Materials for the Study of Variation* (London, 1894). In this case the specimens belonging to a species can be arranged into groups according to a discontinuous character, each group containing individuals in which that character is continuous or nearly so, while from one group to the other that character exhibits a more or less wide gap. In diagnostic zoology the groups of individuals of polymorphic animals have often been mistaken for distinct species. The study of independent discontinuous variation of two or more organs can, however, often help us to distinguish polymorphism from specific distinctness. In the following diagram the specimens are first arranged into groups according to character a, and then into groups according to character b:—

I.	A	B	C	D	E	F
	a^1	a^2	a^3	a^7	a^8	a^9
	b^5	b^9	b^1	b^2	b^3	b^7
	c^{11}	c^7	c^6	c^5	c^9	c^{12}
	⋮	⋮	⋮	⋮	⋮	⋮
II.	C	D	E	A	H	I
	b^1	b^2	b^3	b^5	b^4	b^{10}
	a^3	a^7	a^8	a^1	a^{11}	a^{12}
	c^6	c^5	c^9	c^{11}	c^2	c^{10}
	⋮	⋮	⋮	⋮	⋮	⋮

In the first arrangement (I.) $A\,B\,C$ form one, $D\,E\,F$ another group; in the second arrangement $C\,D\,E$ belong to one, and $A\,H\,I$ to another. In each case the individuals $A\,B\,C\,D\,E\,F\,H\,I$ form two groups not connected by intergradations, each group, therefore, being conformable to what we species-makers call "species" as a rule; but in the first arrangement the specimen C belongs together with A and B to a "species," while in the second arrangement it stands together with D and E, which, according to arrangement I., are specifically different from A, B, and C. The danger of arriving at erroneous results by taking into account only one organ is so evident and so well known that one must wonder how it is possible that nevertheless a classification—for example, of *Lepidoptera*—based upon wing-markings alone, or upon neuration, can be expected to be an exact expression of the blood-relationship of the classified forms.

Which characters are correlated and which independent in respect to variation can only be found out by the study of individual variation; where this study is neglected correlated characters are often taken to be independent diagnostic characters. The length of the wing and the breadth of the wing-bands are often correlated in *Lepidoptera*, and so is in many cases the lesser or greater concavity of the outer margin of the forewing of butterflies depending on the length of the wing; to say in such cases that a certain form of butterfly differs from another form in the wing being longer, externally more concave and having narrower bands, would amount to the same as if in the case of two black forms with yellow spots we should say that the one is differentiated from the other by the yellow spots being restricted and by the black ground-colour being extended.

The independent variability of organs found to exist among the individuals derived from one *female*, or among the individuals flying in the same locality—in short, among specimens about the specific identity of which there is no doubt—leads us to the conclusion that the same organs of the same species vary also independently in other localities. The distinguishing characters of a geographical race thus can be shown to be independent of one another, and that the association of distinguishing characters is not correlation of these characters, which is of the greatest importance, if we come to consider the causes of the divergence exhibited by such races, the degree of relationship of the races, and the probable history of their geographical distribution. We mention in this place only that, as the wing-form and wing-pattern of the *Papilios* vary independently of the copulatory organs, we shall find in the body of this paper ample illustrations of those three phylogenetical and biological phenomena. The first we have to do is in every case to study the individual variation in order to know which characters are correlated and which not in respect to variation, then to study the characters of the same organs of the geographical representatives of the same species, and finally to compare the results we arrive at, if we draw from each single independent character conclusions as to subspecific and specific distinctness, the influence of the evolutionistic factors, and the history of this influence.

The occasional appearance of individuals, mostly single or in very small numbers, amongst the normal specimens, differing widely from the latter in one or more points, we have to classify as a peculiar kind of di- and polymorphism. The so-called sports and monstrosities, between which terms there is no line of delimitation, as there is also no such line between normal and abnormal varieties, belong to this kind of discontinuous variation, and it is a rather general assumption that the characters of such sports and monstrosities get swamped away by intercrossing. Is this really true in the verbal sense? If swamped away means "not appearing in the direct offspring" of that abnormal specimen, it might often be correct; but if it means disappearing for ever, never reappearing amongst the individuals constituting the species, it is not true. Many sports and even monstrosities are found again and again, as every collector knows; and when an exceptionally abnormal variety has been found once, there is no reason for the assumption that it will not be found a second time. In fact, the collectors, who work with individuals, expect and hope to come across such a variety themselves. If, for example, somebody had published this year that from one of his pupae of *Acherontia atropos* (death-head moth) a specimen with entirely ochreous wings had emerged, we are quite sure that all those who are in possession of a considerable number of pupae of this insect would look forward to the emergence of the imagines with the eager expectation to find such an individual among them.*

The repeated occurrence of the same abnormal variety is, to our mind, of the greatest importance, as the repetition of the phenomenon is a proof that the variety, how abnormal and rare it ever may be, is not entirely swamped away from the species, and that the constitution of the individuals of the respective species, taken as a whole, is such that under certain circumstances, whichever they may be, the variety will be produced, or even must be produced. It is, therefore, quite intelligible that, when those certain circumstances become more frequent, the variety which we now call abnormal might become normal. From this point of view, the record of unusual varieties, including monstrosities, is by no means so unimportant as it appears to be to the systematist who recognises only "distinct" species. On the contrary, we

* For illustrations see Bateson, *Materials for t Study of Variation*. London, 1894.

maintain with Eimer that abnormal varieties show distinctly the directions in which a species is able to develop. We give an illustration. For certain reasons which we cannot explain here, as they concern details of structure, we must consider *Papilio sarpedon* to be derived from a form which had green spots within the cell of the forewing and a submarginal row of green markings, and that *P. sarpedon* is now on the way to lose the green markings altogether. The specimens of *P. sarpedon* from the Solomon Islands have preserved some of the additional spots, while in the forms from other localities the forewing has only a median macular band; in South India and Ceylon the first spot of this band disappears very often, and in China the band of the hindwing is often reduced to a costal patch. Now, Mr. de Nicéville figures a "sport" from Sumatra * in which the median band of both wings has disappeared, except a small spot, and which therefore has an almost entirely black upperside. The specimen is now in the Tring Museum, which contains also another individual of *P. sarpedon* (from Sikkim) that has the median band of the forewing dusted over with black scales, which conceal partly the green ground-colour of the wing-membrane. The direction of development indicated by these two "sports" coincides with that which we are led by structural characters to consider the real direction of development of *P. sarpedon*, and the importance of this coincidence is obvious.

Apart from polymorphism among the individuals in the same locality, we observe very commonly a polymorphism in which the various forms are separated geographically. This geographical polymorphism we shall have to deal with later on, and therefore we restrict ourselves here to the remark that the various geographical varieties are, just like the forms of ordinary polymorphism, often not connected by intergradations, and thus are likely to mislead us species-makers to treat them as "distinct species"; in the latter respect geographical and non-geographical polymorphism have much in common, because they are homologous phenomena, as we shall soon see; and we may add that geographical separation of different forms cannot be an *a priori* criterion of specific distinctness, though this has often enough been alleged.

The individual variation including non-geographical and geographical polymorphism, as dealt with in the preceding lines, concerns especially the individuals which exist as contemporaries; now let us briefly consider the historical side of the variation. According to the theory of evolution, the descendants have in the course of time (gradually or *per saltum*, in respect to the distinguishing characters as well as to time) become dissimilar to their ancestors; we assume generally that a long period was necessary to bring a considerable change in an animal or plant about. A period of one or two hundred years is by many systematists considered quite insufficient to alter in nature a form of animal or plant so far that the change is obvious, or that any transformation has taken place at all within the same locality. Though we accept the theory of the transmutation of the species in the course of time as the base of scientific work in Natural History, we nevertheless *identify* the forms found in our days with the forms which our forefathers in science had before them; without hesitation we treat the forms, whether they be species or variety, captured in 1896, as identical with those which Linné received a hundred and fifty years ago, or which Merian or Seba obtained about two hundred years back. And when we observe a difference between our recent specimens and the old pictures, differences which are by no means always explainable by the assumption of incorrectness of the drawings,

* *Journ. Bombay N. H. Soc.* 1893, p. 54, t. L, f. 11 (♂).

the very last we think of in systematic work is that the form we now receive from a particular locality has actually changed during the last fifty or two hundred years. Of course, our knowledge of a single specimen of a certain form preserved from the collections made during the last century, and our knowledge of an old figure of that form, does not enable us to draw any conclusions as to the extent of variation of that form at the time of its capture, nor does such poor knowledge admit any conclusion as to a probable transformation. The evidence is gone, and that is very much to be regretted.* But should not the want of evidence from the past be a hint to us to procure more evidence for the scientists who come after us? It is all important to prove that the transmutation of species upon which the theory of evolution is based actually takes place; and it would be a good object for small provincial museums to preserve long series of specimens, with exact dates, at least of the species of those families of the respective district which are known to be easily influenced by the transmutating factors, families which moreover are easily preserved, such as butterflies and moths, wingless beetles, and landshells; museums with such collections would not be simply a sight for the public, but they would be of scientific value, and their scientific success would be far superior to that which they can obtain by gathering sparse material from all countries of the globe. There would certainly be no want of voluntary help from the side of private collectors in civilised countries. The study of the local fauna and flora and their variation carried out in this sense, though many systematists and species-makers (which terms are not always synonymous) look down upon the study of aberrations as being unscientific, stands far above the mere descriptions of new species, which mostly do not help the least to solve the all-governing questions of evolution, but add simply some more "species" to the hundreds of thousands of "species" already made known.

However, we are not entirely left without evidence that transformation is actually going on under our eyes. We know from many plants† and a small number of animals that geographical races, when reared under conditions other than those of the country where the race lives, change in characters; we refer to the Porto Santo rabbits,‡ and *Polyommatus phlaeas*,§ and *Pieris brassicae*. And a striking

* Since the above was written I have received Oberthür's *Études d'Entomologie* XX. 1896. Here Oberthür tries to demonstrate from copies of old figures of *Lepidoptera* and figures of recently caught specimens that no change has taken place in these insects since Linné's time. The differences, however, which are exhibited by these old drawings and the figures of the recent specimens are not only so conspicuous that identity is entirely out of the question, but the differences are such that if they actually were found in contemporary specimens, many prominent Lepidopterists, including Mr. Ch. Oberthür himself, would treat these differences as being of "specific" value. In fact, Clerck's figure of *Papilio deiphobus* resembles much more that insect which Felder separated as a distinct species (*Papilio deiphontes*) than it does Oberthür's figure of a specimen of *deiphobus* caught in 1893. Oberthür must have been led by that kind of reasoning indicated in the above text, else he could not have spoken of a "proof" that the species in question have not undergone "the least modification." This kind of reasoning is: first the figures of Clerck are mentally corrected according to the characters of recent specimens, then the characters thus corrected are pronounced to be identical with those of recent specimens.

I by no means will say that the particular species in question have been transformed since Linné's time; but I maintain that if there is any evidence as to transformation or non-transformation, the evidence is certainly in favour of transformation.

† Kerner, *Gute und schlechte Arten*, gives many illustrations of the transformation of plants.

‡ Darwin, *Variation of Animals and Plants under Domestication*, 2nd edition, London, 1888. p. 119.

§ Weismann, *Studies in the Theory of Descent*. From pupae of the southern form of *Polyommatus phlaeas* brought from Italy to Germany imagines emerged which were intermediate between the Italian and German forms.

Scudder, *Butterflies of New England* II. 1889. p. 1175, gives a detailed account of the gradual spread of *Pieris rapae*, which butterfly was first noticed in Canada in 1860, and describes a new variety (*novangliae*) into which *rapae* has developed.

illustration of the fact that in a certain district a transformation of a species takes place has been published during recent years from different sides. A moth of the family *Geometridae*, *Amphidasis betularius*, has a black and a white form (with intergradations): the black form (*doubledayarius*), which for a long time was known to occur in Great Britain, was very rarely found in North-Western Germany; during the last ten to twenty years, however, the black form has become more frequent, and is at the Lower Rhine now nearly as common as the white form. Without trying to give an explanation of this phenomenon, which speaks for itself, it is of interest to note that in countries with a rational cultivation of the soil the changes in the immediate neighbourhood of the animals are very varied: the disappearance of swamps, planting of new forests on barren hills, artificial watering of pasture land, and so on, will not only destroy many forms, and give opportunity for other forms coming into the district; but these changes will most probably also have a certain amount of influence on those animals and plants which remain residents, at least on those forms which, like butterflies and plants, are very sensible to a change in the biological factors; and it would be highly interesting to have correct data whether perhaps a visible transformation of some animals and plants would be effected in a shorter time in a country with an intensive cultivation of the soil (like France) than in a country (like England) in which agriculture is more stagnant. Certainly we will not maintain that all the forms of animated nature have changed during the last hundred and fifty years, but will only draw attention to the historical side of the question, which cannot be entirely neglected. Palaeontology teaches us that there are forms which for a very long time have not changed, at least not in those parts which have been preserved; while, on the other hand, we know from palaeontology that in most cases a change must have taken place.

At subsequent geological epochs the earth has been inhabited by different faunas and floras; that we know. If we had now before us all the specimens of animals and plants which ever have existed, and tried to group them as we do with the specimens in our collections, what would be the result? The gaps between the various forms would all be filled up by intergradations;* the Gorilla would be as different from the Giraffe as he is now; but tracing both animals back to their common ancestral form, we could draw up a series of individuals which would perfectly connect the two animals, and which would not allow us to draw a line of division: Gorilla and Giraffe thus would appear to be merely the extremes of the series. If, as we mostly practically do, the "species" are based only upon morphological differences, all the animals and plants would belong to one variable species. Any definition, therefore, based solely upon morphological differences must necessarily be a failure, and it follows also that the allegation that a certain form is a "distinct species" because there are no intergradations between it and the allied forms is in discordance with the theory of evolution, according to which the intergradations did occur, but are perhaps now extinct.

If we trace the line of ancestrals of two given types back to the form from which both have descended, we have for each type a separate line until we come to the primordial type in which both lines combine. The line of ancestors of every species comprises the different steps of development from the primordial form down to the recent form, and represents the historical polymorphism of the species, in opposition to contemporary polymorphism. Are the differences between the steps of development "specific" differences? *Hipparion* and *Equus*, though assumed to stand in

* Romanes, *Darwin and After Darwin* II. London, 1895. p. 282.

the relationship of ancestor and descendant, are treated as members of different families; if it is right to keep ancestor and descendant, in spite of the intergradations which have existed according to the theory of evolution, in separate families in this case, why do we not do it in the case of the horses which our forefathers rode and those which live now? If it is the presence of morphological difference which leads us to split up in the one case, and the absence of such difference in the other case to unite, why then are *Distomum*, *Redia*, and *Cercaria*; *Rhabdonema* and *Rhabditis*; *Vanessa levana* and its offspring *prorsa*, the same species? Morphological difference alone is not a criterion of specific distinctness.

Besides the morphological differences among animals we observe a mental or psychological difference. It has often been noticed that in mixed flocks of sheep * or cattle the individuals belonging to the same race often keep separate from the rest, and it is also well known that in the state of nature strangers are driven away or even killed. Though psychological selection, as manifested in these cases, is of importance to accelerate the transformation of a variety and to fix the varietal characters, we believe that among domesticated animals it is very often not racial community that keeps the individuals together, but the circumstance of being accustomed to one another. In some districts of Germany all the geese of a village are driven to pasture in one large flock; when on the pasture ground, the individuals belonging to each house keep together, even if they are not the offspring of the same parents, but are brought together from different villages as goslings: this keeping together is an expression not of community of characters, nor of community of descent, but of community of the stable.

For us systematists that kind of psychological variation is of more interest which is the immediate outcome of morphological differences in the organs of sense and in the organs which are destined to affect the senses. The variability of the organs of sense among higher animals, and the difference of discriminating power among the individuals of the same species and race, are facts so well known that it is sufficient to remind the reader of the variability in the eyesight of men, or of the difference between dogs in regard to the power of smell. Among lower animals the senses are often very differently developed in the various families; in insects the power of discriminating form and colour seems generally to be rather weak, while in some families the organ of smell is highly developed. Carrion- and dung-beetles are able not only to smell the carrion or dung from a great distance, but, what is more important, they distinguish between the scent of carrion and that of dung. The sexes of *Lepidoptera* and *Coleoptera* are brought together by differences in the scent of the sexual scent-glands of the various forms; *females* of certain moths attract great numbers of *males*, even if the *female* is kept in a box with holes, and there is not the least doubt that the *males* of the various species of a genus follow the scent of the respective *females* and not that of allied species. As individuals of one species sometimes come to a *female* of another species, and as, further, dung-beetles are occasionally attracted by carrion, we must conclude that the specimens of dung-beetles really perceive the scent of dung *and* carrion, and that the *males* of insects not only perceive the scent of the *females* of their own species, but also that of other species. The phenomenon that dung-beetles come to dung, and that the *males* of a given species of insect follow the scent of the *females* of their species, cannot be explained by the assumption that the organ of smell of the specimens is so constructed that the insect is not able to perceive any scent but that particular one. The specimens of allied species, therefore,

* Darwin, *Variation of Animals*, etc., 2nd Ed. London, 1888, p. 145.

discriminate between the various scents, and follow that scent which, to put it more personally, incites them most. We have here a psychological selection. Now, if a variation takes place in the organ of smell and in the scent-producing glands, it seems to us evident that the effect will be such that the varietal individuals do not follow the same scent as that to which the normal specimens give preference, but select a varietal scent. Careful observations about psychological variation are extremely scarce; but we can give a beautiful illustration on the authority of Professor Standfuss,* who says that at Zürich *males* of *Callimorpha dominula* came very rarely to *females* of the Italian variety *persona*, while they were attracted in great numbers by the *females* of *dominula*. We see here that morphological and psychological variation can go hand in hand. If the power of discriminating scent is so highly developed throughout the order of *Lepidoptera* as in the case of *Callimorpha dominula*, we have a ready explanation of the phenomenon that the scent-organs, compared with the colour and pattern of the wings, are so constant in *Lepidoptera*. It is readily conceivable that the relative constancy of the scent-organs of *Lepidoptera* is a consequence of psychological selection based upon the difference in the organ of smell and in the scent-glands. And if we must admit the probability of the influence of this kind of mental selection, we are justified in concluding that psychological selection takes place in all animals which have one or the other organ of sense highly developed. As, however, with the various organs of sense only certain kinds of characters are perceivable, it is obvious that in different groups of animals psychological selection will affect different sets of characters according to which organ of sense has a high power of discrimination. Thus it seems to us intelligible that there exists such a strong contrast between *Lepidoptera* and birds in respect to the constancy of colour and markings. The great variability in colour in the order of *Lepidoptera* and the relatively slight variability† in scent-organs can be accounted for by the presence of selection as to scent-organs and the absence of selection as to colour,‡ while the surprisingly great constancy even in the shade of colour among birds may largely be due to the sharp eyesight of these animals rendering them capable of distinguishing between shades of colour, and hence inducing them to associate with specimens of their own colour and to drive differently coloured individuals away.

The effect of the variation of psychical qualities as dependent on the variability of the organs of sense can, like the variation of morphological characters, be classified in individual, geographical, and historical polymorphism. The considera-

* Standfuss, *Handbuch für Schmetterlingssammler*, Jena, 1896, p. 107.

† The scent-organs of *Lepidoptera*, especially those of the *males*, are not constant in every case; there are even species in which they are very variable; and the colour of birds is also not constant in every species.

‡ Eimer, *Artbildung und Verwandtschaft bei Schmetterlingen*, tries to "prove" on the ground of his studies on the wing-pattern of Papilios that the transmutation of animated nature takes place without natural selection. But even if this be true as regards a direct effect of selection on the wing-pattern, it is conceivable that psychological selection, which is a part of natural selection, can have, besides the direct influence on "structural" characters, an indirect influence on the distribution of colour on the wings. Eimer is in so far quite right as he says with Darwin (not against Darwin) that incipient varieties cannot have been originated by natural selection; where a "selection" takes place, there must already be a difference amongst the individuals. As Eimer expressly says that natural selection cannot produce species but only preserve species, and as, further, Eimer actually does not show how species (conforming to Eimer's definition of species) but only how varieties originate, I cannot perceive why we should not attribute to natural selection the preservation of *varietal* characters. Variation is, according to Darwin, not the outcome of natural selection, but is the premiss of natural selection; varietal characters can be preserved by selection and increased by survival of the fittest. I do not perceive any great contrast between Darwin and Eimer in respect to these points.

tion of these three kinds of polymorphism in the previous lines led us to the conclusion that morphological differences of any kind and degree are not decisive criteria as to specific distinctness; the systematist actually sinks his species in spite of distinguishing characters as soon as it is proved that the morphologically different forms appear among the offspring of the same *female*. The most general case of bodily difference which is not regarded as being specific is the difference between *males* and *females*; notwithstanding the great dissimilarity which the sexes so often exhibit, not only in the reproductive organs, but also in other morphological characters, the systematist puts *male* and *female* together in one species, and hence makes at once the concession that his term "species" is not a purely morphological one, but that the higher criterion of the term is of a physiological kind.

Although morphological identity means also specific identity, the inverse that specific identity means morphological identity is not correct. The question, therefore, is now, which physiological divergence we will take as the real criterion of specific distinctness.

We have seen above that the line of ancestors of a given type can be divided into a recent portion which is independent of the lines of ancestors of all other types, and into a remote portion in which the lines of several types are combined. The specific difference which now keeps allied types separate was absent from them in remote times; what now is specifically different was formerly specifically identical. Hence a definition of "species," *i.e.* a definition of what makes two types specifically different, has to exclude any relation to the ancestral forms of the given types, but has to take into consideration the contemporary types and their descendants. For the sake of argument let us assume all types of animals and plants were monogamic, so that every individual would produce offspring without copulation with another individual. The question as to the characters of the descendants would be twofold: first, the descendants of a type (taken as a whole) become under certain conditions so changed that the gap which separates them from the descendants of another type is entirely filled up by intergradations, or that the descendants of both types entirely fuse together in characters; or, second, the sum of the descendants of each type remains under all conditions separated by a morphological gap from all other sums of descendants, whether the characters change or not. We have already referred to the transplantation of plants and animals by which it has been proved that forms which were unhesitatingly considered specifically different became identical. The divergency in the development of forms has in these cases been annihilated, and we must conclude that similar divergencies will in nature also be annihilated when the necessary conditions arise. If, therefore, *all* the various types in animated nature were different only to that degree, it follows that under favourable circumstances all these different forms would fuse together to one single type. Divergency would change into convergency and identity, and there would be no question as to species. As we, however, observe that fusing together is restricted to the nearest allied types, and that with the greater divergency of allied forms the possibility of fusing decreases until the forms remain separate under any condition, the term "species" as an expression of the divergency in nature must be an expression of that divergency which, though starting from identity in the ancestral forms, will never again develop into identity.

In the case of sexual propagation the question is more intricate in consequence of the intercrossing which takes place between different types. The question as to the lines of descendants is threefold: the line of descendants of a given type fuses

completely together with that of one or more other types under certain conditions, and the descendants are qualified for propagation; secondly, the line of descendants remains separate under every condition; and thirdly, the lines of descendants are partly fused by the appearance of cross-products, which, however, are not fully qualified for propagation. The two first points are the same as those mentioned under monogamic propagation. The third case is of little consequence; the cross-products, though often obscuring the fact of the independence of the descendants of two given types, have really no influence upon the lines of descendants, as the offspring of the cross-products soon become extinct, and therefore do not affect the characters of those descendants of the present types which are not cross-products. In asexual and in sexual propagation we observe that the lines of descendants of the various types exhibit this contrast, that they are either capable of fusion or not capable of fusion: in the first case divergent development changes under certain conditions into convergent development, and ends in identity; in the second case the development ends under every condition in divergency.

In order to see clearly which kind of divergency in animated nature we shall have to term *specific*, we will shortly recapitulate those points which have to be taken into consideration.

1. The presence of morphological distinguishing characters is not a final criterion of specific distinctness; a definition of species based solely upon such differences not only would not take into account individual, geographical, and historical polymorphism, but would, if consequently applied, make every individual specifically distinct, as we have seen that the sum of the characters of every individual is different from the sum of the characters of every other individual.

2. Though according to the theory of evolution every species is the outcome of the transmutation of another, ancestral species, we have only morphological characters to distinguish ancestral and descendant species by. Therefore, considering what is said under 1, a final criterion whether the different types which form the direct line of ancestors of a given type are "specifically" different is wanting; palaeontology provides us with morphologically different specimens, which can never be proved to have been specifically distinct. And as, further, allied species have at a former period not been specifically different, a definition of the term "species" based upon evolution must leave the line of extinct ancestors altogether out of consideration.

3. As the theory of evolution further implies that a species can in the course of time develop into one or more descendant species, the term "species" rigorously applied must be restricted to contemporary individuals. Hence the definition of the term "species" as designating a certain kind, and always the same kind, of diversity throughout animated nature, has to be arrived at by comparing the divergency of coexistent types.

4. The theory of creation explains the diversity in animated nature by assuming that every species from the time of its special creation to its extinction is a unit separate from every other unit; allied species have never been and will never be the same. The theory of evolution, abandoning special creation of each species, puts in its place divergent development from a common form, but to explain the actually existing great discrepancy in nature must assume, like the theory of creation, that when a certain degree of divergency is attained the form of animal or plant exhibiting this divergency can never become one with any other form. This degree of divergency stands in the same contraposition to all lower degrees of

development, which allow a fusion of the respective forms, as the negative does to the affirmative, and therefore is different from the lower degrees of development not only as to degree, but also as to kind.

5. From the fourth point it follows that if specific difference means a difference of kind, not only of degree, the chief criterion of specific distinctness of a given form of animal or plant is the impossibility of fusion with other forms.

Hence we have to accept the following definition of the term "species":—

A species is a group of individuals which is differentiated from all other contemporary groups by one or more characters, and of which the descendants which are fully qualified for propagation form again under all conditions of life one or more groups of individuals differentiated from the descendants of all other groups by one or more characters.

The reasons why we do not accept one of the definitions of species as given by other authors are best stated by shortly discussing the definitions of Eimer, Romanes, and Wallace.

I. Eimer's definition * is a purely physiological one:—

"Species are groups of individuals which are so modified that sexual intercourse does no longer take place between them and other groups, or that successful intercourse is not unlimitedly possible."

Apart from the criteria of the term "species" in this definition being negative, we cannot accept the definition simply because it is not a definition in consequence of its allowing us a *choice* between two different criteria. Let us discuss these criteria separately:—

1. "Species are groups of individuals which are so modified that sexual intercourse does no longer take place."

According to this definition the prevention of intercrossing is a consequence of the modification of the groups of individuals. From several sides attention has been drawn to the occurrence of psychological selection among the individuals of the same species, especially among specimens belonging to varieties of domesticated animals. As in these cases intercrossing does not take place on account of a dislike of the respective varieties, *i.e.* as the prevention of intercrossing is a consequence of the modification of a species into varieties, these varieties would conform to Eimer's definition, and therefore would have to be considered as distinct species.

2. "Species are groups of individuals which are so modified that successful sexual intercourse is not unlimitedly possible."

In the second part of his studies on Papilios † Eimer claims priority over Romanes as to the principal idea upon which Romanes based his theory of Physiological Selection. The chief premiss of this theory is the occurrence of such a variation among the individuals of the same species that a group of specimens does not only not cross with the rest of the individuals on account of dislike, but is infertile or restrictedly fertile with them, whereas the specimens of that group are *inter se* completely fertile. If such a physiological variation occurs, and there is no reason why it should not occur, that group of individuals would constitute a species according to Eimer's definition, in spite of the absence of morphological distinguishing characters, and in spite of the offspring of the physiological variety belonging partly to the

* Eimer, *Arthildung und Verwandtschaft bei Schmetterlingen*, 1889, p. 16. Romanes, in ***Darwin and After Darwin***, 1895 p. 229, says that the "purely physiological definition is not nowadays entertained by any naturalist."

† Eimer, *Arthildung und Verwandtschaft bei Schmetterlingen* II. Jena, 1895, p. 14.

normal form of the species. Even if the physiological difference is accompanied by a morphological difference, the variety cannot be considered a species as long as some of its offspring are of the normal form; *A* and *B* are not specifically distinct as long as *A* produces *B*, and *B* produces *A*.

II. Romanes's definition * is as follows:—

"A group of individuals which, however many characters they share with other individuals, agree in presenting one or more characters of a peculiar and hereditary kind, with some certain degree of distinctness."

This definition, if the words "and hereditary" were left out, would be based solely upon the presence of morphological difference. "Evolutionists," says Romanes, "have more and more grown to lay stress on the hereditary character of such peculiarities as they select for diagnostic features of specific distinctness. Indeed it is not too much to say that, at the present time, evolutionists in general recognise this character as, theoretically, indispensable to the constitution of a species." † Our objection against the word "hereditary," which does not "supply exactly that objective and rigid criterion of specific distinctness" which we necessarily require, is twofold:—

1. There are characters of an hereditary kind which are not specific. Indeed many of those peculiarities of individual varieties which regularly appear in every brood are hereditary, but do not make the individuals which exhibit them specifically distinct. Among the individuals of *Papilio sarpedon*,‡ to give an illustration, appear specimens (in New Britain regularly) which have one or two additional green spots on the forewing; in specimens from the Solomon Islands additional green spots are always present; as for certain reasons we consider *Papilio sarpedon* to be the descendant of a species with a greater number of markings than *sarpedon* now has, the presence of such additional markings we have to explain by the assumption that these markings are inherited from the ancestors. We observe here restricted inheritance of a peculiar character in the individuals from various parts of the Indo-Australian regions, and constant inheritance of that character on the Solomon Islands. Notwithstanding that it is an hereditary character which distinguishes the respective individuals, these specimens are not specifically distinct from those individuals which are devoid of that character.

2. Specific characters are not unrestrictedly hereditary. It is a well-known fact that the various forms of some polymorphic species of butterflies are so distributed that the species is polymorphic in one, monomorphic in other districts. *Papilio aegeus* has a number of different *female*-forms in New Guinea, the Aru and Key Islands, while in Australia there is only one kind of *female*. *Papilio clytia* is remarkably dimorphic in India in both sexes—the varieties are called *clytia*-form and

* Romanes, *Darwin and After Darwin* II. 1895. p. 231.

† *Ibid.*

‡ In this article I have given the names of species and varieties without adding the "author" for two reasons. (1) The original meaning of a name has mostly changed, its application having become restricted or extended. The reference to the original author, therefore, would give us quite an erroneous idea about the extent in which the name is used in this article. Various writers apply the same name with the same original author to different forms of *Lepidoptera*; hence it is necessary, in order to avoid confusion, to say precisely in which sense a name is here made use of. (2) As it is the contents of a name and not the name I have to deal with, the mere annexation of an author's name to the specific or varietal name would not convey to the reader any idea about the meaning of the name; it is, therefore, necessary to give a reference to a book where the respective form has been figured or sufficiently described. Instead of giving the reference behind each name, I annex to this article, for the sake of simplicity, an alphabetical list of the species and varieties with the necessary references.

dissimilis-form—while on the Andaman Islands only a *dissimilis*-form and on the Philippines only a *clytia*-form occurs; both the Andaman and the Philippine monomorphic insects are not specifically distinct from the Indian dimorphic insect. The nearest ally of *Papilio clytia* is the very variable *Papilio paradoxus*.* If we assume that the Andaman and Philippine insects are the descendants of the Indian dimorphic *clytia*, or the latter the descendant of the former, or all three the descendants of a common ancestor, it is evident that the characters by which formerly (before the separation into three geographical races) the species was distinguished from *paradoxus* are not the same as those by which all forms from the three localities together (which forms now constitute the species) are at present distinguished from *paradoxus*.

We may add a few more illustrations from other well-known butterflies. The large Papuan butterflies usually called *Ornithoptera* are in the *male* sex of an orange, green, or blue colour. For the sake of argument let us assume that the green *priamus*, orange *croesus* and *lydius*, and blue *urvillianus* were derived from a common ancestor which had an orange *male*. The nearest ally is *O. tithonus*, which has a green *male*. In the diagnosis of the green ancestral forms of *tithonus* the difference in colour between it and the orange ally would have been a specific difference; the recent *tithonus* cannot be differentiated from *priamus* by the shade of colour, as both insects are green. This one specific character has not remained a specific character in *tithonus*, though perhaps the ancestral *tithonus* and the recent one are identical in colour, and though the character itself, therefore, has proved to be hereditary; on the other side, that one distinguishing character of the orange ancestor of *priamus*, *croesus*, *lydius*, and *urvillianus* has been inherited only by *lydius* and *croesus*, not by *priamus* and *urvillianus*, and therefore has proved to be only restrictedly hereditary.

One of the characters by which *Papilio eurypylus* is distinguished, for instance, from *P. sarpedon*, is the position and extent of the red costal mark on the underside of the hindwing. This mark is in *eurypylus* a small red spot before the costal nervure, while in *sarpedon* the spot is extended beyond the costal to the subcostal nervure. Quite recently Mr. Walter Rothschild received a series of specimens of *P. eurypylus* from the Kei Islands,† among which is one that has the red mark extended to the subcostal vein. The extent of this spot, which until now was a specific character of *eurypylus*, is no longer of specific value, and cannot serve to distinguish *eurypylus* from *sarpedon* or *macfarlanei*: in respect to the latter two species the form of the spot is hereditary, but no longer specific; in respect to *eurypylus* it is not unrestrictedly hereditary, and also no longer of specific value. Now, if it should happen that all specimens of *eurypylus* acquired the extended red mark and became at the same time in other characters still more different from *sarpedon* and *macfarlanei*, would then *eurypylus*, *sarpedon*, and *macfarlanei* of our days not be specifically different, because their offspring exhibited other distinguishing characters?

The objection against the use of the word "hereditary" in the definition of the term "species" which we have here raised is based immediately upon the assumption of the transmutation of species and their components (varieties). The species *A* and *B*, to put it figuratively, may have as specific characters *a* and *b* respectively; in the

* *Papilio echidna* from the lesser Sunda Islands is a *dissimilis*-form, but is perhaps specifically distinct; I do not take this insect into account here.

† Collected by Captain Cayley Webster. The importance of the record of individual aberrations is here again evident.

course of time, which need not be long, the species A and B develop into A^1 and B^1, with the characters a^1 and b^1 respectively; this change in characters may perhaps be due to the respective areas occupied by the species being suddenly extended or restricted. The characters a and b are, therefore, not inherited by A^1 and B^1; but A and B (and A^1 and B^1) are nevertheless specifically distinct.

III. Wallace's definition of the term "species" * is a combination of definitions I. and II., with the addition that the specific characters are of an *adaptive* kind. As the objections raised under I. and II. apply also to Wallace's definition, we can restrict our remarks to a short discussion of that latter point. As a species is not only opposed to every other species, but is also to be distinguished from variety, the definition of the term "species" must be a guide for the distinction of species from variety. The kind of characters, therefore, to be mentioned in the definition must exclusively be distinctive of species; a certain quality alleged to be required to make a group of individuals specifically distinct must not be a quality that distinguishes variety from variety. The question is, therefore, are there varieties (as opposed to species) the distinguishing characters of which are adaptive? The theory of Natural Selection, so much supported by Wallace, gives an affirmative answer. All the varieties which are selected as the fittest are varieties with special adaptive characters. If we accept Natural Selection as a factor in evolution, we have consequently to concede that both species and varieties are "adapted to slightly different conditions of life." Hence it is evident that Wallace's definition of the term "species" includes a quality which is not exclusively specific, but applies also to the term "variety," and that we have to cancel altogether the restriction that specific characters are of an adaptive kind.

The principal objection here raised against those three definitions, which may be taken as fairly representing the various views of modern authors, is that the definitions, even when accepted as giving the general distinction between any two species, do not furnish us with a general criterion between species and varieties. This sounds baroque, but is a fact. There are varieties (as opposed to "species") which do no longer have sexual intercourse with the other individuals of the same species, and we must also assume that sometimes such an intercourse is not possible; there are varieties which exhibit hereditary distinguishing characters; and there are also varieties with adaptive distinguishing characters. The consequence of accepting a definition of the term "species" which does not exclude every kind of variety (*varietas* as opposed to *species*) leads naturally to the conclusion that there is no real distinction between "species" and "variety," and that it is purely conventional whether we call a form species or variety, an opinion by no means rarely met with even amongst us species-makers. For example, Butler says: † "For some years past I have held the view that what is generally understood by the term "species" (that is to say, a well-defined, distinct, and constant type, having no near allies) is non-existent in *Lepidoptera*, and that the nearest approach to it in this order is a constant, though but slightly differing, race or local form—that genera, in fact, consist wholly of a gradational series of such forms."

According to our definition there is, however, a real distinction between the

* *Darwinism* 1889. p. 167.

† *Ann. Mag. N. H.* (5). XIX. p. 103. It is easily perceivable from Dr. Butler's work on *Lepidoptera*, for instance from his revision of a group of butterflies called *Euploeinae*, that what Butler regards above as "species" is subspecies or geographical variety, the gradational series of which constitute the "species," and that his "genus" is the species.

terms "species" and "variety," a distinction which indeed everybody silently accepts who considers the enormous numbers of different forms of animals and plants to be the outcome of divergent development, and expresses this development by the conventional figurative tree. If the specimens represented by any given portion of a branch of this tree were so constructed that under favourable circumstances they would be identical with the specimens represented by a portion of another branch, *i.e.* if any two branches could, and can, long after the common origin, merge together, then branch off again, merge together again, and so on, it would be preposterous to assume that this should never have happened. But if we thus should have to concede the possibility that the lines of ancestors of any two forms of plants or animals, say of the lion and the giraffe, were such that they first became widely divergent, then identical, then again widely divergent, not only the figurative tree, but also the kind of evolution it is meant to illustrate, would be pure nonsense. Therefore we take it that we are actually agreed upon that part of our definition which says that from a certain point a branch of the tree *cannot* merge together again with any other branch ; now, if we call every form which has reached this degree of development *specifically* distinct, we have an absolute distinction between species and the lower degrees of development.

The question of specific distinctness or non-distinctness is therefore twofold : first one of morphological, and second one of physiological difference. As the systematist is practically not able to test by experiment the presence of the second distinction, it is obvious that he never can *prove* with *certainty* from the specimens alone whether the distinguishing morphological characters they exhibit are of specific value or not. However, we are able to arrive at a probably correct conclusion without testing in each case the specific distinctness, if we take into account the way in which divarication of species comes about, and if we further compare the characters of such forms as have been tested to be specifically distinct.

For our present purposes it is quite irrelevant whether the causes of the transmutation and divarication of species are those factors which are maintained by the Neo-Darwinians to be the sole agents, or those which the Neo-Lamarckians consider to be alone effective. Hence we shall abstain from any discussion of the much contested final causes of divergent development, and shall simply ask, which is the way that leads from variability of a species to divarication of this species into more species? Our purpose allows us to simplify the question still more and to restrict the discussion to the two points: first, can a species develop into two (or more) species without isolation? secondly, can isolation as such transmute one species into two (or more)?

The most extreme kind of variability of a species logically possible is that in which the varieties composing the species are not only morphologically but also physiologically different. As upon the occurrence of such variation Romanes's theory of Physiological Selection, which we have had to allude to several times, is founded, we may be allowed to annex our notes to a short discussion of this theory as far as it bears upon our particular question.

In order to explain the infertility or restricted fertility between different species Romanes assumes that the divarication of one species into more species has something to do with the occurrence of such a variation that some individuals of a given species are not fertile with the rest of the species, but are fully fertile *inter se*. That variety, though living in the same district as the normal form of the species, will develop divergently, according to the theory, and give rise to a new species, as it

is physiologically so separated from the normal individuals that intercrossing is excluded. Is this conclusion correct ?

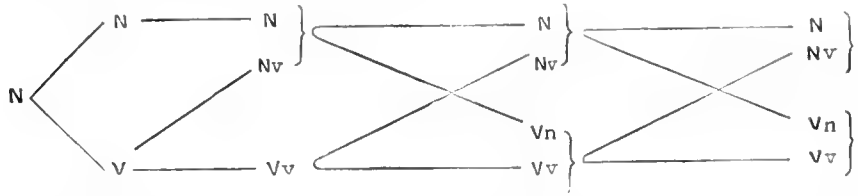
We have seen above that aberrational individuals occur again and again among the normal specimens; if therefore a physiological variety such as Romanes's theory demands occurs once, a species is able to produce it again and again, as long as the circumstances under which the species lives do not change. But to make the case as favourable as possible we will assume that the normal individuals, which may be designated as *N*, gave birth to the variety *V* only once, so that if all the specimens of the variety were killed the variety would never reappear. Now, the offspring of the variety *V* will in the first and following broods belong either all to the variety *V*, or partly to the variety *V* and partly to the normal form *N*. The first assumption nobody can admit to occur, as this would mean that *V* is a species suddenly branched off from *N*, and as further we should have, instead of the explanation of the phenomenon of sterility between species which it is the aim of the theory to give, merely the statement that species *V* has sprung up among the individuals of species *N* with which it is infertile. Hence we have to do only with the second case, that part of the offspring of *V*, at least part of the first brood after the origin of *V*, belong to *N*; these offspring of *V* we will designate *Nv* in order to indicate that, though they are normal, they are the immediate descendants of parents with varietal characters. *Nv* cross *inter se* and with *N*, not with *V*; which characters will the offspring of *Nv* have, which itself, we repeat it, is the descendant of *V*? The offspring of *Nv* could be either all identical with *Nv* (=*N*), or partly identical with *Nv* and partly with *V*. The first alternative means that each specimen of *V* produces two groups of individuals, *Vv* and *Nv*, of which one group (*Nv*) never will give rise to a form similar to its parent-form *V*, while the other group (*Vv*) produces both the parent- and grandparent-form. Although the assumption here made, that some of the offspring of one specimen breed perfectly true (*Nv*), while the other offspring do not breed true, is quite at variance with our experience, and therefore not acceptable to any naturalist, we will nevertheless accept the assumption for the sake of argument. As *V* breeds in and in, according to that assumption, it is argued that in the course of time *V* will become so modified that it will also breed true like *N* and then be specifically distinct. Apart from *Nv* and *V* here being already two species from the beginning, one (*Nv*) breeding true, the other (*V*) producing *per saltum* in every generation some specimens of *Nv*, an illustration will show at once that before the above-mentioned modification is effected the variety *V* will altogether be swamped away. Let us assume (1) that in an isolated district two hundred specimens of a certain species (one hundred of each sex) could find subsistence; (2) that each *female* would produce ten *females* and ten *males*; (3) that at a given time one-tenth of the specimens conformed to the variety *V*, *i.e.* were sterile with the other nine-tenths (*N*), but fertile *inter se*; and (4) that 80 per cent. of the offspring of *V* belonged to *V*, the other 20 per cent. to *N*, which breeds true,—for convenience we shall take into account only the *females*,—the numbers of the forms *N* and *V* in the successive broods would be as follows :—

	i.	ii.	iii.	iv.	. . . .
N ♀	90	92	94	95	.
V ♀	10	8	6	5	. .

We see that the number of specimens of *V* diminishes, and that extinction of

V must soon be the result, if at the first appearance of *V* the number of individuals of this variety was not very great. With every successive brood the percentage of varietal specimens produced by *V* will become higher, and to make up for this we have assumed that the very first specimens of *V* produced already 80 per cent. of the varietal form.

There remains now only the second alternative, that *Nv* as the descendant of *V* produces both *V* and *N*, which agrees with what we know of the propagation of varieties which occur among normal specimens, and hence is the only acceptable alternative. The offspring *Vn* of *Nv* crossing with *V* will bring the blood of *Nv* and *N*, which interbreed, into *V*, just as *Nv* (as the offspring of *V*) brings the blood of *V* into *N*, and this would go on as long as *V* and *N* exist together in the same locality. Though *N* and *V* are mutually sterile, the blood of *N* comes into *V* by means of *Vn*, and the blood of *V* into *N* by means of *Nv*; this *indirect intercrossing* will completely annihilate the effect of the assumed mutual sterility of *N* and *V*. The following diagram will serve to illustrate these lines:—



It can easily be shown that after a certain time *N* and *V* will occur in equal numbers.*

The physiological selection will, therefore, in no case result in divarication of a species into two, but the outcome of the physiological variation will be either dimorphism of the species, when both the normal and the varietal form are equally favoured in respect to the circumstances of life, or extinction of that form which is the least favoured. If however the most favourable kind of variation does not lead to the origin of a new species beside the parent one, no other variation will lead to this end. Hence we must conclude that a divarication of a species into two or more species cannot come about so long as the divergent varieties live so together that a direct or indirect intercrossing is not prevented.

Having thus disposed of the possibility of the divarication of species without the help of some kind of local separation, we have to consider the other question: whether local separation as such can be able to give origin to a variety and to transform a variety into a species. The theory of isolation as promoted by Wagner says that the peculiar characters of some isolated specimens will by breeding in and in finally be transmitted to all the descendants of those specimens, and their degree of divergency become in the course of time so much higher that these descendants represent a new species.

Experiments teach us that aberrant specimens of a species occurring amongst the normal specimens produce, when crossed together, offspring which partly are of the normal, partly of the varietal form of the species; from black specimens of the moths *Amphidasis betularius* and *Liparis monacha* are obtained both black and white individuals. To make the circumstances most favourable for the eventual

* Murphy, *Habit and Intelligence*, London, 1879, p. 241.

divergent development of the variety we will assume (1) that a number of varietal specimens are *completely* isolated from the rest of the species ; (2) that 80 per cent. of the offspring of these specimens belong to the varietal form. The specimens now have to propagate under the further premiss (3) that the normal and the varietal forms exist under exactly the same conditions of life, so that every other transmuting factor besides mechanical isolation is excluded. By mechanical isolation we understand a separation of the animals or plants in question by a mechanical barrier, so that an intercrossing with the original stock is prevented; experimentally the case could be demonstrated by rearing wingless animals side by side, but separated by an adequate fence. Under the above premisses ten *females* of a variety, each producing twenty *females*, kept in an enclosure representing the isolated locality, would give birth to a hundred and sixty *females* of the varietal (*V*) and forty of the normal form (*N*). If the latter produce also each twenty *females*, of which 80 per cent. might be taken as normal and 20 per cent. as varietal, and if the locality is fit to provide food for a thousand *females* (and a thousand *males*, which are not taken into account), the numbers of both forms would in the succeeding broods be as follows :—

	i.	ii.	iii.	iv.	v.
N	—	40	320	392	435
V	10	160	680	608	565

The result is here again that after a small number of broods both the varietal and normal forms will exist in equal numbers in the isolated district. The varietal form can never become the sole inhabitant of that district unless the circumstances of life are such that the normal form is less favoured by them, *i.e.* unless there is some transmuting factor active besides isolation. Isolation as such is not an active factor which produces a character, but is a factor which merely preserves a character produced by some other factor; isolation has, therefore, no direct effect. The reason that the effect of isolation has by many authors been so much overestimated is so obvious that we scarcely need mention it : the differences exhibited by geographically isolated forms of the same species are often attributed to the direct effect of isolation, because isolation and morphological difference were seen to be always associated, while no other transmuting factor seemed to be obvious to those who were unacquainted with the experiments made in this direction. Apart from experiments, there are many geographical races which, on closer examination, show at once that their characters cannot be the outcome of the isolation of some ancestral specimens which accidentally exhibited the respective distinguishing character. Wallace * was the first to draw attention to a peculiarity common to a great many species of butterflies on the island of Celebes : these species or varieties have much longer and more falcate forewings than the races from the other islands of the Indo-Australian region. On the island of Sumba, which lies south of Flores, that character is also found in some species. The Chinese races of butterflies and moths have generally the black colour more extended than the respective Indian races. The butterflies and moths of Sumatra and Borneo † are mostly much darker than the races of the same species from Malacca and Java. The Queenslandian races are often pale, those from the Kei Islands have the markings often restricted, and so on.

* *Proc. Linn. Soc. Lond.* XXV. p. 18.

† Hagen, *Iris* 1894. p. 17.

Characters like these, common to a multitude of racial forms living in one isolated district, cannot be accounted for by a direct effect of isolation : it would be almost ridiculous to assume that the first specimens of a great number of species which came to Celebes had all long and falcate wings, while the specimens dispersed over the neighbouring groups of islands had short wings ; or that the first specimens which came to Sumatra and Borneo were dark, while the individuals of the same species which migrated to Java were in so many cases less black.

We now have seen that the geographical isolation of aberrant specimens has not been and is not the means of the divarication of species, and that the effect of the transmuting factors acting upon the specimens of a species within the same locality is at the highest marked polymorphism ; therefore there is only one way possible by which the divarication of a species into two or more can come about—that is, the combination of isolation and transmuting factors. *The isolation of one or more* (Neo-Darwinian and Neo-Lamarckian) *factors* is the means by which the specimens of a species which are subjected to these isolated factors, whichever they may be, become different from those specimens which stand under other influences, no matter whether the first specimens which became isolated as to the transmuting factors were normal or aberrational. This assumption corresponds completely with the result of experiments, and explains all the peculiarities in the characters of geographical races and representative species. And we shall see in the third part of this paper that there are instances in which the geographical isolation can be very incomplete, and in which, nevertheless, the divergent development will lead to specific distinctness of the biologically isolated specimens.

The geographical races thus produced we must assume to be first inconstant, to become more and more constant and divergent by the incessant influence of the transmuting factors, and to develop finally into a form which is so modified that it never will fuse either with the parent-form or the sister-forms, and that it therefore agrees with the definition of the term "species."

As this kind of divarication of species is the only possible * one, and hence geographical polymorphism of a species the beginning of the ramification into more species, the study of localised varieties is of the greatest importance in respect to the theory of evolution ; the study of geographical races, or subspecies, or incipient species, is a study of the origin of species. The meaning of the term "subspecies," † nowadays generally applied to geographical or localised forms, is evolutionistic, and, in fact, the only evolutionistic idea which has penetrated into that work of systematists which is purely diagnostic. Every scientist who pretends to be an evolutionist must perceive the importance of subspecies. Whoever persistently ignores the existence of subspecific characters ought to have the courage which I admire in Charles Oberthür—great courage it certainly requires to defend a standpoint against the bulk of naturalists—to define the species as a created entity.

Eimer, *Artbildung und Verwandtschaft bei Schmetterlingen*, gives beautiful examples of the various degrees of divergency of localised varieties. Whether only one or a few specimens exhibit in a given locality a character not found elsewhere ; whether a greater number of individuals in a certain district are characterised by a

* It is scarcely necessary to add that the area to which a certain transmuting factor is restricted need not be a political or physiographical district.

† This term had already been applied to geographical races before the appearance of Darwin's *Origin of Species*.

peculiarity not met with, or rarely met with, in other districts; whether all the localised specimens are different from the rest of the species; whether a localised variety is or is not connected with the other varieties by intergraduate specimens,—in every case the presence of a localised peculiarity indicates that the individuals inhabiting the respective locality are on the way to develop divergently in consequence of some biological peculiarity of the locality. All these degrees of divergency are distinguished from that higher degree which we have taken as the criterion of specific distinctness by not conforming to the physiological part of our definition of species. By experiments it has been proved* that geographical forms lose their distinguishing characters and fuse together with other forms of the same species. Therefore, if all the coexistent specimens of a species were at our disposal, the definition of the term "subspecies" would be as follows:—

A subspecies is a localised group of individuals of a species the mean of the characters of which is different from the mean of the characters of all the other localised groups, and which will, under favourable circumstances, fuse together with other groups.

However, the material contained in collections is, compared with the actual number of specimens existing of each variety, extremely meagre, though nowadays systematists comprehend more and more that a few specimens of each species are insufficient for a serious study, and hence try to bring together long series from every locality. The conclusions, in respect to variation, which we draw from the inadequate material we have to work with, must necessarily often be erroneous. If, for example, our series shows a variation of a character (expressed in numbers) between twenty and fifty, there may, in fact, exist individuals which stand outside these limits. Rare varietal specimens, which hitherto have been found only in a certain locality, may very well occur elsewhere; a certain variety may appear to us more common in one locality than in another, and hence the mean of the characters in the first locality to be different from the mean in other localities, because a collector paid more attention to varietal specimens in the first locality. This imperfectness of our knowledge we have to take into account, and we must, therefore, restrict the application of the term "subspecies" in order to avoid deception as far as possible.

The above definition has not had regard to the degree of divergency attained by the localised form. Now, we ask, which then is the lower limit of application of the term "subspecies"? The diversity which the sexes exhibit in respect to localised variation gives us the answer. We know a good many cases in which the *males* are in various districts not distinguishable, while the *females* are very different, and cases in which the variation takes place in the *male* sex and not in the *female* sex. For illustration we refer to the following insects: *Papilio semperi*, from the Philippine Islands, varies in the *female* sex according to locality, while the *males* from the various islands, in spite of individual variability, are not distinguishable; *Papilio oenomaus*, from Timor and Wetter, is on these two islands the same in the *male* sex, while the *females* are conspicuously different; and so it is with *Papilio phestus*, from New Britain, New Ireland, and the Solomon Islands. If we apply in these cases, the importance of which we shall soon endeavour to show, the term "subspecies," we have a rule which can guide us in all other cases—namely, as the numbers of specimens of each sex can be taken as being (roughly) equal, we shall have to use the term "subspecies" when a localised variation is such that about half

* Kerner *Gute und Schlechte Arten*; Weismann *Studien zur Descendenztheorie*.

of the individuals belong to the varietal form. All lower degrees of localised variation may be termed "localised aberration" (ab. loc. = *aberratio alicuius loci*).*

We have already referred to some observations which show that localised divergent development is going on under our eyes. There are certainly species which are at present stationary, and perhaps have been so for a long time; but so much is certain that nearly all the species which have a wider distribution (except a number of "globe-trotters") exhibit some kind of local variation, and that, therefore, since local variation is the beginning of the divarication of a species into more species, the more widely distributed species are at the present period actually in a state of divergent development. We have examined a great many *Lepidoptera*, both butterflies and moths, in regard to this question, and find that there are very few species which are not split up into geographical races, although the differences between the subspecies are often extremely minute. The degree of divergency depends especially on the sensibility of the species in respect to the transmuting factors, and on the degree of isolation and intensity of the latter, as well as on the degree of geographical isolation. Wingless animals, and plants without means of dispersal, are generally more easily affected and on smaller areas than animals and plants with good means of dispersal. Wingless beetles, for example, such as *Carabus*, vary enormously according to locality; in the Alps, for instance, there are a great many subspecies of *Carabus* each confined often to one mountain.

The number of subspecies into which the Indo-Australian *Papilios* have developed is very great,† and, when studying these insects, we were surprised to find that, in opposition to the general view, not the *males* but the *females* appear to be the first affected by localised transmuting factors. In *all* cases, without exception, where the distinguishing characters of a subspecies are found only in one sex, it is the *female* and not the *male* which exhibits them; and further, in those subspecies which are obviously different in all specimens of one sex, slightly or even only occasionally different in the other sex, it is again the *female* that is the more aberrant sex. If we further take into account the *local aberrations* as far as they constantly and commonly appear among the normal specimens, we have thirty-six cases among the Indo-Australian Papilios in which the localised variation is entirely or almost entirely restricted to the *female* sex, while there is not a single subspecies which is in the *male* much more different from the allies than in the *female*. In seasonal forms of Papilios the *females* again exhibit a greater amount of divergency than the *males*, a phenomenon which is strikingly illustrated by the Japanese *Papilio machaon hippocrates*. The variability is in the *females* of the Indo-Australian Papilios altogether greater than in the *males*, or, to express it biologically, the *females* are more easily affected by the causes of variation than the other sex. If localised variation is the beginning of the divarication of a species into more species, and we have seen that this is the only possible way by which divarication can come about, those phenomena, which relate especially to pattern, admit no other explanation than that, at least in all cases where the localised variation is restricted, or nearly so, to the *females*, the transmutation of the species begins in the *female* sex, and that, therefore, the *female* is in advance of the *male* in respect of the development into new species. Eimer and Fickert in their studies on the Papilios come to the opposite result; and that is, we think, due to their assumption that the original pattern of the wings of Papilios consisted of "longitudinal" bands

* See this journal, 1895. p. 180.

† See Rothschild, Nov. Zool. 1895. p. 463.

standing at right angles to the veins ; if Eimer had assumed that the original pattern of the wings consisted of "longitudinal" bands running in the direction of the veins,* he would have arrived at a "preponderance" of the *female* sex.

The degree of divergency is, in many subspecies, so minute that the peculiarity would escape even a skilled eye but for a carefully working systematist having drawn attention to it, and having fixed, so to say, the minute peculiar character by naming the subspecies. Romanes has severally referred to minute specific characters in order to confute Wallace's opinion that all specific characters are useful; as specific characters are only higher degrees of development of subspecific characters, the question whether subspecific characters have originated and are accumulated by Natural Selection is no less important than the same question in respect to specific characters. Dixon † and Allen ‡ give ample illustrations of the question as regards birds. Of *Lepidoptera* we mention, out of hundreds of cases, only two: *Papilio nomius* has a western subspecies (Ceylon to Assam) and an eastern subspecies (Burma, Tenasserim, Tonkin, Hainan) which are *constantly* differentiated by one minute character, namely a brown line situate in the eastern form on the praecostal vein on the underside of the hindwing, which short and thin line is absent from the specimens of the western subspecies ; that this distinguishing character is indeed minute will be admitted if we add that, though it is the only constant difference of the two subspecies we can find, it has never been mentioned by any specialist until 1895, in Mr. Walter Rothschild's Revision of the Eastern Papilios.§ *Papilio agamemnon argynnus* from the Kei Islands and *P. agamemnon neopommeranius* from Neu-Pommern differ from all the other subspecies of *agamemnon* in the hindwings being above nearly devoid of markings, which renders the two subspecies extremely similar ; but there is one constant character, which can easily be perceived with the help of a lens, that distinguishes *neopommeranius* and *argynnus* : in *neopommeranius* the spots of the median row of the forewing beneath are scaled all over, while in *argynnus* the outer portion of each spot is scaleless. Though nobody can very well entertain the opinion that such differences are due to the direct action of Natural Selection, one can evade the weight of the minute distinguishing characters by the assumption that these minute characters are correlated to some other, unknown, character which is of a useful kind. *Lepidoptera*, however, furnish us with the means to repudiate this evasive answer. All those species which are said to be mimetic, and which have been quoted again and again as excellent illustrations of the marvellous effect of Natural Selection, have certain characters of colour or form which are attributed to the direct (not indirect) influence of Natural Selection. Now, if such a character varies geographically in the mimetic species and at the same locality in the imitated species by minute degrees, the minute difference between the geographical forms of the mimetic species ought logically also to be attributed to the direct action of Natural Selection. Such cases are, however, not rare among insects. We refer, for the sake of illustration, to one of the most striking examples of mimetic adaptation. *Papilio caunus* of the Malayan region has a style of marking quite unusual for a *Papilio*, and resembles another, nauseous, butterfly, *Euploea rhadamanthus*, to a surprising

* According to Eimer, the costae and rows of punctures on the elytra of beetles are transverse, while the bands (of *Cerambycidae*, *Cantharidae*, etc.) which stand at right angles to those rows, and which are often continuations of the transverse bands of the sterna and abdomen, must be called longitudinal.

† *Evolution without Natural Selection*, London, 1885.

‡ *On the Mammals and Winter Birds of East Florida*, in *Bull. Mus. Comp. Zool.* II. 1871.

§ Nov. Zool. 1895. p. 422.

degree. The three Malayan subspecies of *Papilio caunus*, inhabiting the first Malacca and Sumatra, the second Borneo, and the third Java, differ from one another by closer examination in the size of the white markings; the differences are, however, so slight that they do not affect the general aspect of the specimens; in fact, the Java *caunus* resembles the Bornean *rhadamanthus* just as much as the Bornean *caunus* does. The difference between the three *caunus*-forms are certainly not such that if the differences were altogether absent the specimens would be less protected; there are, to be sure, very few cases of mimicry in which the resemblance of the mimetic and imitated species is greater than that of any of the three *caunus*-forms with any of the three *rhadamanthus*-forms. If, therefore, mimicry is of value to the imitating species in all cases where the resemblance is of a much more superficial kind, we cannot see why it was necessary at all to have the white markings of the Borneo *caunus*, compared with the Malacca and Java *caunus*, a little reduced. Further, though the resemblance between the species in question is very great, there are still differences in markings between the mimetic and the imitating species in each locality which are greater than the differences between the three *caunus*-forms. It certainly requires a great deal of faith in the omnipotency of Natural Selection to believe that the slight reduction of the white markings in the Borneo form of *Papilio caunus* is due to a survival of those specimens of *caunus* in which the white markings were a little smaller than usual; the enemies of *caunus* to which we attribute the execution of the selection then must have been possessed of a much keener power of discrimination of markings than the entomologists who, until the appearance of Mr. Walter Rothschild's Revision of the Eastern Papilios, treated the Bornean *caunus* as identical with the Java *caunus* as figured by Westwood! If we, however, admit that the slight distinguishing characters of the three Malayan *caunus*-forms cannot possibly be due to the action of Natural Selection, but must be the effect of some other transmuting factor, it is evident that also in all other cases of minute distinguishing characters we need not refer to Natural Selection as the cause of the minute difference. The presence of minute distinguishing characters allows, therefore, a restriction of the possible causes of the divergency of the respective forms; and, as we thus have to admit the importance of insignificant distinctions in respect to evolution, it will be obvious that the importance increases as the degree of distinctness decreases.

We have said above that we take as the lower limit of the application of the term "subspecies" such cases in which about half of the individuals are characterised by some peculiarity: which is the upper limit? or, when have we to begin to call a form specifically distinct? According to our definitions of the terms "species" and "subspecies," the distinction between subspecies and species is a biological one, the presence of which, as mentioned on p. 442, we systematists are not able to directly prove or disprove from the material we are working with. As we know now from experiments and careful field observations that morphologically very different forms, connected or not by intergradations, can, in spite of the conspicuous differences, be one species (individual and seasonal polymorphism, heterogenesis, etc.), it is *a priori* evident that also geographically separated forms, in spite of their being morphologically distinct and in spite of their not being connected with one another by intergradations, can very well be subspecies of one species, *i.e.* can under favourable circumstances fuse into one form. The actual proof of specific distinctness the systematist as such cannot bring; we species-makers do, in fact, not pretend, at least many of us do not, that in every case the form which we pronounce to be

a species is really a species ; we work, or ought to work, with the mental reservation that the specific distinctness of our *species novae* deduced from morphological differences will be corroborated by biology (in the widest sense). The work a systematist has to do is twofold : above all, he is a registrar of facts observed upon the body of individuals, and secondly he has to draw conclusions from those facts.

All our knowledge of nature is based upon the knowledge of single phenomena. In Natural History the base of our knowledge is the individual : the characters of individuals and sums of individuals are the A B C of this science ; they are to the naturalist what words are to the philologer. To render the characters clear is the first task to be solved ; before this task is completed we are not able to draw correct conclusions. Although nowadays the recorder of facts, the diagnosticist, does not rank high in science, every theory in Natural History depends especially on the correctness of the facts furnished by the diagnosticist ; when that record lacks correctness the theory based upon it must break down. As an excellent illustration of this we may regard Weismann's theory* of "Phyletic Parallelism in Metamorphic Species," as far as it asserts the existence of an incongruity in the classification of *Lepidoptera* based on larval or based on imaginal characters. The "*Rhopalocera*" are by no means a sharply defined group in the imago state ; neither the erect position of the wing of the resting butterfly and the colour of the wings, nor the clubbed antennae, are characters applying to all "*Rhopalocera*" and exclusively to *Rhopalocera* ; and as there is no single character by which all the *Rhopalocera* are distinguished from all other *Lepidoptera*, we can also not expect that the larvae of *Rhopalocera* form a sharply defined group distinguished as a whole from all other Lepidopterous larvae. The apparent incongruity in the classification according to the larval or imaginal state of "*Bombycidae*" and "*Notodontidae*" again is not due to an incongruent development of larvae and imagines, but to the fact that Lepidopterists have placed in these (and other) families the most heterogeneous things in consequence of an entirely inadequate knowledge of the forms classified.

We learn from this illustration first that diagnostic work is the true basis of evolutionistic theories and hence of the highest importance, and secondly that the record of facts must be exact. Huxley says that the record of facts is not scientific if the facts do not permit of the drawing of general conclusions. In the above case the blame is much more on the side of the systematists who gave the clubbed antennae as distinguishing character of butterflies, than on the side of Weismann who accepted this statement as correct. If, therefore, diagnostic work is intended to meet the claim of furnishing facts from which general conclusions as to evolution (classification, variation, etc.) can safely be drawn, or if a diagnosticist claims to have his work regarded as scientific, it must be well distinguished between the description of the characters of individuals and the statement of an opinion deduced by the diagnosticist from the characters of the individuals ; the record of the characters of individuals, or the statement of facts, ought to precede the statement of the personal conclusion, which perhaps is entirely wrong. In the case of species and lower degrees of divergency diagnosticists mostly lose sight of this ; when we describe a number of individuals as belonging to a new species we present very often to the reader, not the characters of the specimens, but a ready-made conclusion which asserts (1) that the specimens are specifically identical, and (2) that the species varies in colour, markings, structure, and size to such and such an extent. The specific

* Weismann, *Studies in the Theory of Descent*, London, 1882. II. p. 132.

identity and the specific distinctness of the specimens are certainly our deduction, and the variation of the species thus erected is also ours. It is not rarely that one meets with diagnoses of species which give the average of some character of the individuals—for example, the average size—which perhaps is not found in any of the specimens measured, or if found may occur very rarely compared with the greater abundance of large and small individuals.* Most deceptive are those diagnoses which contain statements like these: "Colour brown to black; size 50 to 60 mm.; *habitat* India to New Guinea." In such diagnoses the facts are veiled, and we are easily deceived by taking the diagnosis as being the record of facts, while it is a mere statement of an opinion. The erroneous view expressed by Romanes † that geographical races are less abundant among animals than among plants, and Pagenstecher's view ‡ that moths do not vary to any extent according to locality, are the consequence of such deceptive statements on the side of the diagnosticists. The description of a species or variety, therefore, ought to be a pure statement of facts; as said above, the facts which the diagnosticist deals with are the characters of individuals: a pure statement of facts, with the exclusion of any statement arrived at by reasoning, we should have when the characters of the different individuals were recorded in such a way that from the description it would be plainly visible which characters belong to each single individual. When this is done, the statement of our opinion as to the specific identity of the specimens, the variation and distribution of the species, etc., cannot affect the facts, and, therefore, cannot do much harm, even if our opinion should be wrong. Hence we take it that the description of a species or variety being intended to be a statement of facts, not of conclusions, ought to be the description of one individual to the characters of which the different characters of other individuals are so annexed that a mistake as to which individual a respective character belongs cannot occur. That specimen round which the others are grouped in the description is the *type-specimen* of the description, and as the description is the description of the species or variety (as far as the individuals of the species or variety are known at the time), in the same sense as a figure of an individual is meant to represent the species or variety, that specimen is correctly called *type-specimen* of the species or variety respectively.

Besides the pure record of morphological facts, the diagnosticist has to draw inferences from the facts; and as the recorder of facts ought to know the facts best, the conclusions the diagnosticist arrives at ought to be generally correct if the method of reasoning is correct. The inferences which concern us here are such as to the specific or non-specific distinctness of groups of individuals, and hence we shall restrict our discussion to this kind of conclusions.

If we received a bird of Paradise with conspicuous ornamental feathers, even if the species were quite unknown to us, we should at once pronounce the specimen to be a *male*, though we know nothing about its having been a physiological *male*; and if the quills of the ornamental feathers were surrounded by a horny sheath, we should conclude that the individual was not yet in full plumage. As Dr. Martin has succeeded in breeding tailed and tailless *females* of *Papilio memnon* from the eggs of one *female* in Sumatra, we must conclude that also in other districts where the two *female* forms occur both can be produced by each of the two. What is found to be true in a number of cases we are bound to conclude to be true in all

* See Bateson & Brindley, *P. Z. S.* 1892. pp. 585 ff.
† *Darwin and After Darwin*, London, II. 1895. p. 209.
‡ *Jahrb. Ver. Nass.* 1896. p. 158.

similar cases. This inductive method of reasoning may often lead to wrong inferences, as the correctness of the latter depends first on the premiss that there are cases which are really proved to be true, and secondly that the cases which we believe to belong to the same category as those proved are really similar cases.

If we apply this to our question as to specific or non-specific distinctness, it is evident that the conclusion of the diagnosticist can be correct only under the condition that the specific or non-specific distinctness of some forms is proved by experiment, and that he is so well acquainted with the morphology of the forms in question that he can with great probability of correctness decide whether the required similarity is actual or superficial. If in a given group of forms the specific distinctness of any form is not proved, we have to resort to a proved case in an allied group of forms; of course, the more dissimilar the forms referred to for comparison are, the more it becomes probable that our inference is not correct. In most cases it is, therefore, circumstantial evidence we have to judge from, and, as many an innocent man has been condemned by a competent judge on the ground of circumstantial evidence, we cannot very well expect to be always right in our judgment of the specific value of the differences of forms. Though the special evidence furnished by morphology and biology is to be carefully considered in every single case, there are nevertheless some general arguments which apply to a multitude of cases. The question as to specific identity or non-identity concerns first forms which occupy the same area, or whose areas overlap, and secondly forms which inhabit localities separated from one another by districts that are not inhabited, or not inhabitable, by them.

We have above tried to show that a species can develop into more species only with the help of isolation of the varietal forms. If, therefore, two allied species are found to inhabit the same district, no matter whether the areas are totally or only partly the same, it is obvious that at a former period, when the species in question were not yet so far advanced in divergent development, they must have occupied separate areas. From the fact of cohabitation (in a wide sense) the further inference must necessarily be drawn that the possibility of cohabitation without fusion is due to the forms having become so divergent that they are indifferent to one another. The time which has elapsed since the two forms now living together became specifically different must therefore be much greater than that elapsed since the formation of the geographical representatives of those two species. If comparative anatomy and morphology are of any value as to the judgment of the phylogeny of species, the morphological differences between a species and an ally which branched off at an early period must be greater than the differences between the same species and its younger geographical representative species, and still greater than the differences between the geographical forms of the species. If in a given case we have to decide whether *A* and *B*, which live together, are two different species, or two forms of one species, the morphological characters of *A* compared with those of *B* and the geographical representatives of *B* will have to guide us in our judgment. There are three possibilities resulting from the comparison. First, the morphological differences between *A* and *B* are greater than those between *B* and its representatives; in this case *A* and *B* must be considered specifically distinct, until experiment proves the reverse. Secondly, the morphological differences between *A* and *B* are less great than those between *B* and any one of its representatives; in this case *A* and *B* are specifically identical. Thirdly, the differences between *A* and *B* are equal in morphological value to those between *B* and any one of its representatives;

in this case *A* has to be put in the same relation to *B* in which that respective representative stands to *B*, *i.e.* it must be considered either as specifically different or as specifically identical with *B*, according to the specific distinctness or non-distinctness of that representative.

The same kind of evidence we may employ when we have to come to a decision as to the specific distinctness of geographically separated forms which are not connected by intergradations. But when that evidence is not conclusive enough, we may have recourse to the evidence furnished by the variation of the forms. We must accept as a general law that forms which are connected by all intergradations, or forms which overlap in characters, are specifically identical ; geographical form, agreeing with this law are, therefore, to be accepted as specifically non-distinct. If we now compare the various organs of the species in respect to the effect which the causes of variation have upon them, we shall find that a number of characters are easily affected and show a variation between wide limits, while other characters remain comparatively constant. Organ *a* varies, for example, in species *A*, as far as we know at the time, from ten to a hundred, while organ *b* varies only from thirty to thirty-five. Now if it is proved that in a number of allied species a similar difference in respect to the variability of the organs *a* and *b* takes place, we can with great probability of correctness conclude that a form *B* similar to *A* is specifically distinct from *A* if the character of the organ *b* is far outside the range of variation observed in *A*, and, on the other hand, that *B* is a form of the species *A* if the character of the organ *b* comes within the limits of variation observed in *A*, no matter whether *A* and *B* are very similar or very dissimilar in respect to the variable character of the organ *a*.

As long as the special evidence does not force us to conclude otherwise, the diagnosticist has to go by the following two general rules :—

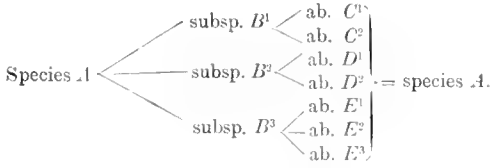
1. If is found that *A* and *B* stand in a certain relation to one another (sexes, aberrations, seasonal forms, subspecies, species), and that the allied forms *C* and *D* differ from one another in a similar way as *A* does from *B*, *C* and *D* have to be put into the same relation to each other in which *A* stands to *B*.

Illustration.—We know by breeding experiments that in Japan the spring brood of *Papilio sarpedon* is smaller and has a wider band than the summer broods ; in North India we find an insect very similar to the Japanese one, and observe that in April and May a form flies which is small and has a wide band, and that later in the year all the specimens belong to another form which is somewhat larger and has a narrower band ; as in Japan the smaller and the larger forms are proved to be seasonal forms of one species, we are logically bound to regard also the smaller and the larger forms in India as belonging to the spring and summer broods respectively of one species. A good number of allied *Papilios* show in India the same phenomenon ; specimens collected during the first half of the year are smaller and have wider bands than the specimens collected later on ; though it has not been proved by rearing that we have here actually to do with spring and summer forms, it would be illogical to regard the spring and summer specimens as specifically distinct.

2. If it is found that *A* and *B* stand in a certain relation to one another, which relation is either proved by experiment or arrived at by general reasoning, a specimen or specimens differing from *A* and *B* in a similar way as *A* does from *B* have to be considered as a third form *C* standing in the same relation to *A* and *B* as *A* does to *B*.

Illustration.—The islands of Sambawa, Alor, Wetter, Timor, Letti, the Tenimber Islands, North Australia, and the New Hebrides, are each inhabited by a subspecies of *Papilio canopus*; the subspecies differ from one another in the shape of the hindwing, and in the extent, presence, and partial absence of the wing-markings. Lately Mr. Rothschild received a specimen of *Papilio* from the island of Sumba differing from the Sambawa and the Alor forms of *canopus* in a similar way as these do from one another and from the Timor form, namely in the partial absence and in the extent of the markings. The only logically possible way, accepted by Mr. Rothschild, was to treat the Sumba specimen also as a form of *canopus*.

When the evidence leads to the conclusion that the differences exhibited by a number of specimens, or forms represented by specimens, are not specific, it is self-evident that the various forms belong to one species. This species, then, consists of a number of different varieties, every single individual of which, however aberrant it may be, represents the species, and every single peculiarity of any individual is a peculiarity of the species ; all the specimens of all the various forms taken together are " the species " as opposed to every other species. The diagnosis of this species, which must not be confounded with the description of the species, is therefore a diagnosis of a sum of varieties ; and as a diagnosis is analogous to the definition of a term, it must contain all the distinguishing characters common to all the specimens, and hence must apply to each single specimen. Besides the specific distinguishing characters each variety has one or more characters of its own which form the diagnosis of each respective variety. The discovery of a new variety, which was hitherto unknown on account of the incompleteness of our knowledge, or which has sprung up in consequence of the area of the species having recently become extended (*Pieris rapae* ab. loc. *novangliae*, for example), may necessitate an alteration of the diagnosis of the species to which the new variety belongs. As the forms diagnosticated for the sake of convenience are fixed by a name given to each of them, it is obvious that the only way logically possible to name a species and its subordinate components is to give a name of its own to the species, one to each subspecies as subordinate to the species, and one to each individual aberration as subordinate to the subspecies. Diagrammatically it can be illustrated thus :—



Every individual forms together with other individuals a group characterised by a peculiarity not met with in the rest of the individuals, which, therefore, form another group (or more), termed here *individual aberration* = *ab.* A number of individual aberrations are the components of a subspecies, and a number of subspecies the components of a species. Each specimen will require in this case a specific, a subspecific, and an aberrational name. In many cases, however, the nomenclature will become much simplified by aberrational names being unnecessary, because the individuals do not vary to such an extent within a subspecies that aberrational names are required ; the simplification will be still greater when, besides the aberrational names, the subspecific names are not required. In order

to avoid grave mistakes it is necessary that we insert before the aberrational name some sign to indicate that the name is meant for an aberration. For, in species which do not vary according to locality we often have important individual variation, and therefore have to designate individuals with aberrant characters, besides by the generic name, by a specific and an aberrational name only, thus : *Papilio gambrisius* ab. *abbreviatus* ; *P. gambrisius abbreviatus* would have an entirely different and erroneous meaning. The abbreviations employed as a sign may be *ab.* for the usual individual aberration, *ab. loc.* for localised individual aberration, ♂-*ab.* and ♀-*ab.* for aberrations occurring only in one sex, ♀-*f.* for a constantly appearing form of polymorphic species, ♀-*f. loc.* when the form is localised, *gen. vern.* and *gen. aest.* for seasonal forms. In this way the various kinds of individual variation can be distinguished by the special sign employed, which would not be possible if the aberrational name were simply annexed to the subspecific or specific name.

Since the diagnosticist when describing a form very often does not know whether this form will ultimately turn out to be cospecific with other forms, or whether it is actually specifically distinct, and as, further, a great many forms have been diagnosticated as species which now are known to be subspecies (and the reverse), the question arises how the above system of nomenclature must be carried out. For the sake of simplicity we shall take into account solely a species with its subspecies ; then we have the following possible cases :—

1. The first diagnosis and description are so general that they apply very well to a certain species A, but do not give any character from which we could see which one of the subspecies (B^1, B^2, B^3) of A the author has had before him. In this case the name given by the author must be kept for the species A, and each subspecies requires another name.

2. The first diagnosis and description apply to two or more forms (but not to all) which are now known to be subspecies of a certain species, and are so general that we do not know whether the author had one or more forms before him. In this case again the first name must be employed for the species, and each subspecies requires another name.

3. The diagnosis applies not to one entire species A, but to one particular subspecies B^1 of A ; the other subspecies B^2 and B^3 of A either were not known to the respective author, or their specific identity with B^1 was not recognised by him. B^1 may be the first described of the three forms. Which name must be used for the species A ? Illustration : Linné described the Amboina form of a beautiful insect under the name of *Papilio priamus* ; we know now that this Amboina form is a subspecies of a species which ranges over nearly the whole of the Papuan region and has developed into several subspecies. Linné's name of *priamus* was given, not to the entire species, but to one particular subspecies, and there is not the least doubt that this name must be kept to designate that particular subspecies. Now, how have we to call the entire species ? A short consideration of what a name is meant for and how systematists employ a name will give a satisfactory answer. A diagnosticist describes a species x from a number of individuals ; further researches show that the characters in the original description apply only to a certain number of specimens ; aberrant specimens are found, and the result is that the original description of the species has to be largely modified ; but, in spite of this, the original name is kept for the species. Illustration : Linné's description of *Papilio podalirius* does not apply to certain aberrations which occasionally occur among the

normal specimens ; nevertheless we include these aberrations under Linné's name, and thus extend the meaning of the name.

As the number of specimens at the disposal of the author is always comparatively small, a name will, in consequence of further research, always cover a larger field than it did when first applied. If we keep this extension of the meaning of a name in view, it is obvious that the name of a certain form has to include all subsequently discovered forms which are specifically identical with the first form. Just as the name of *Papilio podalirius* comprises the so-called normal as well as the aberrational specimens, the name of *Papilio priamus* comprises the particular subspecies *priamus* described by Linné as well as all the more recently discovered forms called *poseidon*, *euphorion*, *richmondius*, etc., as the following diagram shows:—

Papilio priamus { *priamus*, *poseidon*, *euphorion*, etc.

That is to say, the first name given to any member of a species is to be taken as the name of the entire species. The consequence is that the name of the species must be repeated when the respective component to which it originally was given is to be designated. Thus it might very often happen that a particular individual aberration had to be called after this pattern : *Papilio polytes polytes* ♀-f. *polytes*. The meaning of this name is exclusive and hence precise, and that is the highest praise we can give to a name : ♀-f. *polytes* shows that the *female* sex of the subspecies *polytes* is polymorphic, ♀-f. *polytes* being co-ordinate to one or some other aberrations of that sex (♀-f. *cyrus*, ♀-f. *romulus*); *polytes* ♀-f. *polytes* means that the particular *female* form was the first described ; *polytes polytes* has again the meaning that the particular subspecies was the first described of all those which belong to the species *polytes*.

A few illustrations will more especially show the convenience of this method of nomenclature. Boucard described one of those beautiful Central-American beetles which belong to the genus *Plusiotis* under the name of *aurora* ; the specimen has remained unique as far as we know, while many individuals have afterwards been found which, though specifically identical with the first-described specimen, differ from the latter very conspicuously in colour, being green instead of aurora-colour. The aurora-coloured individual is apparently a so-called accidental aberration, while the green individuals are the normal (or morphologically typical) ones. According to the old style of nomenclature the two forms would have to stand as *Plusiotis aurora* (accidental aberration) and *Plusiotis aurora* ab. *chrysopedila* (normal form). How absurd this kind of nomenclature is will easily be understood if we take, instead of these beetles, an albinistic specimen and normal individuals of a mammal or bird. Our method treats both forms as forms of one species, *Plusiotis aurora* ab. *aurora* and *Pl. aurora* ab. *chrysopedila*, the species *aurora* thus being composed of a normal form (ab. *chrysopedila*) and an aberrant form (ab. *aurora*).

A European moth of the genus *Hepialus* has developed into two subspecies, one with ♂ and ♀ nearly the same in colour (*hethlandicus*), and the other with ♂ and ♀ very different in colour (*humuli*); the first is said to be phylogenetically the older form, and therefore represents morphologically the typical one of the two ; the first described, however, is the sexually dimorphic form *humuli*, and therefore the typical

one in a nomenclatorial sense. Morphology and nomenclature come into contest if we employ the old style of naming the forms, while the contest is entirely avoided by accepting our method, according to which the species *Hepialus humuli* comprises two forms, *Hepialus humuli humuli* and *Hepialus humuli hethlandicus*.

A species of *Pieris* was described by Linné in 1758 as *Pieris napi*, while the Alpine and boreal variety of it, which has a different appearance, received in 1808 the name of *Pieris bryoniae*. From the experiments with this insect carried out by Weismann and others, the inference has been drawn * that *bryoniae* is phylogenetically the older one of the two forms, and that, therefore, the species ought to bear the younger name of *bryoniae* instead of the older name of *napi*. As the meaning of *Pieris napi* var. *bryoniae*, which is the name of the Alpine and boreal butterfly according to the old style of nomenclature, is that *bryoniae* is a variety originated in consequence of the variation of *napi*, an alteration is indeed necessary if the above interpretation of the experiments is correct, and thus evolutionists would have to play havoc with the names of all those numerous species of which a younger form happens to be described first. We have, however, endeavoured to show † that *the species* is represented neither by the white form *napi*, nor by the darker form *bryoniae*, but is composed of *napi* and *bryoniae*; the *species* is not congruent with the *ancestral* form of the recent forms, but is congruent with the sum of the recent forms, and its name is, therefore, independent of the name of that form which is supposed to be phylogenetically the oldest of the component forms. According to our method of nomenclature the name of the *species* in question would be *Pieris napi*, the name of the Alpine and boreal form *P. napi bryoniae*, and that of the form inhabiting the rest of Central and Northern Europe *P. napi napi*. If in theoretical treatises it is necessary to distinguish nomenclatorially the oldest from the younger forms of a species, it could be done by adding (f. prim.) = *forma primigenia*, or some such sign, to the name—*P. napi bryoniae* (f. prim.).

The various points in these introductory notes have been very cursorily dealt with; but we are in hopes that the remarks, in spite of their shortness, will serve to explain our interpretation of the facts of variation we are now going to bring before the reader.

II.—THE VARIATION OF THE GENITAL ARMATURE OF CERTAIN PAPILIOS.

The prehensile organs situated round the orifice of the sexual system of insects have for about fifty years been made use of for diagnostic purposes, and it was, and is, a general belief that the genital armature is of such great constancy in every species that peculiarities exhibited by certain individuals in these internal ectodermal organs, and not found in other individuals which otherwise are very slightly different from those, are of specific value. As we have shown in the introduction that every individual has its individual peculiarities, a slight distinguishing character of an individual, besides the sexual armature, can always be found, and therefore the above opinion leads practically to the assertion that a specimen with some kind of peculiarity in the sexual armature is specifically distinct from the specimens which do not have that peculiarity. On the other hand,

* Weismann, *Studies in the Theory of Descent* I. London, 1882. pp. 61 ff.

† Compare also Lorenz, *Sitz.-Ber. zool. bot. Ges. Wien* 1892. p. 17; Jordan, Nov. Zool. 1895. p. 182; Hartert, *Ibis* 1896. p. 363.

comparatively very few authors * have given expression to the opinion, not only that there is a certain amount of variability found in those organs, but that one can by no means rely upon them in the judgment of specific distinctness or non-distinctness. During our researches on the Eastern Papilios † we came across some striking cases of variability of the copulatory organs which made it evident to us that the above assertion of an extensive variability was not the outcome of superficial research, and this induced the Honourable Walter Rothschild to charge me with investigations in the matter. As Mr. Rothschild knew from the study of the external characters of the Eastern Papilios that a decision about the specific distinctness of these variable insects with some certain degree of correctness could not be arrived at unless one had ascertained with some probability of correctness the limits of individual variation of each form (no matter whether the form was described as species or variety), and hence in order to come as nearly as possible to the knowledge of the limits of variation it was necessary to compare a great many specimens, he liberally put the long series of individuals of his collection at my disposal, and to this the results of our investigations are largely due. It seemed to us that in the first place the aim of our researches had to be to ascertain whether the alleged constancy of the genital armature was, at least in most species, real, especially as compared with the distinguishing characters derived from the wing-pattern. A little consideration, however, showed us that this was scarcely necessary. First, if we accept the statement that every specifically distinct form is to some degree different from the allied forms in the genital armature as being true, it by no means follows that the inverse is correct, namely that forms presenting in the sexual organs some differences from the allied forms are specifically distinct. Hence the proof of the variability of the organs in question would not imply that these organs are useless for diagnostic purposes, though their taxonomic value would certainly be lessened. Secondly, if two or more allied species are different in the sexual organs we have to conclude from the theory of evolution that the present differences are the outcome of divergent development of the allied species from a common ancestral species which itself had the sexual organs either different from all its descendant species, or from all but one ; if we concede this, and all followers of Darwin have to do so, it is self-evident that the ancestral species must have been variable in the sexual armature. As, therefore, in the ancestors of our present species the genital armature must be assumed to have been so variable that the variation could lead to specific separation, we cannot but assume *a priori* that in all the species of the present which are in the state of diverging into varieties the genital organs must exhibit not only some variability, but also variation to such an extent that the genital characters of a certain variety could be increased by the factors of evolution and ultimately be transformed into specific characters, unless one tries to avoid these consequences either by abandoning evolution altogether, which would be acceptable, or by maintaining that evolution is not going on during the present epoch, which would be ridiculous.

This consideration made it pretty clear to us that the more important part of our investigations would have to be, not to prove the occurrence of variation of the organs in question, but to ascertain the kind of variation, especially to accumulate such facts from which could be seen whether there is individual,

* Perez, *Ann. Soc. Ent. Fr.* p. 74 (1894) ; Edwards, *Canad. Ent.* p. 56 (1894) : Kolbe, *Ent. Nachr* p. 133 (1887).

† Nov. Zool. p. 269 (1895).

seasonal, and geographical polymorphism in the sexual armature. And if such variation be found, the next task would be to compare this variation with that of the external organs, especially with that of the wings, in order to see, first, whether the genital organs and the pattern of the wings were independent of one another in respect to their variation; secondly, whether, in spite of this independence, there are certain kinds of varieties which are characterised by more or less constant peculiarities in the wing-pattern associated with, but not correlated to, peculiarities in the genital armature. As such varieties could easily be mistaken (in fact, have largely been mistaken) for distinct species, and hence would have the appearance of incipient species, and as, further, the divarication of a species can come about only by means of branching into subspecies, we could *a priori* expect to find such a combination of characters in geographical races or subspecies.

As the present paper stands in close connection with the classificatory investigation on the Papilios we are carrying on, the researches here demonstrated are restricted to that group of insects; and this we deem the more necessary, because the correctness of the results of such work depends to a great extent on the full acquaintance with the various forms dealt with. Though in a monograph of the Papilios all the forms of all the species must be taken into consideration, we have abstained from treating upon all the Palaearctic and Indo-Australian Papilios in this paper for the good reason that, as in every form at least all the more prominent varieties in the genital armature have to be described and figured, the detail of the paper would be so immense that in consequence of the great amount of detail the single facts of variation would be much obscured. Hence we have thought it best to demonstrate the variation of the genital armature on a small number of species which have been so selected that they very well illustrate, first, the amount of variation; secondly, the kind of variation; and thirdly, both the amount and kind of variation within several, morphologically very different, groups of *Papilio*.

As far as we know, systematists have, as regards *Lepidoptera*, only made use of the *male* genital armature for diagnostic purposes. Salvin * mentions the presence of a kind of armature at the orifice of the vagina, but has not succeeded, in consequence of an inadequate method of preparation, in bringing it forward for the purpose of classification. We first came across the vaginal armature when we studied the morphology of the abdomen of the Papilios with a view of discovering characters which could help us in coming to a decision about the extent of the genera into which the Papilios must be classified, and soon found out, on the one side, that the morphology of the abdomen of the *females*, including the vaginal armature, presents excellent generic characters to the systematist (compare Pl. XIX., f. 181, 182), and, on the other side, that the detail of the structure was of the highest taxonomic value as to the delimitation of species. Therefore we have selected a few of the species examined to illustrate the peculiar structure and the variation of the vaginal armature, and the form of the eighth abdominal segment.

A. Male Genital Armature.

The clasping apparatus of the *male* comprises three organs: (1) a dorsal hook called by Gosse *uncus*; (2) the lateral *valves* or *claspers*, bearing on the inner side ridges, teeth, and hooks called *harpe*; and (3) the *scaphium*, which is situated

* *Biol. Centrali-Amer., Rhop.* II. p. 189 (1890).

immediately below the anus and above the penis, and becomes visible when the valves are removed. The homology of these organs has been explained by Dr. Peytoureau in his work entitled *Contribution à l'étude de la Morphologie de l'Armure génitale des Insectes*,* and we therefore refer the reader to that work ; it is here sufficient to mention that Dr. Peytoureau comes to the result that the *valves* are lateral wings to the *ninth* segment, which itself becomes visible only by dissection, and that the dorsal *uncus* and the ventral *scaphium*, between which the *anus* is found, represent the *anal* or *tenth* segment ; the penis, therefore, has its position between the *ninth* and *tenth* segments.

The *uncus*, *scaphium*, and the *valve* with the *harpe* are of classificatory value, and if we intended to explain here the complete morphology of the genital armature of the Papilios we certainly should have to take all three organs as well as the *penis* into account ; merely for the sake of simplifying matters we have restricted our notes almost to the *valve* and *harpe*.

The harpe of the Papilios is a fold of the inner sheath of the valve partly raised to ridges, teeth, hooks, rod-like processes, etc., which are sometimes of rather a complicated structure. We have generally given a figure of the harpe and valve as they appear when viewed with the eye perpendicularly above the plane of the valve, while the figures representing the harpe or parts of it are so drawn that the planes of harpe and paper are the same. Very much depends on the position in which the eye is to the harpe, if the comparative study of these organs is to be of any use ; a curved or twisted ridge or process appears very different when viewed under a different angle ; and hence we have endeavoured to represent the same organ of the various species and subspecies in the same position, so that a comparison of the figures gives an exact idea of the differences in the organs.

1. **Papilio machaon** ; † f. 39 to 45.

This species occurs nearly all over the Palaearctic Region, inclusive of China and Japan, and is found also on the Indian side of the Himalayas at higher elevations, as well as in the Nearctic Region. The lines of delimitation between the Old World forms of *P. machaon* are very difficult to draw, in fact cannot be drawn, as the forms overlap in characters. The most remarkable varieties are the summer brood of the Japanese *machaon*, and the subspecies from the interior of Sikkim and the higher parts of Western China. As we shall have to describe and figure the sexual armature of the various forms of *P. machaon* in another paper, we introduce the species here merely because it is the only British representative of the entire group, and therefore will enable the British entomologist to verify our observations.

The *valve* of *P. machaon* is of a triangular shape, and, though somewhat variable in outline according to the individual specimens, does not present any obvious differences in the specimens of the different subspecies.

The *harpe* is a longitudinal fold lying along the ventral margin of the valve ; it is distinctly raised and leans somewhat over dorsally. The basal half or so is rounded and simple, whereas the apical half is compressed, with the upper free edge denticulate, so that it resembles the blade of a saw (f. 39—43, ventral view). The

* *Revue Biologique du Nord* VII. 1895. The author gives on pp. 13 to 50 a list of works dealing with the abdomen of insects.

† See note on p. 439.

basal, rod-like, portion either immediately runs out into the saw (f. 43), or has to curve a little dorsally to join the saw, the latter being a little more dorsal than the former; this variation is independent of locality.

a. *P. machaon flavus* from Great Britain.

The denticulate portion of the harpe is generally longer than in *machaon machaon* from Germany and in *machaon sphyrus* from South Europe and Asia Minor. F. 39, 40, and 41 are taken from three British specimens, and represent the amount of variation found by us in our series. The proportion of the length of the saw to the entire harpe is in the three specimens 19 : 30, 15 : 30, and 13 : 30 ; the variation in the length of the denticulate portion amounts therefore to almost 50 per cent. of the length of the saw figured in f. 141.

The *uncus* of the British specimens (f. 44, dorsal view) is nearly always slenderer than that of the Continental individuals (f. 45), and agrees very well with that of the Japanese subspecies (spring and summer broods).

b. *P. machaon machaon.*

In f. 45 the *uncus* of an individual from Switzerland is represented to show the divergence from f. 44.

c. *P. machaon sphyrus.*

The harpe of this southern subspecies as well as the harpe of *machaon machaon* agrees on the whole with f. 40, but in some specimens from Asia Minor and Palestine the denticulate portion is remarkably short. F. 42 represents an extreme, the proportion of saw to entire harpe being 11 : 30 ; the saw is in this individual from Syria more than 70 per cent. shorter than in the British specimen represented by f. 39, an amount of variation which is higher than we anticipated. The harpe of a Palestine specimen, as drawn in f. 43, is abnormal in so far as the saw does rise gradually, not abruptly.

d. *P. machaon hippocrates* from Japan.

Besides the *uncus* mentioned before, we do not see any difference between the genital armature of this remarkable form and the European *machaon*. The spring and summer broods, though so conspicuously different in size and pattern, also do not exhibit, to our knowledge, any distinguishing character in the organs in question.

As the swallow-tails found in the Wicken Fens, near Cambridge, are doubtless one species, the variation of the species in the length of the denticulate portion of the harpe, or, in other words, of the prehensile part of the harpe, amounts to nearly 50 per cent. As further the Syrian specimens do not differ in the wing-pattern so much from British specimens as in Germany and in Syria the individuals of the first brood very often differ from those of the second brood, and as a line of separation between the characters of British and Syrian specimens is altogether absent, we have also to admit that f. 39 and 42 are taken from the same species, *i.e.* that the variation of the prehensile organ amounts to 73 per cent.

Our conclusions are : (1) The genital armature of *machaon* does not afford any characters by which the various geographical races, distinguished especially by differences in the wing-markings, can be constantly differentiated from one another. The harpe of the British form has, however, on the whole, the longest prehensile part,

while the specimens from Syria and Palestine have that denticulated portion on an average shorter than specimens from England, Central Europe, Sikkim, China, and Japan ; the *uncus* is thinner in nearly all British and Japanese individuals than in most individuals from the interjacent countries.

(2) The spring and summer broods are not different in the genital armature.

(3) The prehensile portion of the harpe varies considerably in length ; the amount of variation is 73 per cent.

2. **Papilio aegeus** ; f. 1 to 11.

According to the wing-pattern the species comprises a subspecies inhabiting New Guinea and Aru (*aegeus ormenus*), another found in Australia (*aegeus aegeus*), a third inhabiting the Kei Islands (*aegeus keianus*), a fourth found on the Banda Islands (*aegeus adrastus*), and a fifth is met with in New Britain (*aegeus bismarckianus*).

Of these we could dissect very long series of the first two forms, while the *males* of the three other subspecies we have not examined for want of sufficient material.

P. aegeus ormenus is in both sexes a very variable insect as regards colour, while the Australian form *aegeus aegeus* is rather constant in that respect.

The *valve* (f. 1, seen from above) is of the usual triangular shape ; its ventri-apical angle is sometimes more, sometimes less rounded, regardless of locality as well as of wing-pattern.

The *harpe* lies as in *P. machaon* along the ventral edge of the valve, extending from the base to the apex ; it is a rather thin blade with the free upper edge sharp, but not conspicuously dentate, bearing only a fine denticulation at the projecting portions, and leans over dorsally. Before the middle it widens out triangularly to form the *submedian projection*, and its free apical portion is raised above the level of the margin of the valve and forms the *apical projection*. The length and form of these two projections vary individually and subspecifically.

a. *P. aegeus ormenus*; f. 1 to 6.

According to the development of the subapical white band of the forewing the *males* belong to three varietal forms : ♂-ab. *ormenus*, with the band complete on upper- and underside ; ♂-ab. *pandion*, with the spots of the band partly obliterated; ♂-ab. *othello*, with the band absent. The three forms occur together in the same locality and are connected by all intergradations. The variation of the sexual armature is entirely independent of that of the variation of the band ; individuals of ♂-ab. *othello* are different *inter se*, while some of them agree with certain specimens of ♂-ab. *pandion* or ♂-ab. *ormenus*, and so it is with the latter aberrations. The following remarks, therefore, refer to every form of the *male*.

F. 1 is taken from an individual from Dutch New Guinea (coast near the Arfak Mountains) ; in this perpendicular view the apical projection of the harpe, being more erect than the shorter submedian one, appears to be short. The harpe of the same individual is represented in f. 2 ; the submedian projection is broad and triangular, and differs obviously from the same projection of f. 3 to 5, which are taken from individuals from the same locality and represent very well the amount of variation we have found in *aegeus ormenus*. In f. 5 the submedian projection is very small, in f. 4 very high, in f. 3 and 4 much slenderer than in f. 2. A specimen (f. 6) from Finschhafen, German New Guinea, has the projection as broad as it is in f. 2, and nearly as high as it is in f. 4. The usual form of the projection met with

in most examples from all parts of New Guinea is that of f. 2. The length of the projection varies about from 1 : 2.

The free apical projection of the harpe varies in a similar way in outline and height, as will be seen by comparing f. 2 to 6; the extremes which came under our notice are shown in f. 4 and 5, the length varying about from 2 : 3. The normal size of the apical projection is that of f. 2.

The specimens from British New Guinea, the D'Entrecasteaux Islands, and Woodlark Island have in the harpes no character by which we could distinguish them from the individuals from Northern New Guinea.

b. *P. aegeus aegeus* from Queensland and New South Wales; f. 7 to 11.

Though the Australian form of *aegeus* is in respect to the wing-pattern very constant as compared with *aegeus ormenus*, the variation in the genital armature is just as great as in the New Guinean subspecies. The *male* corresponds in the pattern of the forewing to *aegeus ormenus* ♂-ab. *ormenus*.

The commonest forms of the submedian projection met with are shown in f. 8 and 11; on the whole, the basal edge of the projection is more vertical than in *aegeus ormenus*, but this does not apply to every specimen; the character is especially often obvious in the individuals from New South Wales and Southern Queensland. The apical projection is in a few examples a little higher than in *aegeus ormenus*. F. 7 and 8 are taken from two specimens from Cairns, North Queensland; f. 9 represents an individual from Cedar Bay, thirty miles south of Cooktown; f. 10, with an abnormally high and slender submedian projection, is taken from a Queensland individual without exact locality, while f. 11 represents a New South Wales individual. The variation in the length of the submedian projection is in this selected series not so great as in f. 2 to 6, as we did not find an individual in which the submedian projection was as feebly developed as in f. 5.

The importance of the differences exhibited in f. 2 to 11 will at once become obvious when we compare the harpes of the two nearest allied species.

3. Papilio inopinatus; f. 12.

P. aegeus is on the Tenimber Islands represented by an insect which is comparatively very constant in external characters, and is in colour and pattern always separated from *P. aegeus* by a wide gap. Though the absence of intermediate specimens is not a proof that the Tenimber insect named *inopinatus* is specifically distinct from *P. aegeus*, we have to treat *inopinatus* as a species for the following reasons: the external differences between *inopinatus* and *aegeus* are greater than, or as great as, the differences between the relative forms which are regarded as distinct species; if *lowi* and *mayo* are kept separate from *memnon—rumanzovius*, *deiphontes*, and *deippylus* as distinct from *deiphobus—gambrisius* specifically separate from *aegeus*, then *inopinatus* is likewise to be treated as a distinct species. Further, the variation within the *male* sex of *P. aegeus* from New Guinea, Australia, Aru, Kei, and Banda Islands takes place between such limits that the difference between the extremes is not so great as that between *aegeus* and *inopinatus*; the same applies to the variation of that *female* form of *ormenus* which corresponds to the *female* of *inopinatus*.

Thus we think it fairly safe to consider *inopinatus* specifically distinct. The evidence is to some extent corroborated by the difference exhibited by the harpe. We

have examined only a few individuals, all of which have the median thin portion of the harpe (f. 12) longer than it is in *aegeus*, especially than we found it to be in *aegeus ormenus*; the submedian projection is broad and low, and the apical projection is likewise shorter than in *aegeus*. A comparison of f. 2 to 11 with 12 evidently shows, however, that the distinguishing points in the harpe of *inopinatus* are of much less weight in the judgment of the specific distinctness of the insect than the external features; the difference between f. 4 and 5 and f. 8 and 11 is far greater than that between f. 12 (*inopinatus*) and 8 or 3 (*aegeus*).

4. **Papilio tydeus**; f. 13 to 16.

This is the representative species of *aegeus* on the Northern Moluccas; the same reasons which induce us to treat *inopinatus* as specifically distinct apply also to this insect. The external differences from *aegeus* are in *tydeus* not quite so great as in *inopinatus*; in opposition to this the harpe of *tydeus* differs much more widely from that of *aegeus*. The clasper or valve of *tydeus* (f. 16) is larger than that of *aegeus*, and the harpe therefore longer. The submedian and apical projections of the harpe are more bent over dorsally, as will be seen by comparing f. 1 and 16. The submedian projection is broad and high, and the apical one is conspicuously higher and more erect than in the allies.

We have examined four individuals from Halmaheira and three from Batjan; there is no localised difference in the harpe of *tydeus*. F. 13, 14, and 16 are taken from Halmaheira individuals; f. 15 represents the harpe of one of the Batjan specimens. The variation in the form and length of the projections is obvious; the apical projection in f. 15 is almost half as broad again as that in f. 14.

The facts here illustrated are as follows :—

(1) The variation of the pattern of the wings of *P. aegeus ormenus* is entirely independent of the variation of the harpe.

(2) The difference in the harpes of *aegeus ormenus* and *aegeus aegeus* is very slight and applies only to scarcely half of the number of specimens examined.

(3) *P. inopinatus*, though in external characters very different from *aegeus*, exhibits in the harpe only a slight, but according to the specimens examined rather constant, difference from *aegeus*.

(4) *P. tydeus*, which is in colour and pattern separated from *aegeus* by a less wide gap, has the harpe in all the specimens examined conspicuously different from that of *aegeus* and *inopinatus*.

(5) If we take the length of the harpe = 100, the projections measured from the plane of the valve to the tip of the projections vary in length as follows :—

P. aegeus: submedian projection from 18 to 33; apical projection from 33 to 45.
P. inopinatus „ „ „ 18 : „ „ „ 32.
P. tydeus „ „ „ 30 to 33; „ „ „ 51 to 63.

Or, in *aegeus* the variation of the submedian projection amounts to 56 per cent. of the length of longest submedian projection observed, while the variation of the apical projection is 27 per cent.

(6) *P. aegeus* and *tydeus* differ somewhat in the size and outline of the valve.

5. **Papilio polytes**; f. 17 to 37.

The *male* sex of this insect is in the pattern of the wing not very variable, while the *female* exhibits a very great amount of individual and local variation. The species ranges in a good number of subspecies over the Indian and Malayan Subregions, and goes as far as the Moluccas; in New Guinea, the Aru Islands, Queensland, and the islands farther east it is represented by *P. ambrax* and *P. phestus* respectively.

The *valve* is more or less triangular (f. 17 and 31), and varies individually. The *harpe* has the same position as in *P. aegeus*; it is a ventral longitudinal fold; the basal half (or so) is stick-like, while the apical portion is abruptly raised into a thin blade, which leans over dorsally so that its ventral surface is visible when the valve is viewed with the eye above the plane of the valve (as in f. 17 and 31); the harpe thus has the appearance of a hatchet; the upper free edge of the blade is very finely denticulate; the tip of the blade projects free for a short distance, and is somewhat curved dorsally, often forming a blunt hook. The outline of the harpe varies according to locality and to the individual specimen.

a. *P. polytes polytes* from N.W. India to Malacca, Natuna Islands, Tonkin; f. 17 to 26.

The blade of the harpe is highest near its basal (subperpendicular) edge, where it is slightly angulate; a second, more distinct, angle is formed just before the edge slopes down towards the apex of the harpe. The apex is scarcely produced or very slightly so. The degree of variation found by us in the specimens from Continental India is represented by f. 18 to 21.

The form of the harpe as shown in f. 18 is that found in most specimens; the figure is taken from a Kumaon individual (caught in June 1893). The blade of the harpe of the individual from Bankipore (captured March 20th, 1893) (f. 19) is much less steep basally than usual, its dorsal edge being much reduced in length; the two angles are conspicuous. The two Burmese (Bassein) examples from which f. 20 and 21 are drawn are especially remarkable for the development of the free apical projection.

In external features *P. polytes* from the Natuna Islands (between Malacca and Borneo) forms a transition from *polytes polytes* to *polytes theseus*. From a long series of individuals examined (captured by A. Everett in September and October 1893) the three most different harpes are here figured (f. 24, 25, 26); the blade agrees very well in shape with that of Indian individuals. The thin carina running from the upper edge of the handle of the harpe along the base of the blade varies from being absent to being well marked.

b. *P. polytes borealis* from China.

All the specimens examined agree in the harpes with *polytes polytes*. The individuals of the interesting variety *P. polytes borealis* ♂-ab. *thibetanus*, in which the white discal markings of the hindwing are partly obliterated, also do not exhibit any peculiarity in the genital armature.

As said in Mr. Rothschild's Revision of the Eastern Papilios, the specimens of *P. polytes* from the Loo Choo Islands (south of Japan) stand intermediate in pattern between *P. polytes borealis* and the Malayan *P. polytes theseus*. The harpe of the Loo Choo *polytes* is in so far remarkable that it differs from the harpe of *polytes*

polytes and *polytes theseus* in being (in individuals of equal size) larger (f. 22 and 23); the angles of the blade are less prominent than in *polytes polytes*, by which character it leads over to *P. polytes theseus* (f. 28).

c. *P. polytes nikobarus* from the Nicobars and Andamans; f. 27.

We have now received more material from these islands, and find that *polytes nikobarus* can very well be kept separate from *polytes polytes*, as the greater proportion of the specimens from the Andaman and Nicobar Islands are somewhat different from *polytes polytes*. The harpe confirms this opinion; the outline of its blade is more rounded (f. 27), not exhibiting the two angles found in *polytes polytes* (f. 18), and resembles somewhat that of *P. polytes theseus* from Java (f. 29), except in the apex being obviously truncate.

d. *P. polytes theseus* from the larger and lesser Sunda Islands; f. 28 to 30.

This subspecies differs in the *male* from *P. polytes polytes* in being generally smaller and in having the tail to the hindwing more or less obliterated. The harpe of *P. polytes theseus* is distinguished from that of *polytes polytes* by being in the blade absolutely longer, less raised, much more evenly rounded, and by the apex being more pointed.

Sumatra and Borneo individuals have the blade shorter and higher than Java examples, and hence lead over to *polytes polytes*; f. 28 is taken from a small example from the Kina Balu (North Borneo). Timor specimens agree generally with the Javan individuals in the form of the harpe; f. 30, however, is aberrant in having the second angle of the edge of the blade faintly marked and the apex distinctly truncate in a ventral view.

e. *P. polytes alcindor* from Celebes and Saleyer; f. 34.

The *female* of this subspecies is very aberrant, the *male* much less so. The *male* has one character in common with *P. polytes polytes* and *P. polytes theseus*, namely the presence of blue scales on the underside of the hindwing outside the macular white band, which scales are absent from the subspecies flying on the Philippine and Moluccan Islands. So insignificant as this character is, it becomes interesting when we see that the harpe of *polytes alcindor* (f. 34) comes closer in outline to that of *polytes polytes* (compare f. 25) than to that of *polytes alphenor* from the Sulla Islands (f. 33) or from the Philippines (f. 32). We observe, however, that the tip of harpe of *polytes alcindor* (f. 34), though short, is visibly curved upwards in a similar way as in *polytes alphenor*.

f. *P. polytes perversus* from the islands of Sangir and Talaut; f. 35.

In external features this form combines to a certain extent in the *male* the characters of *polytes alcindor* (Celebes) and *polytes nicanor* (Halmaheira). The harpe comes nearest to that of *alcindor*; has the tip, however, a little more hook-shaped.

g. *P. polytes alphenor* from the Philippine Islands (inclusive of Palawan), the Sulla Islands, and the Southern Moluccas; f. 31 to 33.

The *males* from these various islands agree very well with one another in external characters; the polymorphic *females*, however, are partly different according to locality, thus showing that the insect is on the way to develop into several local races. The harpes of the *males* are, according to locality, slightly different.

In all the specimens examined the blade of the harpe is conspicuously longer and slenderer than in all the other subspecies of *P. polytes*, and reaches close to the apical margin of the valve (f. 31, taken from a Mindoro example); the narrow apical portion is especially long, and often rather strongly hook-shaped, the hook projecting above the level of the raised ventri-apical edge of the valve.

The harpe of the average example from the Philippines is represented in f. 32; it has a very different appearance from the harpe represented in f. 18 to 26, while the difference between f. 32 and 29 is less conspicuous; the variation of the Philippine examples takes place in such a direction that some individuals approach f. 35.

Of the *males* from the Sulla Islands Mr. Rothschild says that they are not exactly identical with the Philippine *alphenor* in wing-pattern, but approach a little *P. polytes perversus*. The harpes of the Sulla *males* (f. 33) are, on the contrary, still slenderer than in Philippine *alphenor*, thus indicating that a relationship in wing-pattern is not necessarily corroborated by the development of the genital armature.

From the Southern Moluccas we had unfortunately only one individual at our disposal ; the harpe of this specimen is shaped nearly as in *polytes perversus* (f. 35).

In the harpes, therefore, the *males* of *alphenor* from the three localities (Philippine Islands, Sulla Islands, and Southern Moluccas) are fairly well distinguishable, though there is no distinct line of separation.

h. *P. polytes nicanor* from Halmaheira and Batjan; f. 36.

The blade of the harpe is much higher than in *polytes alphenor*, and in this respect *nicanor* comes nearest to the Indian *polytes polytes*; the apex of the harpe is produced, nearly as in *alphenor*. F. 36 is taken from a Halmaheira individual.

6. **Papilio ambrax**; f. 37 and 38.

The outline of the valve (f. 38) of this species varies individually. The harpe is generally formed as in f. 37, but is sometimes somewhat slenderer and at the apex less hooked.

We merely give the two figures of the valve and harpe of an *ambrax* individual (from German New Guinea) in order to enable the reader to compare them with f. 18 to 36. The differences between f. 37 (*ambrax*) and 36 or 34 (*polytes*), belonging to two species, are not so conspicuous as the divergency exhibited by various harpes within the species *polytes*.

The facts of variation observed in *P. polytes* are as follows :—

(1) The valve is variable in the individual specimens, but does not exhibit in the specimens examined any obvious variation according to locality.

(2) The conspicuous individual aberration *P. polytes borealis* ♂-ab. *thibetanus* has no peculiarity in the genital armature.

(3) The individual variation in the blade of the harpe of the individuals from India is such (f. 18 and 19) that the extremes stand further apart than many individuals of *polytes polytes* do from many individuals of *polytes theseus*.

(4) The harpe of *polytes theseus* from Java and the lesser Sunda Islands is well distinguished from that of the Indian *polytes polytes*, but there is no parting line on account of the intermediate form of the harpe of *polytes theseus* from Borneo and Sumatra.

(5) Certain Timor individuals of *polytes theseus* come in the harpe (f. 30) very near *polytes perversus* from Sangir and Talaut (f. 35), and this again is very close to *polytes alcindor* from Celebes (f. 34).

(6) The harpe of *polytes alphenor* from the Philippine and Sulla Islands is in the height of the blade nearer related to *polytes theseus* from Java and the lesser Sunda Islands than to *polytes theseus* from Borneo and *alcindor* from Celebes, which subspecies are geographically the nearest to *alphenor* ; while, on the other hand, the apex of the harpe is in all the subspecies inhabiting Celebes, the Philippines, Sangir and Talaut, the Sulla Islands, and the Moluccas, somewhat curved upwards (and towards the dorsal margin of the valve), and not turned up, or rarely so, in *polytes theseus*.

(7) The subspecies most conspicuously different in the harpe is *P. polytes alphenor*, while the subspecies most conspicuously different in the shape and pattern of the wing is *P. polytes nicanor*.

7. **Papilio euchenor**; f. 51 to 64.

This insect is purely Papuan, being found in New Guinea, the Aru and Kei Islands, the D'Entrecasteaux Islands, Woodlark Island, and on New Britain and New Ireland; it has no near relative. Up to 1895 the specimens from these various localities had been treated as identical; Mr. Rothschild in his Revision found, however, that the individuals in his collection from the Bismarck Archipelago are in both sexes conspicuously different from the New Guinea specimens, and that, on the other side, the individuals from Aru are in the *female* sex, not in the *male*, also *constantly* different as far as the great material examined can be taken as furnishing a *proof* of a constancy of distinction. Lately, Mr. Rothschild observed, moreover, that the specimens from New Ireland are again in both sexes distinguishable from the individuals from New Britain ; so that there are four well recognisable forms, to which is to be added a fifth from Woodlark Island* described as a distinct species some forty years ago, but scarcely different in the ♂ in external features from the New Guinea form. The question is now, are the five forms one species, or do they belong to more species? An answer is in this case extremely difficult to give : first, because *euchenor* stands quite isolated amongst the Indo-Australian Papilios, and thus does not allow us to compare the distinguishing characters of other forms assumed, or proved, to be specifically distinct ; secondly, because the main portion of New Britain, which geographically is nearest to New Guinea and hence may perhaps be inhabited by an *euchenor* form intermediate between the New Guinea form and the New Britain form, is entomologically an entire blank, all the specimens received from New Britain being caught in the north-east of the island. The external characters of the various forms, however, allow us to set at rest the question ; as *obsolescens* from Aru and Kei, and *godarti* from Woodlark, are in the *male* not always distinguishable from *euchenor* from New Guinea, these three forms have to be treated as subspecies of one species (the name of which is *euchenor*).

The two forms from the Bismarck Archipelago, *depilis* from New Britain and *novohibernicus* from New Ireland, have several conspicuous characters in common by which they are differentiated from *euchenor euchenor*, *euchenor obsolescens*, and *euchenor godarti*, while the differences between *depilis* and *novohibernicus* are

* And perhaps a sixth from the D'Entrecasteaux Islands.

quantitatively much slighter; hence *depilis* and *novohibernicus* must (on the ground of external features) be considered as nearer related to one another than to the other *euchenor* forms. As in the present paper it is our purpose to demonstrate the variation of the genital armature within the limits of a species, and as therefore we have to avoid, as far as possible, any error as to the actual specific identity of the forms included by us in the limits of a respective species, we will, merely for the sake of being on the safe side, assume that *depilis* is a species distinct from *euchenor*. The external characters by which *novohibernicus* is distinguished from *depilis* are found in every specimen of our short series ; if, therefore, the constant presence of a distinguishing character is considered sufficient to make the respective form specifically distinct (as some naturalists do), *novohibernicus* is also a distinct species. However, the distinguishing characters of *novohibernicus* amount quantitatively not to more—about the qualitative amount of these characters we know nothing—than the differences do which are observed between New Guinea individuals, differences in the extent of the yellow markings which are not thought to indicate anything else but individual variability within the same species ; consequently we must assume that the differences between the individuals from New Britain and those from New Ireland being quantitatively the same are also qualitatively the same, *i.e.* do not indicate more than divergency of individuals of the same species. Hence the characters distinguishing *depilis* and *novohibernicus* must correctly be considered as not being of specific value. The various forms in question are therefore to be grouped as follows :—

1. *P. euchenor* { *euchenor ;* New Guinea and islands near it. / *godarti ;* Woodlark Island. / *obsolescens ;* Aru and Kei Islands.
2. *P. depilis* { *depilis ;* New Britain. / *novohibernicus ;* New Ireland.

The genital armature of the five forms is in accordance with this division.

The *valve* of *P. euchenor* (f. 51) is very large, strongly convex outwardly, with the apical margin rounded, the ventri-apical angle not being triangularly produced as in *P. aegeus* and most other species ; it exhibits some individual variability in the outline, especially in the ventri-apical portion. The armature of the valve consists of a fold running along the ventral margin of the valve in a slightly oblique direction, turning near the apex round towards the dorsal edge of the valve, running from here as a thin fold backwards to the base, first in a directly basal, then in a dorso-ventral direction, and thus returning to the starting-point ; from the basal dorso-ventral portion an oblique fold (f. 51, *d*) starts, traverses the (concave) valve, and widening out joins the ventral longitudinal ridge. The ventral portion is raised into a ridge, armed at both ends with a process, of which the first (*c*) is here called "basal hook," the second (*b*) "ventri-apical hook"; the basal ridge leans over ventrally, so that in a view perpendicular to the valve the dorsal surface of the ridge is visible (as in f. 51) ; it is highest near the basal hook (f. 52) ; the outline is not constant. The ventri-apical hook is directed in a basi-apical direction leaning over ventrally, with the tip protruding above the elevated edge of the valve. The vertical, ventri-dorsal, portion of the fold is less high than the ventral ridge, thinner and denticulate ; it leans over apically, so that in a perpendicular view the basal surface of the ridge is visible ; at the dorsal end it is produced into a slender and very sharp hook (*a*), the "dorsal hook," which is curved in an apici-ventral

direction; just underneath the hook the ridge is highest; the number of teeth is variable.

The variation according to locality affects especially the length of the longitudinal (ventral) and the ventri-dorsal ridges, their outline and armature, and the height of the oblique fold.

a. *P. euchenor euchenor*; f. 51 to 54, 59 to 61.

The variation noticed by us in the ventral ridge of New Guinea individuals is represented in views from the dorsal side in f. 52 to 54. The usual form of the ridge is given in f. 52, taken from an example from Constantinhafen, German New Guinea (f. 51 is taken from the same individual). In f. 53, representing a specimen from the same locality, the ridge is very high in the basal third and then rather suddenly diminishes in height; and in f. 54, taken from a specimen from Simbang, near Finschhafen, Huon Golfe, the abruptly raised basal portion is rather angulate.

Our specimens from the D'Entrecasteaux group of islands, east of New Guinea, as well as those from Waigeu, west of New Guinea, come in respect to the ventral ridge within the limits of variation as illustrated by f. 52, 53, 54. All the specimens have the angle formed by the sudden break in the outline of the ridge produced into the beak-like basal hook.

The vertical (ventri-dorsal) ridge is represented separate from the ventral ridge in order to be able to give the exact outline; f. 59, 60, 61, are taken from the same individuals as f. 52, 53, 54 respectively. As f. 59 to 61 are drawn from a basal view of the ridge, the ventri-apical hook (*b*) has a different appearance from that in f. 52 to 54.

The higher dorsal (left-hand side in figure) portion of the ridge is dentate: just at the highest point, or close to it, stands nearly always a stronger tooth, which in f. 59, however, is obsolete. The specimens from the D'Entrecasteaux Islands have nearly all the ridge toothed similarly to f. 61, a character which becomes more obvious in the individuals from Woodlark Island. The interesting aberration from Jobi Island, *P. euchenor euchenor* ab. *eutropius*, does not present any peculiarity in the valval armature.

b. *P. euchenor godarti*; f. 58.

We have examined three specimens of this form, which is all known to exist in collections, except Montrouzier's type-specimen which is perhaps (? !) preserved in the Paris Museum. The only distinguishing character in the valve and its armature found in all three individuals concerns the oblique fold (*d*), which is higher than in either *euchenor obsolescens* or *euchenor euchenor*; the valval cavity before and behind the fold is consequently deeper. The ventral and ventri-dorsal ridges are not constantly different from those of the New Guinea individuals; the dentition of the vertical fold is, however, in all three examples rather plentiful. The more aberrant harpe of the three is represented by f. 58 and 64; the ventral ridge (f. 58) is distinguished by the long basal and relatively short ventri-apical hook, and by the upper edge of the ridge being feebly and widely bisinuate; the ventri-dorsal ridge is multidentate.

c. *P. euchenor obsolescens*; f. 55, 56, 57, and 62, 63, 64.

In Aru individuals the ventral (longitudinal) ridge is somewhat shorter than in *euchenor euchenor*, and the vertical ridge accordingly longer, as will be seen by

comparing f. 55, 56, and 62, 63, with f. 52 to 54 and 59, 60 respectively. In outline the longitudinal ridge is on the whole not different from that of New Guinea examples, but the usual form of the ridge is not that represented in f. 56, which is similar to f. 52, representing the usual form of the ridge in *euchenor euchenor*, but a form resembling f. 55. In the latter figure there is an additional tooth upon the crown of the basal dilatation of the ridge, which we have seen only in this one individual. The ventri-apical hook is in the specimens examined shorter than in *euchenor euchenor*. The vertical ridge (f. 62 and 63) shows a certain amount of variability in the dentition. The ventri-apical hook appears to be somewhat more curved towards the right-hand side than in f. 59 to 61; this is due to the hook being more erect than in *euchenor euchenor*, less leaning over ventrally and apically.

From the Kei Islands three individuals have been examined which, in external features, do not exhibit obvious differences from the Aru specimens in the Tring Museum. The harpe presents, however, in the three examples some slight distinguishing characters. The longitudinal ridge is (f. 57) still shorter than in Aru individuals, the ventri-apical hook stands still more erect to the plane of the valve and the upper edge of the ventral ridge (as will be seen both from f. 57 and f. 64), and the vertical ridge (f. 64) is provided with many strong teeth.

8. **Papilio depilis**; f. 65 to 71.

The *valve* is ventrally a little more rounded than in *P. euchenor*, but this character is not constant. The armature of the valve (f. 65) is, however, obviously different. A comparison of f. 51 and 65 will show that the valves with the armature are in both species closely related; there are the same folds, ridges, and hooks in *depilis* which we have found in *euchenor*, but the organs have differently developed. The ventral (longitudinal) and apical (vertical) ridges of *euchenor* stand in *depilis* both so oblique that the angle formed by them in *euchenor* has almost disappeared. The ventri-apical hook does not lean over to the ventri-apical side of the valve, but to the dorsal side, so that the point of the hook will in *depilis* meet in copulation quite a different spot in the vaginal region of the *female* than in *euchenor*. The dentate vertical ridge is much shorter (f. 70, 71), sinuate in or near the middle, with the two higher parts at the side of the sinus dentate. The oblique fold (*d*) joins the ventral ridge near the apex (f. 66 to 69), not in the middle as in f. 52 to 58, and is basally not rounded but strongly compressed.

a. *P. depilis depilis*; f. 65 to 67, and 70.

The ventral ridge is throughout its length very high; its outline is variable. In f. 66 the upper edge of the ridge is undulate; the basal angle (*e*) is without the beak-like hook found in every specimen of *euchenor*. In a second individual (f. 67) the basal hook is indicated by a very minute tooth; in the middle the ridge is triangularly dilated. In a third specimen (not figured) the ridge is again without the basal hook, and is in the middle also higher than at the basal angle, but not so triangularly dilated as in the second example.

The ventri-dorsal dentate ridge (f. 70) leans strongly over to the apical side of the valve, and hence appears less high than in *euchenor*, but there are specimens of *euchenor* which in this respect are scarcely different from *depilis*. Besides the dorsal hook (*a*) there are three longer subdorsal and two smaller subventral teeth separated by a sinus; in a second specimen these teeth are all obsolete, while in a third only two are present.

b. *P. depilis novohibernicus*; f. 68, 69, and 71.

The harpe is very slightly different from that of *depilis depilis*; the portion of the ventral ridge which is produced into the ventri-apical hook forms a slight angle with the basal portion of the ridge, being a little more curved dorsally than in *depilis depilis*; the vertical dentate ridge is shorter than in that subspecies.

In three out of four examples the ventral ridge is highest beyond the middle, as in f. 68 and 69; while in the fourth specimen the dilatation takes place before the middle in a somewhat similar way as in f. 53. The basal hook (*c*) is in f. 68 scarcely indicated; in f. 68 it is as strong as in many *euchenor*. The dorsal ridge is generally shaped as in f. 71, but the teeth are sometimes much feebler than in the figure.

The facts of variation illustrated by f. 51 to 71 are as follows:—

(1) In the two closely allied species *P. euchenor* and *P. depilis* the armature of the valve is built up after exactly the same plan, but in the detail of structure there are conspicuous differences.

(2) The subspecies of *euchenor* from New Guinea and that from Woodlark present in the specimens examined no constant difference except in the oblique fold (*d*); the subspecies from Aru is so slightly different that the distinguishing character is scarcely noticeable if one does not compare several specimens; the Kei Island individuals are more obviously different than the Aru specimens (and represent probably another local form). The two subspecies of *depilis* are, according to the seven specimens examined, slightly different in the *male* genital armature.

(3) The individual variation within each subspecies is such that the differences between the harpes of several individuals from the same place (and hence most certainly belonging to the same species) are more obvious than those of the subspecies *inter se*.

(4) The only specimen known of the aberration *P. euchenor euchenor* ab. *eutropius*, which is abnormal in the pattern of the forewing, does not present any peculiarity in the genital armature.

9. **Papilio cloanthus**; f. 149 to 155.

The range of this insect is rather widely interrupted, the species being found all over North India, Upper Burma, and Central and Western China, and again in the mountainous regions of N.E. Sumatra; from the mountains of Malacca, Tenasserim, and Siam *P. cloanthus* is not known. The external features of the specimens from the various localities are such that we can group the individuals according to locality in three forms: an Indian, a Chinese, and a Sumatran form. The first two are not always distinguishable in pattern, and hence are certainly not specifically distinct from one another. The Sumatran specimens, at least all individuals of our long series (forty odd examples), are constantly different in the colour and extent of the markings; the divergency from Indian specimens is, however, not very conspicuous, which will be admitted if we call to mind that de Nicéville* especially says that the Sumatran insect is "identical" with the Indian one. As the minuteness of the distinguishing characters of the insect is, according to what has been said in the introductory notes, *a priori* no objection to the constantly found characters being of specific value, there must be other reasons brought forward which

* *Journ. As. Soc. Beng.* p. 526, n. 607 (1896).

force us to treat the Sumatran form not as a separate species. North Indian *cloanthus* occur in several broods; the individuals of the spring and those of the summer broods are in the extent of the markings rather obviously different, and this proves that the species is in pattern easily modified by the transmuting factors; the extreme individuals of the spring brood differ in the extent of the markings more from the extreme examples of the summer brood than certain Indian individuals do from certain Sumatran ones. Further, the differences of certain Chinese specimens from Indian individuals are quantitatively greater than those between Indian and Sumatran examples. Hence it is correct to accept Mr. Rothschild's opinion * and to treat the three insects in question as three subspecies of *P. cloanthus*.

The valve (f. 149) of *P. cloanthus* is, as in all the allied species, rather small; at the apex it is deeply sinuate. The sinus divides the apical third of the valve in a smaller dorsal lobe (*b*) and a larger ventral lobe (*a*). The ventral edge of the valve is angulate (*f*), and from this angle to the tip of the ventral lobe densely beset with irregular rows of thin and sharp teeth. The internal sheath of the valve is raised into a distinct fold (*e*), which begins ventrally at the base—in f. 149 and 150 the right-hand side is the ventral side of the valve—runs for a short distance along the ventral margin of the valve, turns in a rather even curve round towards the dorsal side, forms a subdorsal tooth (*c*), and then traverses longitudinally the dorsal lobe, being here raised into a short dentate ridge (*d*), the "dorsal ridge" which stands almost perpendicular upon the plane of the lobe leaning very feebly over ventrally. In f. 149 and 150 the subdorsal tooth (*c*) is visible almost in its entire length, because it is bent over apically, while the dorsal ridge appears much less high than it really is.

The variation of the species according to locality relates especially to the form of the valve, the length of the subdorsal tooth, and the form of the dorsal ridge.

a. *P. cloanthus cloanthus* from Kulu to the Shan States, at higher elevations; f. 149, 151, 152.

The sinus of the valve is $\frac{3}{4}$ mm. deep. The ventri-dorsal fold (*e*) is slightly curved. The subdorsal tooth (*c*) is high, simple, and when seen from the dorsal side, as in f. 151 and 152, reaches so far that its tip appears to be above the dorsal ridge. The length of the tooth is variable: the lower extreme met with by us is represented by f. 152 (Shan States); in a second individual from the Shan States the tooth is nearly as long as in f. 151, which is taken from a Sikkim specimen and represents the usual form of the tooth. As both the Chinese and Sumatran subspecies have the tooth generally considerably shorter, the mountainous regions of Siam, Tenasserim, and Malacca on the one side, and of Upper Tonkin on the other, will most probably yield (if inhabited by *cloanthus*) individuals more often, or even constantly, intermediate between the three subspecies in respect to the length of the tooth.

The dorsal ridge (f. 151, 152) of *cloanthus cloanthus* is a little longer than high, and is in all our specimens rather strongly denticulate.

The individuals of the spring brood are not different in the valve and harpe from the individuals of the later broods.

b. *P. cloanthus clymenus* from Western and Central China; f. 153.

In the outline of the valve all the individuals examined agree with specimens

* Nov. Zool. p. 145 (1895).

of *cloanthus cloanthus*, and so they do in the form of the ventri-dorsal fold. The subdorsal tooth is in every specimen shorter than that of f. 151 (normal length of tooth of *cloanthus cloanthus*), but there occur individuals which have the tooth nearly as long as it is in f. 152. A specimen of *cloanthus clymenus* with the tooth of a length which is normal for *clymenus* is represented by f. 153. We have examined some individuals which externally are not different from Sikkim specimens, and observed the highly interesting fact that in these individuals the tooth is as short as in f. 153, while in some other examples which differ in the extent of the black colour on the wings considerably from *cloanthus cloanthus* the tooth approaches in length that of f. 152. This is a remarkable illustration of what we have said in the introduction, namely that specimens can be similar or identical in one set of characters, while in another, independent, set they are dissimilar; the Chinese individuals of *cloanthus* which in pattern are like Indian *cloanthus cloanthus* are nevertheless individuals of *cloanthus clymenus*, distinguished from *cloanthus cloanthus* by a character of the genital armature not found, to our knowledge, in any individuals from India. We shall have to refer again to this fact later on.

The dorsal ridge of the Chinese *cloanthus* is similar to that of the Indian specimens; we have not found any difference that can be pronounced constant; in many individuals the ridge is a very little longer, and the teeth are often more numerous and smaller.

c. *P. cloanthus sumatranus* from the mountainous districts of N.E. Sumatra: f. 150, 154, 155.

The sinus of the valve is much smaller than in the two preceding subspecies: the dorsal edge of the dorsal lobe is more rounded, and the ventral lobe is considerably blunter. The dentition of the ventral edge of the valve is, especially near the blunt angle (*f*), extended upon the outside of the valve to such a degree that five or six small, but strongly chitinised, teeth stand irregularly one above the other.

The ventri-dorsal fold (*e*) is straighter and more raised than in *cloanthus cloanthus* and *cloanthus clymenus*, its edge is less rounded off and, especially near the subdorsal tooth, slightly notched or faintly denticulate.

The subdorsal tooth is as short as in *cloanthus clymenus*, but at the base broader, in consequence of the fold, of which it is a process, being higher; mostly it bears two or three faint teeth at the ventral edge.

The dorsal ridge is obviously shorter than in the rest of the species, but is of the same height; the free edge is less dentate, often simply sinuate. F. 154 and 155 illustrate the degree of variation in the dorsal ridge and the subdorsal tooth noticed by us.

The principal facts of variation as illustrated by f. 149 to 155 are as follows:—

(1) The three subspecies of *P. cloanthus* agree in the valve and its armature, but exhibit some differences in the detail of structure.

(2) The Indian and the Chinese forms differ constantly in the length of the subdorsal tooth, though the extremes come very close.

(3) The Sumatran form is aberrant in the form of the valve, the ventri-dorsal ridge, the subdorsal tooth, and the dorsal ridge.

(4) In the length of the subdorsal tooth the Sumatran and Chinese forms agree with one another, while they disagree with the Indian subspecies which inhabits interjacent countries.

(5) The individual variation of the genital armature in the Chinese subspecies is entirely independent of external characters.

(6) The seasonal dimorphism in external characters obviously marked in the Indian *P. cloanthus cloanthus* does not affect the genital armature in any way, as far as we could ascertain.

10. **Papilio sarpedon**; f. 96 to 148.

Though some people have treated *P. sarpedon* and *P. cloanthus* as belonging to two different genera, the insects are, nevertheless, very closely allied to one another, more closely than to any other species. This does not only follow from a careful comparison of the wing-pattern of the two Papilios, but also from the structure.

The range of *P. sarpedon* comprises the whole of the Indo-Australian Region, including Japan (except the north of it). The number of subspecies into which the insect has developed is very great. As it is one of the commonest species we could examine a large number of specimens, and to this it is due that we here came across an individual which stands in the genital armature far outside the usual limits of variation of the subspecies to which it belongs.

If we select some of the extreme forms here treated as subspecies of one species, for example the Indian, Celebensian, and the Solomon Island forms, their external differences are so very conspicuous that one might easily be misled to consider these forms specifically distinct. A comparison of the representatives from all the various localities, however, convinces us that the differences in colour, pattern, shape, and size between every two nearest allied forms are very slight, and do in some forms not even apply to every specimen; and we observe further that, where the differences are constantly met with, the characters amount quantitatively not to more than the differences between the seasonal forms of Japanese *sarpedon*, or than the differences found between certain Indian examples. Hence we think it to be quite correct to accept Mr. Rothschild's statement that all the forms dealt with in the following lines are subspecies of one species.

As we now are acquainted with the more simple armature of the valve of *P. cloanthus*, that of *P. sarpedon* will be more easily understood. A comparison of f. 96 and 149 will at a glance show the great similarity in the apparatus of the two species. The valve, though differing in outline from that of *P. cloanthus*, has the same apical sinus, and the armature has nearly the same position.

The ventral lobe of the valve (f. 96, *a*) is longer, mostly broader, than the dorsal one (*b*): its ventral edge is denticulate, as in *cloanthus*, but there is only one row of teeth, and the toothed portion extends farther down towards the base. There is a good deal of variation in the shape of the lobes and the depth of the sinus, both in respect to individuals and to geographical races.

The fold (*e*) formed by the inner sheath of the valve begins ventrally at the base of the valve, as in *cloanthus*, runs in an oblique direction to somewhat beyond half-way to the apex, turns round here towards the dorsal side, forms, when having arrived at a level with the ventral margin of the dorsal lobe, a subdorsal tooth (*c*), and then is continued in a longitudinal direction to form a dorsal ridge (*d*). The homology of the organs is obvious. The fold *e* is homologous to the fold *e* in *cloanthus*, but is here less raised, takes a somewhat different course, and is at the point where it curves round towards the dorsal side often feebly toothed. The

subdorsal tooth corresponds to that of *cloanthus*, but is here much less chitinised, usually broadened at the tip, and is in fact a dilatation of the fold *e* partly rolled in so as to form a half-cylinder ; though this tooth is variable, we shall not refer to it under each subspecies. The dorsal ridge corresponds to the dorsal ridge of *cloanthus*, but is here of a more complicated structure. In a view from the dorsal side (f. 97) it will be seen that the dorsal ridge of f. 96 consists of a dentate high basal portion and a free rod-like apical process (*g*), the *dorso-apical process*, which is curved upwards—that means towards median plane of the abdomen—is denticulate at the tip, and protrudes beyond the tip of the dorsal lobe. At the ventral side of the dorsal ridge a longitudinal fold (f. 96, *i*, and 98, *i*) will be noticed which is continued to the apex of the dorsal lobe ; that vertical portion of the fold (f. 98, *h*) which runs up to the upper edge of the ridge is of high importance, as it develops in most subspecies to a peculiar organ.

a. *P. sarpedon sarpedon* ; f. 96 to 114.

This form occurs all over India (except S. India and Ceylon) to Java, the Philippine Islands, and Japan ; in China it is replaced by another subspecies. There are some external characters by which the individuals from Java, Borneo, and the Philippines can be distinguished from the individuals from N.W. India and N. India, but these characters are very slight ; besides, the Malayan individuals lead over to the more different forms from the lesser Sunda Islands, and hence remain best included in *sarpedon sarpedon*. The genital armature is entirely in accordance with this statement.

We have examined specimens from N.W. India, Sikkim, Assam, Burma, Shan States, Tenasserim, Cochin China, Sumatra, Nias, Java, Natuna Islands, Borneo, Palawan, Mindoro, Luzon, the Riu Kiu Islands (= Loo Choo Islands), and Japan. The specimens from all these localities agree so well with one another, apart from individual peculiarities, that we did not succeed in finding in the genital armature any character by which the specimens from one or the other place could be recognised.

The outline of the valve normally met with in *sarpedon sarpedon* is represented by f. 96, which is taken from a Kumaon individual. The sinus is about $\frac{1}{2}$ mm. deep ; the dorsal lobe is rounded at the apex ; the ventral one is also rounded, its ventral edge feebly incurved. The dorsal ridge is in the dentition very variable ; the important feature is that normally the lateral fold *h* of f. 98 is very slight and incomplete, as in f. 99, or even absent.

The variability in the form of the valve is illustrated by f. 96, 97, 113, and 114. In f. 97, taken from an example from the Shan States, the sinus is narrow, and the apex of the ventral lobe also very narrow. F. 113 and 114 represent two other Shan States specimens : one has the ventral lobe much produced, and the sinus accordingly deep ; in the other the same lobe is very short and broadly rounded. In the individuals from the Malayan region the ventral lobe is often, but by no means regularly, more produced and slenderer than in the average Indian specimen ; and this is not surprising, as in the various subspecies from the lesser Sunda Islands the lobes are constantly long and slender.

The variation of the dentition of the dorsal ridge is very great, as will be seen from f. 98 to 100 and 104 to 110. Sikkim specimens are represented by f. 99, 100, and 108 ; individuals from the Shan States by f. 105 and 106 ; a Malacca specimen by f. 107; two Bornean examples (from Mount Mulu) by f. 109 and 110.

Every individual specimen examined exhibited some peculiarity in the number, size, and form of the teeth of the dorsal ridge.

The lateral (ventral) fold (*h*) of the dorsal ridge (f. 98) is in f. 107 (Taiping, Malay Peninsula) absent, in f. 99 (Sikkim) very short, in f. 106 (Shan States) complete but very slightly raised, and is more distinct in f. 98 (Kumaon). In f. 100 (Sikkim) the fold runs up to a small tooth, which has a somewhat transverse position to the longitudinal ridge; in f. 108 the fold is raised to a low but obvious dentate ridge, which we shall call "*transverse ridge*."

In a Mindoro specimen caught by Mr. A. Everett in December 1894 the additional transverse ridge is raised above the level of the dorsal ridge, and forms a conspicuous, broad, tooth-like prominence; in f. 111 the dorsal ridge with the transverse prominence is represented in a view vertical upon the plane of the valve; and in f. 112 we give a view of the same organ from the apical side (with the eye a little above the valve).

Still more aberrant is a specimen from the Shan States caught by Mr. Roberts in the same district where the individual was obtained from which f. 106 is taken. The increase in the size of the transverse ridge, as illustrated by f. 107, 99, 106, 98, 100, 108, 111, and 112, reaches in f. 101 to 103 the maximum. The transverse ridge *h* is higher, strongly dentate, and more extended than the dentate portion of the dorsal ridge *d*; in f. 101 the organ is seen from above, in f. 102 from the ventral side, and in f. 103 from the apical side (compare f. 111 and 112).

We have examined more than a hundred specimens of *P. sarpedon sarpedon*, and found only one that has the additional transverse ridge so extraordinarily developed; the significance of this variation is obvious if we compare the special structure of the dorsal ridge of *P. sarpedon anthedon*, *milon*, *choredon*, *teredon*, etc. We shall have to refer to this particular case again.

b. *P. sarpedon semifasciatus* from China.

The Chinese subspecies of *sarpedon* is in the markings not always distinguishable from *sarpedon sarpedon*, but the greater number of the individuals from Central and Western China have a very remarkable character in the band of the hindwing being more or less obliterated. Such specimens with almost entirely black hindwings are, in respect to pattern, quantitatively more different from *sarpedon sarpedon* than the individuals of any other subspecies are. Though we dissected a long series of Chinese individuals, we did not perceive any character in the genital armature by which they could be differentiated from *sarpedon sarpedon*; and this concerns the examples which are most aberrant in pattern, as well as specimens with the ordinary *sarpedon sarpedon* pattern. The fact is of high interest, as it distinctly shows that a great external discrepancy of a localised form does not necessarily imply that there is also a peculiarity in the genital armature of the form.

c. *P. sarpedon adonarensis* from Adonara and Sambawa; f. 127.

The interesting external features of this form are pointed out by Mr. Rothschild on p. 324 of this volume. In pattern it comes near the subspecies from the neighbouring islands of Sumba, Timor, and Wetter; and we were rather surprised when we found that in the armature of the valve the specimens from Sambawa and Adonara disagree with those subspecies, and agree much better with the Indo-Malayan *sarpedon sarpedon*, as the dorsal ridge is dentate and has the transverse ridge as feebly developed as it normally is in Indian examples. F. 127 represents

the dorsal ridge of an Adonara individual from the ventral side; it will be noticed that the dentate part of the ridge is markedly less extended than in *sarpedon sarpedon*, and that the transverse fold *h* has not developed to a ridge, as in f. 123 (Sumba), or f. 128 (Wetter) and f. 129 (Timor). The valve of *adonarensis* stands in shape intermediate between *sarpedon sarpedon* and *sarpedon jugans*, the lobes being slenderer than in the former, and shorter and broader than in the latter.

The individuals from the island of Lombok approach in external characters and in the genital armature still more the Indo-Malayan form.

d. *P. sarpedon teredon* from South India and Ceylon; f. 115 to 120, 133, 134.

The range of this subspecies is separated from that of *sarpedon sarpedon* by a wide area where most probably the species does not occur. We have examined above thirty specimens of *P. sarpedon teredon* from South India and Ceylon, all of which are in external features and in the genital armature well distinguishable from all other forms of *sarpedon*.

The valve is much narrower and the sinus considerably deeper than in *sarpedon sarpedon*. The ventral lobe (f. 115, 133, 134) is usually slender in its apical half, and curved towards the median axis of the abdomen, thus forming almost a hook-like organ; the dorsal lobe is sometimes strongly pointed (f. 133). The inconstancy of the outline of the lobes is illustrated by f. 133 and 134, which are taken from South Indian individuals.

The ventral (longitudinal) portion of the valval fold extends farther towards the apex of the valve than in the preceding forms, and hence the ventri-dorsal portion has a more oblique direction. The dorsal ridge is much less raised than in *sarpedon sarpedon*; the denticulation is absent; only the middle portion of the ridge, which corresponds to that part of the ridge of *sarpedon sarpedon* in f. 98 and 102 which bears the transverse fold or transverse ridge respectively, is elevated; it has, combined with the transverse fold (*h* of f. 98), developed in a vertical and transverse direction to a strong tooth-like transverse ridge, which slightly leans over basally and dorsally. As in f. 115, taken from an example from Trichopolis, the transverse ridge is too inconspicuous, we give an enlarged figure of the dorsal ridge of the same specimen in the same position (f. 116), and also a figure of the organ from the ventral side (f. 117). In f. 118 to 120 the transverse ridge alone is represented from the apical side; mostly the ridge is shaped as in f. 119; its edge is usually not dentate, but there occur specimens, like that from which f. 118 (South India) is taken, which have the transverse ridge dentate; in one of the Ceylonese examples (f. 120) the ridge is considerably smaller than in f. 119.

The individuals which belong to the ab. *thermodusa* have no character in the valve and its armature that is peculiar to them.

In external features and in the genital armature *teredon* comes much closer to the forms from the lesser Sunda Islands than to *sarpedon sarpedon*, which inhabits the interjacent countries.

e. *P. sarpedon jugans* from Sumba; f. 121 to 126.

"This form combines to a certain extent the characters of *sarpedon sarpedon* and *sarpedon timorensis*," and its "genital armature resembles more that of *timorensis* than that of *sarpedon* and *adonarensis*" (Rothschild, this volume, p. 324).

The sinus of the valve (f. 121) is deep. The ventral lobe is very slender, often

of almost rod-like appearance, sometimes even narrower than that of *sarpedon teredon*. The apex of the dorsal lobe is mostly rounded. The dorsal ridge is denticulate in the four specimens in the Tring Museum, but a comparison of f. 123 with f. 108 shows that the basal half of the ridge is very feebly raised; as in *teredon* (f. 117), the elevation is restricted to the median part of the ridge and the transverse ridge. F. 121, 122, 123, 125 are taken from the same individual; 122 and 123 give a view from the apical and ventral sides of the valve respectively, while f. 125 represents the median part of ridge alone in a view from above (as in f. 121). The dorsal ridge of another individual is represented from the apical side in f. 124; the transverse ridge is here much less developed than in the other specimen, in fact not more than in the Mindoro example represented by f. 112; the ridge *d* of the latter is, however, scarcely indicated in f. 124; the transverse ridge of f. 124 is enlarged in f. 126, which gives it in a view from above. The differences between f. 122 and 124, and 125 and 126, are very conspicuous.

f. *P. sarpedon timorensis* from Timor and Wetter; f. 128, 129.

We have only two specimens of this interesting form, one from Dili, Portuguese Timor, and the other from Wetter; the two individuals disagree somewhat with one another in external characters as well as in the form of the transverse ridge, but the differences are such that they may very well be individual and not subspecific.

The valve agrees with that of *jugans*, but the ventral lobe is less slender. The dorsal ridge, as in *teredon* from Ceylon and South India, is not denticulate; the transverse ridge is tooth-like, nearly as in *teredon*; f. 128 (Wetter) and 129 (Timor) represent the transverse ridge in a view from above; the figures may be compared with f. 125 and 126 (Sumba), 132 (Queensland), 138 (New Britain), 143 (Celebes), and 148 (Guadalcanar, Solomon Islands).

g. *P. sarpedon choredon* from Australia and New Guinea (including the islands near its coast); f. 130 to 132, 135 to 137.

The specimens from Waigeu and the northern parts of New Guinea are in external characters sometimes slightly different from ordinary individuals from Australia, and lead over to the next subspecies, which inhabits the Bismarck Archipelago.

The sinus of the valve is very deep (f. 135, Queensland). The ventral lobe is very prominent, its upper edge straight, its ventral (denticulate) edge evenly rounded; in breadth the ventral lobe is intermediate between *timorensis* and *jugans* on the one side, and *sarpedon sarpedon* on the other; in some examples the lobe is a third broader than in others. The dorsal lobe is in all examples we have seen rounded at the apex. The fold *e* of f. 135 is more curved than in *sarpedon sarpedon*, and takes about the same course as in *sarpedon teredon*.

The dorsal ridge divides basally in a dorsal (*r*) and a ventral (*s*) portion which correspond to the two slight folds marked *r* and *s* in f. 96. Now, in very many specimens both from Australia and New Guinea, only the ventral branch of the ridge participates in the formation of a high transverse ridge, as in f. 135 and in f. 136; the latter figure is taken from an individual from Redscar Bay, British New Guinea, and is a highly enlarged view of the transverse ridge and the adjoining parts of the dorsal ridge. In this case the dorsal ridge is rounded off,

and has no teeth, except at the tip of the apical rod-like processus, which is longer than in all the preceding subspecies. F. 137 represents the dorsal ridge with the transverse ridge of a Redscar Bay individual in an apical view. Another extreme in the structure of the dorsal ridge is represented by f. 130 to 132, which are taken from an example from Cairns, North Queensland. F. 130 gives a view from the apical side ; the dorsal ridge *d* is provided with teeth, and the transverse ridge *h* is joined to the dorsal ridge, and is not a separate structure as in f. 136; f. 131 gives the ridges in a ventral view, while f. 132 is taken from above. The intergradations between the extremes figured here are equally abundant in Australia and New Guinea.

The individual variation of *choredon* in the direction from f. 130 to 137, from the transverse ridge forming one piece with the dorsal ridge (as in *sarpedon sarpedon, teredon, jugans*), to the other extreme where the transverse ridge stands isolated, will serve to comprehend the still more exaggerated development of the transverse ridge in some of the following subspecies.

h. *P. sarpedon imparilis* from New Britain ; f. 138.

The external differences between this subspecies and the preceding one, though slight, are prominent enough to enable us to distinguish all our New Britain individuals from *choredon*. In the genital armature *imparilis* comes again very close to *choredon* ; the lobes of the valve are, however, more pointed (f. 138) ; the transverse ridge is smaller, stands less oblique, and leans over towards the base of the valve ; the dentition of the transverse ridge is as variable as in *choredon*.

The specimens with additional spots on the forewing have no character in the valve and the armature peculiar to them.

i. *P. sarpedon impar* from New Georgia, Solomon Islands.

The *male* of this insect is unknown; the *female* is in pattern midway between the preceding and the following form.

k. *P. sarpedon isander* from Guadalcanar and Bougainville, Solomon Islands: f. 148.

Though this form is so very aberrant in markings that it has been described by Godman & Salvin as a distinct species, and has also been kept separate from *sarpedon* by Mr. Rothschild in his Revision (who, however, informs me now that, in consequence of the receipt of more specimens, he must sink it to the rank of a subspecies of *sarpedon*), the valve and its armature are only slightly different from that of *imparilis*. The ventral lobe of the valve is broader, blunter, and shorter. The transverse ridge is not separated from the dorsal ridge ; it is high, mostly simple, and seldom notched or faintly dentate. F. 148 is taken from an individual from Guadalcanar.

l. *P. sarpedon dodingensis* from the Northern Moluccas (Halmaheira and Batjan); f. 139 and 140.

The sinus of the valve (f. 139) is very deep and especially narrow, being about twice as deep as broad. The ventral lobe of the valve is shaped nearly as in *imparilis*. The dorsal ridge is bifurcate as in *choredon*, but the bifurcation takes place not far from the apex of the valve; the ventral part of the ridge is raised and forms the usual transverse ridge. From f. 140, which is taken from the same

specimen as f. 139 and gives a view of the dorsal ridge from the apical side, it will be observed that the dentate ridge differs essentially from the transverse ridge of f. 103, 130, 137, 142, 144, in so far as it is not homologous to the fold *h* of f. 98, but to the middle portion of the dentate dorsal ridge to which that fold is joined. In a Batjan example the ridge, which in f. 140 is tridentate, is much reduced. The apical process of the dorsal ridge is long.

m. *P. sarpedon anthedon* from the Southern Moluccas (Amboina, Ceram); f. 141 and 142.

The sinus of the valve is twice as broad as in *sarpedon dodingensis*, but not so deep as in that form. The ventral lobe of the valve varies a good deal individually, and has generally the outline of that of *choredon* or *dodingensis*; the dorsal lobe is broader than the ventral one, and rounded at the apex. The dorsal ridge has the apical (rod-like) process prolonged, as is the case in *dodingensis*. The transverse ridge is always strongly developed, and nearly always so obviously detached as in f. 142, which is taken from a Ceram individual of which f. 141 represents the valve and harpe from above.

In external features *anthedon* is much more closely allied with *dodingensis* than with *choredon*; in the valve and its armature the difference between the former is, on the contrary, much greater than that between *anthedon* and *choredon*. *Anthedon* is distinguished from *choredon* only in the free apical process of the dorsal ridge being longer, and in the transverse ridge leaning more evidently over basally, as will be seen from comparing f. 135 and 141, and 137 and 142; while it differs from *dodingensis* in having a broader dorsal lobe, a much wider sinus, and a differently shaped and differently situate transverse ridge. The relationship indicated by pattern is therefore not the same as that which we must deduce from the structure of the genital armature.

n. *P. sarpedon monticolus* from Bonthain Peak, S. Celebes; f. 146 and 147.

The discovery of a mountain form of *sarpedon* in Celebes which is in general appearance very different from the form inhabiting the lower districts of the island is highly interesting. The subspecies resembles on superficial examination Indo-Malayan individuals of *sarpedon sarpedon*; the actual affinities of the subspecies are, in respect to the external characters, as follows: In the green colour of the markings *monticolus*—it ought to be *monticola!*—agrees with *sarpedon sarpedon*, *sarpedon jugans*, *sarpedon adonarensis*, and *sarpedon timorensis*, and differs conspicuously from its compatriot *milon* and the Moluccan races. In the shape of the wings it resembles *sarpedon sarpedon* from the Sunda Islands. In the shape of the median band of the forewing it comes nearest to *sarpedon dodingensis* from the Northern Moluccas, except in the third spot being larger than the fourth, in which character it agrees with *timorensis*. The underside of the hindwing is in *monticolus*, *milon* (Celebes), and *dodingensis* (Northern Moluccas), in opposition to all other subspecies, provided with a red mark before the median cell between veins 6 and 7. And, lastly, the genital armature of *monticolus* stands intermediate in structure between that of *milon* and that of *dodingensis*, and hence is obviously different from that of *sarpedon sarpedon*.

We have to lay great stress upon the mixture of characters found in *P. sarpedon monticolus*. As the relationship to *milon* from Celebes, *sarpedon* from the Sunda Islands, and *dodingensis* from the Northern Moluccas is equally great in the

characters of the wing and valve, we have no reason whatever to say that *monticolus* is derived from *sarpedon sarpedon*, or from *sarpedon dodingensis*, and not from *sarpedon milon*; and hence a conclusion, based upon the occurrence of a special form of *P. sarpedon* on Bonthain Peak, as to the probable geological history of Celebes—connection with the Sunda Islands or with the Northern Moluccas—would lack the necessary facts. We shall have to refer again to *monticolus* in the last chapter of this paper.

The valve is nearly shaped as in *sarpedon milon*, *i.e.* the ventral lobe is much longer and narrower than in *sarpedon sarpedon*. The dorsal ridge (f. 146, from apical side) bears a transverse dentate ridge, similar in position to that of *dodingensis* (f. 140), but differently shaped; the dentate ridge is much less extended than in ordinary examples of *milon* (f. 144). F. 146 gives a dorsal view of the ridge.

o. *P. sarpedon milon* from Celebes, the Sulla Islands, and the island of Talaut; f. 143, 144, and 145.

This long-winged and narrow-banded subspecies has the blue colour of the wing-band in common with the Moluccan races; the nearest ally in respect to the pattern of the wing is *dodingensis*, which has, like *milon* and *monticolus*, an additional red spot before the cell on the underside of the hindwing, and has the median band of both wings also obviously narrower than it is in the subspecies from Amboina and Ceram.

The sinus of the valve of *milon* (f. 143) is deep and broad; the ventral lobe of the valve is very slender and long, resembling somewhat that of *jagans* from Sumba (f. 121) and *teredon* from Ceylon and S. India (f. 133). The apical processus of the dorsal ridge is nearly as long as in the two Moluccan races. The transverse ridge has developed to a broad saw-like organ, which when seen from above sometimes almost extends to the sinus of the valve. In the ventral view of the dorsal ridge (f. 145, Celebes specimen) the denticulate portion of the dorsal ridge itself (*d*) is plainly visible; this portion of the ridge is not developed in the Moluccan races, but in *monticolus* from Bonthain Peak (f. 147). The transverse ridge (*k*) is in this specimen almost perpendicular. A view of the same organ from the apical side of the valve is given in f. 144; the ridge is larger than in any other subspecies, but there is some individual variation in the size of the ridge.

We have only one ♂ from the island of Mangiola (Sulla Islands), which, like the *female*, differs from the Celebes individuals in having a narrower median band to the wings. The valve and its armature is in this ♂ very slightly different from that of our Celebes examples; but, of course, we cannot tell from one individual whether the difference is due to individual or to local variation.

The more prominent facts of variation illustrated by f. 96 to 148 are as follows:—

(1) The genital armature varies according to locality: the Chinese subspecies agrees in the apparatus, however, with the Indo-Malayan one, in spite of very prominent external differences.

(2) The distinguishing characters in the genital armature of the subspecies are found in the valve as well as in the harpe.

(3) The individual variation within the Indo-Malayan subspecies, of which a large material has been examined, is so great that the difference between every two nearest allied subspecies is small compared with the difference exhibited by the extreme individuals of the Indo-Malayan subspecies.

(4) The Ceylonese and South Indian subspecies is in the genital armature and in the shape of the wing nearer related * to the forms inhabiting Sumba, Wetter, and Timor, than to the Indian form.

(5) The subspecies which are in colour and pattern nearly allied * (*sarpedon sarpedon* from India, *sarpedon choredon* from Australia, *sarpedon monticolus* from Celebes) need not be similar in respect to the genital armature.

(6) The spring and summer broods in North India and Japan are not different in the genital armature.

11. **Papilio bathycles** ; f. 46 to 50.

We have selected this species out of a number of "green" Eastern Papilios for two reasons : first, because the harpe of the species has long spines and processes the variation of which is more easily demonstrated ; secondly, because the three subspecies of the species (Java ; Malacca, Sumatra, Borneo ; North India and Burma), though in external characters not always distinguishable (at least as regards those two of them of which we have a long series), are in the harpes, according to our material, always different. We believe that the great gap between the harpe of the North Indian form and that of the Malayan form, and the smaller gap between the Malayan and the Java subspecies, are due to the circumstance that we have not examined specimens from the interjacent countries, Tenasserim and South-West Sumatra.

As the valve of *P. bathycles* does not vary to any extent, we figure only the harpe. The harpe consists of a fold extending ventrally from the base of the valve to near the apex, and from here to near the dorsal edge of the valve ; the fold is apically produced into a ventral spine (*a*), a ventral ridge (*b*), and into a dorsal ridge (*c*), all of which extend in an apical direction; the fold between the dorsal ridge and the ventral ridge is very slightly raised.

a. *P. bathycles bathycles* from Java ; f. 46.

We have examined but four individuals, the harpe of one of which is represented by f. 46. In all four specimens the ventral spine (*a*) is simple, without denticulation ; the ventral ridge is dentate, either of the form as represented in f. 46, with a small dentate dilatation at its dorsal edge, or the place of this dilatation is occupied by some small teeth ; the dorsal ridge is broad, denticulate, and has generally one larger tooth, as in f. 46 ; the surface of the ridge is basally limited by a faint fold.

b. *P. bathycles bathycloides* from Sumatra, Malacca, and Borneo ; f. 47.

F. 47 is taken from a Bornean example. The ventral spine is either simple, or, as in figure, denticulate at the tip ; the ventral ridge is longer and basally much narrower than in the Java form, being there without dilatation or denticulation ; the dorsal ridge is nearly shaped as in *bathycles bathycles*, but the fold *c* is more obviously marked and has a different direction.

c. *P. bathycles chiron* from Sikkim, Assam, Burma ; f. 48, 49, 50.

The material of this form which stood at our disposal was much larger than that of the two preceding subspecies, and consequently the amount of variability

* The words "allied" and "related" mean here simply "similarity," not phylogenetic relationship.

observed in *chiron* greater than the amount observed in *bathycloides* and *bathycles*. As in wing-pattern *bathycloides* and *chiron* are not always distinguishable with certainty, while *bathycles* is more easily recognisable, the dissimilarity in the harpes of *bathycloides* and *chiron* is much greater than the difference between the harpes of *bathycloides* and *bathycles*. Comparing f. 46 (*bathycles*) and 47 (*bathycloides*) with f. 48 to 50, which represent *chiron*, we observe as main character of the harpe of *chiron* that the dorsal ridge (*c*) is reduced to a small triangular tooth. Besides, the dorsal tooth *c* stands nearer the ventral ridge owing to an increase in breadth of the ventral portion of the harpe; the ventral spine has a somewhat different direction, and the ventral ridge is differently shaped.

The division of the ventral ridge of *bathycles* into two lobes (f. 46) is in f. 48, taken from a Shillong (Assam) example, more obvious; in f. 49 (Sikkim) the bifurcation is complete and the denticulation is much reduced; in an individual from the Shan States (f. 50) the ridge is divided into three teeth.

The ventral spine is either simple (f. 49), or denticulate at the tip.

The dorsal, triangular, ridge varies a good deal in size, but to our knowledge this variation is independent of locality, as is also the variation of the ventral ridge and ventral spine of *chiron*.

There often occur specimens of *chiron* in which the ochreous costal mark on the underside of the hindwing is wanting (ab. *chironides*), a character by which also *bathycloides* is distinguished from *bathycles*; in the genital armature of ab. *chironides* there is no peculiarity, and we also failed to find any distinguishing character in the genital armature of the spring specimens from Sikkim (broad-banded) as compared with the summer specimens (narrow-banded).

The facts of variation illustrated by f. 46 to 50 are as follows :—

(1) The three subspecies of *P. bathycles*, the Javan (*bathycles*), the Malayan (*bathycloides*), and the Indian (*chiron*), have the harpe built up after the same plan, but the detail of the structure furnishes in the specimens examined obvious distinguishing characters.

(2) The Malayan and the Indian forms are nearest related in pattern, while the Malayan and the Javan forms are nearest related in the structure of the harpe.

(3) The individuals of the spring and summer broods of *chiron*, and the specimens of *chiron* ab. *chiron* and *chiron* ab. *chironides*, are in the genital armature the same.

12. **Papilio aristeus**; f. 72 to 83.

This species ranges from Sikkim all over the Indo-Australian Archipelago, and is replaced on Celebes and some islands south of it by a close ally (*P. chesus*), and on the islands of the Bismarck Archipelago by another close ally (*P. paron*). Mr. Rothschild, Nov. Zool. 1895. p. 418, distinguishes four subspecies, which, arranged according to the geographical position of the district which each of them inhabits, are as follows :—

(1) *P. aristeus anticrates* in Northern India (Sikkim and Assam).

(2) *P. aristeus hermocrates* from Upper Burma to Timor and the Philippine Islands.

(3) *P. aristeus aristeus* on the Moluccas.

(4) *P. aristeus parmatus* in Queensland, on New Guinea and Waigeu.

That these four forms are really one species there can scarcely be any doubt, for the distinguishing characters are by no means perfectly constant.

P. aristeus, *rhesus*, *paron*, *antiphates*, etc., and all the green Eastern Papilios have in neuration a prominent character in common : in all of them the first subcostal branch is *invariably* anastomosed to the costal nervure. The relationship indicated by this phenomenon is doubtless blood-relationship, not simply form-relationship, as the structure of the larvae, pupae, and the morphology of the imagines point in the same direction. The form of the ninth abdominal segment in the *male*, and especially that of the eighth in the *female*, is in several groups of Indian Papilios with that peculiarity in the neuration morphologically similar, while those segments are in *P. podalirius*, *ajax*, and allies, which have a superficial resemblance to *aristeus*, *antiphates*, etc., of quite a different form (compare f. 181, *podalirius* ♀, and 182, *sarpedon* ♀).

The peculiar form of the valve of *P. aristeus* will easily be understood if one compares with f. 72 (*aristeus anticrates*) the valve of *P. sarpedon* (f. 96).

The apical sinus which in *sarpedon* occupies the middle of the apex is in *aristeus* more dorsal and is very narrow ; in a view perpendicular on the plane of the valve, as in f. 72, the sinus is concealed by a brush-like organ (*b*) ; but in f. 75, which represents the brush-like organ from the ventral side (*minus* the bristles), the narrow sinus between *a* and *b* is visible.

The organ *b* is homologous to the dorsal lobe of the valve of *sarpedon*, and therefore will here be called so. The ventral lobe of the valve (*a*) is very broad and rounded, or somewhat triangular. The position of the two lobes against one another can easily be imitated with the thumb (representing the dorsal lobe) and the four other fingers (representing the ventral lobe) by moving the thumb inwards.

The middle portion of the inner edge of the thick and raised ventral margin of the valve is furnished with short bristles.

The armature of the valve is also homologous to that of *sarpedon*. The usual fold of the inner sheath begins ventrally at the base of the valve, is soon curved a little dorsally, and then suddenly raised into a strongly chitinised, denticulate, ridge (*c*) ; from here the fold turns dorsally and becomes soon dilated into a long process (*e*), the subapical tooth of *sarpedon*, which we shall call *subapical process* ; this process leans strongly over dorsally and apically, is curved, and penetrates between the dorsal and ventral lobe of the valve, so that its tip is visible when the valve is viewed from the dorsal side. The position of the subdorsal process will become clear from f. 75 and 82.

The variation according to individuals and according to locality affects the dorsal lobe (*b*), the ventral denticulate ridge (*c*), and the subdorsal process (*e*).

a. *P. aristeus anticrates* from Sikkim and Assam; f. 72, 73, 75.

The dorsal lobe of the valve is always very broad ; its free apical portion is ovate. The outline is not always the same : sometimes the lobe is a little slenderer than in f. 75, which represents the average form and is taken from a Sikkim example ; sometimes it is a little shorter.

The ventral ridge appears in the view from above (f. 72, Sikkim individual) almost straight ; the ridge is concave dorsally, its middle portion being more ventral than the basal and apical edge. When seen from the dorsal side (f. 73) the denticulation of the ridge is more prominent ; in all specimens examined

the longest, most basal, tooth (right-hand side in figure) is nearly horizontal. The subdorsal process is simple, without denticulation.

There is no difference in the genital armature between the darker and the less dark specimens from Sikkim and Assam.

b. *P. aristeus hermocrates* from Burma to Timor, Borneo, Palawan, and the Philippine Islands; f. 74, 76 to 80.

We have examined individuals from the Shan States, Borneo, Palawan, the Philippine Islands, Sumba, Kalao, Wetter, and Timor. The individual variation in the pattern of the wings and in the size of the specimens is considerable, but we cannot find distinguishing characters which would necessitate a division of *hermocrates* into more subspecies; the Wetter and Timor individuals, from which islands we have only three altogether, are faintly different in the shape of the forewing, and may perhaps, on receipt of more material, be separable from *hermocrates*. An examination of the genital armature likewise did not furnish us with characters by which specimens from the various localities could be recognised, except the Shan States individuals, which are more similar in part of the genital armature to the North Indian *anticrates*.

The chief distinction in the genital armature of *hermocrates* concerns the form of the dorsal lobe, which normally is shaped as in f. 78, and the form of the ventral ridge, which has the basal tooth (f. 74) less horizontal than it is in *anticrates*.

We have two individuals from Muong Gnow, Shan States, one darker than many Philippine Islands specimens, one intermediate in the development of the bands between *anticrates* and ordinary Philippine *hermocrates*. The dorsal lobe of the dark specimen (f. 76) is scarcely different from that of *anticrates*, being much broader than it normally is in *hermocrates* (compare f. 76 to 80); in the whiter individual, which in the wing-pattern is scarcely different from dark Sikkim examples of *anticrates*, the dorsal lobe is considerably narrower (f. 77).

The series of f. 76 to 80 represents the variation of the dorsal lobe. F. 78 is taken from a specimen from Kudat, North Borneo; the lobe is still narrower than in f. 77; the next two figures (79 and 80) represent the lobe of two Palawan individuals. The specimens from Kalao, Timor, Wetter, and Sumba have the lobes as in f. 78 to 80.

The *gradual* decrease in the size of the dorsal lobe from f. 75 (*anticrates*) to f. 76 (*hermocrates*), and from there to f. 80, is evident; and it is further obvious that the difference between the extreme form of the lobe of *hermocrates* (f. 80) and the lobe of *aristeus*, as well as the difference between the other extreme of *hermocrates* (f. 76) and *anticrates* (f. 75), amounts quantitatively to much less than the difference between the extremes of *hermocrates* (f. 76 and 80).

c. *P. aristeus aristeus* from the Southern and Northern Moluccas; f. 81 to 83.

The individuals from the various islands of the Moluccas, though individually variable, exhibit neither in the wing-pattern nor in the genital armature any character confined to one or the other of the islands, or group of islands. This subspecies is in pattern most nearly related to *hermocrates*, but is easily distinguished by the ground-colour of the underside being obviously darker.

The dorsal lobe of the valve (f. 81 and 82) is in all specimens examined slenderer than in *hermocrates*; the individual variation is slight. The ventral ridge

is much more extended than in the two preceding subspecies ; when seen from above, as in f. 82, it is a kind of half-ring ; f. 83 gives the same organ in a view from the dorsal side of the valve. The difference between the ridge of *aristeus* and that of *hermocrates* and *anticrates* is obvious enough without further comment. Intergradations in the form of the organ are unknown to us. F. 81 to 83 are taken from a Halmaheira individual.

The subdorsal process is denticulate, and is longer than in *hermocrates* and *anticrates*, projecting distinctly beyond the upper edge of the ventral lobe of the valve (f. 82).

d. *P. aristeus parmatus* from Queensland, New Guinea, and Waigeu.

This subspecies agrees externally so well with the Indian *P. aristeus anticrates* that Professor Eimer did not perceive the slight differences in colour and pattern which generally separate *parmatus* from *anticrates*, and which Mr. Rothschild pointed out on p. 419 of Vol. II. of this journal.

Although we know from several species that in forms which in the wing-colour and pattern are the most closely allied the genital armature is more different than in externally less closely allied forms, we were nevertheless much surprised to find that *aristeus parmatus* has, in opposition to *aristeus anticrates*, the same genital armature as *aristeus aristeus* ; we dare say exactly the same, as *we have not found a single character* by which the apparatus of *parmatus* could be distinguished from that of the Moluccan insect. This discovery is very important, as it shows evidently that, in order to understand the relation of a form, it is necessary to compare sets of entirely independent characters, and as it further proves that a form externally similar to another can be dissimilar in the genital armature, while it agrees in these organs with an externally very different form.

13. **Papilio rhesus** from Celebes, Saleyer, and Djampea; f. 84, 85.

Though Eimer removes this insect from *aristeus* and puts it into another group of species along with American species, such as *ajax*, all the characters by which *P. rhesus* is distinguished from *P. aristeus* are developments of the characters of *aristeus*. The only argument in favour of a relationship with *ajax* is the number of the black bands on the forewing ; in *rhesus* there is one band less than in *aristeus* ; but even this argument is not valid, as there very often occur specimens in which the usually absent band is indicated by a black spot, and as there are even examples in which this spot has developed to a distinct band. All the other characters of the wing-pattern speak against a relationship with *ajax*, and this statement is corroborated by the morphology of the *male* sexual armature and by the form of the eighth abdominal segment of the *female*. To begin with the latter, it will be sufficient to say that the eighth segment in *rhesus* is complete, as in *aristeus*, *agamemnon*, *sarpedon*, etc. (see f. 182, *sarpedon sarpedon* ; f. 185, *aristeus parmatus* ; f. 187, *macfarlanei*) ; whereas in *ajax* ♀ the eighth segment is incomplete, as in f. 181 (*podalirius*). The similarity in the armature of the valve of *rhesus* with that of *aristeus* will become evident by comparing f. 84 and 85 with 75 and 83.

The dorsal lobe of the valve of *rhesus* (f. 84) is much broader than even in the Indian *aristeus anticrates*, except the free apex, which is comparatively narrower; the subdorsal process is thin, and, as in *anticrates*, not dentate ; the ventral ridge

is almost shaped as in *aristeus aristeus* and *aristeus parmatus*, but the basi-dorsal portion of the half-ring is much higher than in these subspecies ; f. 84 gives a dorsal view of the ridge.

The affinities of *rhesus* are as follows : in the pattern of the wings it comes nearest to *hermocrates*, in the form of the dorsal lobe of the valve and the subdorsal process nearest to *anticrates* and *hermocrates*, in the form of the ventral ridge nearest to *aristeus* and *parmatus*.

The facts of variation illustrated by f. 72 to 85 are as follows:—

(1) *P. aristeus hermocrates* exhibits obvious variability in the shape of the dorsal lobe of the valve ; the extreme specimens come very near *anticrates* and *aristeus* respectively.

(2) That Shan States individual of *hermocrates* which is most "typical" in pattern has the dorsal lobe nearly identical with *anticrates*, while a specimen from the same locality which in pattern is almost identical with certain North Indian individuals of *anticrates* has the dorsal lobe much narrower.

(3) There are no intergradations between the form of the ventral ridge of *aristeus parmatus*, *aristeus aristeus*, and *rhesus* on one side, and *aristeus anticrates* and *aristeus hermocrates* on the other.

(4) The two Eastern subspecies, *parmatus* and *aristeus*, geographically the nearest related, are identical in the genital armature and conspicuously different in pattern.

(5) The two subspecies, *anticrates* and *parmatus*, inhabiting the extreme parts of the range are in pattern closely related, and in the genital armature very different.

14. **Papilio alcinous** from Japan, the Loo Choo Islands, Formosa, and China ; Nov. Zool. 1895. t. VI.

China is inhabited by several forms related to the Japanese *alcinous*, namely *confusus*, *impediens*, *plutonius*, and *mencius*. Of these we shall take here into consideration only the first, *confusus*, which differs externally in the ♂ from the Japanese Papilio in the body being more extended red, especially in the front of the head being clothed with red and with black hairs (while in the Japanese insect the head is all black), and in the submarginal spots of the hindwing being generally more brilliant red. The Formosa specimens agree with this Chinese form in colour, and so do the individuals from the Loo Choo Islands. The examination of the harpes of a long series of Chinese and Japanese individuals led to remarkable results which are laid down in Vol. II. of this journal. The results were as follows:—

The harpe of the black-headed Japanese insect is, in all specimens examined, very different from the harpe of the Chinese individuals, except in one individual which has the harpe like the Chinese specimens.

The red-headed Loo Choo specimens have the harpe like the black-headed Japanese specimens. We have here, therefore, a combination of the external characters of the Chinese form with the genital characters of the Japanese form.

Amongst the red-headed Chinese specimens one was found in which the harpe has the dentate ridge of the Japanese form and the free apical process of the normal Chinese form, and hence combines the characters of the harpe of the red-headed Chinese and black-headed Japanese Papilios.

The facts are briefly as follows :—

(1) Japan : Head black. Harpe with dentate ridge, without free apical process ; one specimen like (3).

(2) Loo Choo Islands : Head as in (3). Harpe as in (1).

(3) China and Formosa : Head red. Harpe without dentate ridge, with free apical process ; one specimen with dentate ridge (= 1) and with free apical process (= 3).

The only inference from these facts logically possible is that neither the red colour of part of the hairs of the head, nor the form of the harpe, is in the Papilios in question of specific value. The present case reminds one strongly of that of *P. sarpedon* as explained on p. 478.

15. **Papilio aristolochiae**; f. 86 to 95.

The group of Papilios to which the present species belongs has the valve much reduced ; the harpe does not vary to any extent, while the *uncus* (dorsal part of the tenth segment, according to Peytoureau) is very variable. To show the amount of variation in one of the species, we figure the uncus of three Sikkim individuals of *P. aristolochiae aristolochiae* (f. 86 to 88), of three Sambawa specimens of *P. aristolochiae austrosundanus* (f. 89 to 91), and of four Bunguran examples of *P. aristolochiae antiphus* (f. 92 to 95). The variability of the uncus within each subspecies of *aristolochiae* is so great that we fail to perceive any character in that organ which could serve to distinguish the three (in external features easily recognisable) subspecies by.

B. Female Genital Armature.

Peytoureau,* in his researches on the morphology of the last segments of the abdomen of the *female Lepidoptera*, comes to the conclusion that there are, as in the *male*, ten segments, the anal segment of the *female* imago, consisting of two lateral pieces comparable in form to the valves of the *male* and having the function of a protector of the anus and the orifice of the oviduct, being homologous to the ninth and tenth segments of the pupa and larva ; the orifice of the oviduct has the same position as the penis underneath the anus between the ninth and tenth segments. The variation of the anal segment is of no importance for our present purposes. The orifice of the vagina is separated from the orifice of the oviduct, and is situated between the seventh and the eighth segments; in consequence of the development of the copulatory apparatus the eighth, not the seventh, segment has undergone great changes. The form of the segment, as well as of the vaginal armature, is in a live specimen easily perceivable when one gently presses the abdomen ; in a dried-up individual the apparatus is concealed, being entirely removed into the vaginal cavity, the opening of which is closed by the seventh and eighth segments being in contact. As it was, in the first place, not the aim of our researches to find characters in the morphology of the abdomen by which the higher divisions in the system of *Lepidoptera*, such as families and subfamilies, could be distinguished, but to try whether the morphological characters of the last segments could be made use of in diagnostic work relating to the lower degrees of division, genera and species, and particularly whether within the limits of a species there was in the copulatory apparatus a variation similar in kind and extent to that of the *male* organs of copulation, it was necessary to study the organs in question *in situ*, in order to be able to

* See note, p. 461.

compare the position and direction and the outline of the homologous parts of the apparatus of the allied insects, and thus to be able to observe minute differences in the most nearly related forms. As in live specimens, or in individuals shortly after death, a pressure of the abdomen sufficed to bring the organs in question fully in view, it was evident that a method of preparation of dried specimens would be successful, if the intersegmental membranes of the end of the abdomen were so relaxed that the whole apparatus could be pushed out without destroying the connection between the several organs. The method of preparation we employ is quite sufficient for our purpose, and has the great advantage of being very simple. We cut off the last four segments, soak them in hot alcohol and water, remove the eggs, scales, etc., with the help of a pin and brush, press the segments gently, and leave the abdomen in alcohol and water until the segments are freely moveable ; then we press the head of a pin from the inside of the abdomen against the vaginal bulb, and push it gently out, taking care that the membranes do not get torn. The eggs and the *bursa copulatrix* ought to be preserved.

While in a live specimen the membraneous and the more chitinised parts in the vaginal region are easily distinguished by their colour, in a dry individual all the parts are more or less brown, and, though the strongly chitinised organs are recognisable by their gloss, the exact limits between the membrane and the chitinised pieces which it connects are often obscured.

According to the development of the eighth segment the Eastern Papilios can be divided into two groups—such in which the eighth segment forms a complete ring without longitudinal sutures (f. 182), and such in which the ventral plate is absent. To the first group belong nearly all those Indian and African species examined in which the first subcostal nervule of the forewing anastomoses with the costa, except *P. mandarinus* and allies, and to the second group all the other Papilios examined, inclusive of *Troides* = *Ornithoptera*. The combination of an obvious character in neuration with a still more conspicuous particularity in the development of the eighth abdominal segment of the *females* of the species allied to *agamemnon*, *sarpedon*, *codrus*, *aristeus*, and *antiphates* of the Indo-Australian Region, and of *antheus*, *leonidas*, *pylades*, etc., from Africa, indicates certainly more than mere similarity in form.

The special copulatory apparatus consists of processes, ridges, tubercles, and folds near the vaginal orifice, all more or less chitinised, often dentate and hook-shaped. It is not a modification of the ventral plate of the eighth segment, but is an independent structure of the intersegmental membrane. The variety of the apparatus in the various species is startling, as a glance at f. 156 to 182 will show. The orifice of the vagina, marked *v* in the figures on Pl. XIX., has in the diverse groups of *Papilio* a different position ; in *P. alcinous*, *philoxenus*, and allies, it has a ventral (*recte* basal or anterior) (f. 179), in *podalirius* and allies (f. 181) a more dorsal (*recte* apical or posterior) position.

The variability of the copulatory apparatus we explain by figures only of four species ; this must suffice for the present. But to demonstrate the classificatory value of the armature we give figures of seven more species.

16. **Papilio machaon**; f. 156 to 159.

The figures are taken from a British individual. When examining the intersegmental membrane which bears the orifice of the vagina and the chitinised prehensile apparatus we perceive (f. 157) a somewhat lyriform or horseshoe-shaped

buckle (*b*), which is a chitinised portion of the membrane itself, and does not protrude free ; its ventral and lateral edges form a slightly raised ridge, as can be seen in f. 156. The ventral part of this buckle is produced into two processes (*a*), which are thin in a dorso-ventral sense, but divided longitudinally into a left and a right half, which stand at a blunt angle to one another in consequence of the middle line of the process being more dorsal than the lateral edges. At the base each process is constricted (f. 158), while the edge of the apical half is armed with teeth. In a side view the process (f. 156 and 159) appears plainly as a dilatation of the buckle *b*. The vagina *c* (f. 159) is behind the middle of the median piece of the buckle, and marked in f. 157 behind the two processes as a black spot.

The series of *females* examined has not been very great, and hence we do not yet know whether there is not some variation in the form of the armature in the various subspecies. From what we have seen we must conclude that if there is such a variation it must be very slight, as neither the European and Asiatic nor some American forms of *P. machaon* presented any obvious deviation from what we have figured on Pl. XIX. And this would be entirely in accordance with what we have found in the *male* genital armature of *machaon*, as far as a distinction between the genital armature of the various subspecies of this species goes. We can safely say that in *P. machaon* from Europe and Asia—

(1) There is no character in the genital armature of both sexes of any of the subspecies by which the greater percentage of the individuals could be distinguished ;

(2) There are obvious characters in the colour and pattern of the wing and body of each subspecies by which the greater percentage of the individuals, but not every specimen, can be distinguished.

The genital armature of *P. xuthus* is entirely different from that of *machaon*.*

17. **Papilio polytes**; f. 160 and 161.

The *female* of this species is polymorphic; we have examined the three *female* forms from Ceylon and North India, the two forms from Borneo, the three from the Philippine Islands, and also a single specimen of each of the subspecies from Celebes, Sangir, Sulla Islands, Amboina, and Halmaheira.

There is a good deal of individual variation in the apparatus of *P. polytes*, but this variation is entirely independent of the colour and pattern of the wings, and hence the various forms of the *female* of each subspecies must be pronounced to be identical in the genital armature ; ♀-f. *romulus*, ♀-f. *cyrus*, and ♀-f. *polytes* do not present any character in the vaginal armature by which one form is distinguished from the other, and so it is with ♀-f. *theseus* and ♀-f. *viridis*, and so on.

The intersegmental membrane (f. 160) is just underneath the eighth segment at each side thickened and corrugated, the corrugated portion having an elongate-ovate outline ; round the orifice of the vagina there is a low ridge continued upwards to the hinder end of the corrugate mark ; this ridge is raised into five processes, one ventral and two on each side lateral. The form of the processes is visible in f. 161, which represents the apparatus flattened out and viewed from the anal side ; the ventral process is rounded, the lateral ones are sharply pointed, the lower one is the longest. The length of the lateral processes is variable. Above the vagina there is a rounded tubercle, *t*, present in all allies.

* This confirms Dr. Seitz's opinion that *xuthus* is not a very near relation of *machaon*. See *Soc. Ent.*, 1895, p. 130.

The various subspecies do not exhibit any obvious difference in the form of the ridge, except perhaps the forms from the Moluccas. We have examined only one individual of the two subspecies from Amboina and Halmaheira. These individuals showed some difference in the length of the lateral teeth ; but as in the Indian, Bornean, and Philippine insects, of which we have examined several specimens, the teeth vary according to the individual specimens, the difference in the Halmaheira and Amboina examples can just as well be due to individual as to subspecific variation. In the *male* sex we have found that the various subspecies are in the genital armature connected by intergradations, but that nearly all the specimens of each subspecies are pretty well recognisable by the form of the harpe. In the *female* sex the difference in the vaginal armature, if present, is certainly much fainter; but we shall see later on that the difference corresponding to that in the harpes does not exist in the chitinised processes, but in the folding of the membrane, and is, when slight, not perceivable in consequence of the shrivelling of the membrane in the dry specimens.

18. **Papilio ambrax** : f. 162.

Though in pattern the *female* of this species comes very near that of *P. polytes nicanor*, so near indeed that entomologists like Kirsch and Snellen have mistaken it for *polytes*, there is a constant and very conspicuous difference in the vaginal armature of the two species. F. 162 represents the apparatus of a specimen from New Guinea ; the ventral process *a* of f. 161 is here wanting, and this character we have found to be constant in all the twenty odd *females* of *ambrax* examined. Besides, the lower lateral tooth is generally somewhat shorter than in *polytes*. The variability of the ridge is similar to that of *polytes*. The Queenslandian subspecies does not, to our knowledge, present any distinguishing character from the New Guinean subspecies in the form of the ridge.

The representative species from the Bismarck Archipelago and the Solomon Islands we have not yet examined.

19. **Papilio aegeus** ; f. 163 to 169, 176.

The individual variability of the vaginal armature is in this species very great, while an examination of a longer series of specimens from New Guinea (*aegeus ormenus*) and Queensland (*aegeus aegeus*) proved that the variation according to locality is very slight. The vagina is surrounded by three high processes which are dilatations of a high ridge. The position and general form of the armature is represented by the half-diagrammatic figure 165. The ventral process is the largest, and is narrowed from the middle towards the base and the apex ; the apical half is dentate, divided by a median sinus into two lobes of variable length (f. 166 and 167), and is curved dorsally (f. 163); ventrally the ridge is, like the processes of *P. machaon*, longitudinally concave, and is provided with a rounded middle keel (f. 164, *m*) which does not reach the apex. The lateral process *b* is seldom simple in outline; mostly it is more or less strongly dentate (f. 166). Above the orifice of the vagina *v* there stands the supravaginal tubercle *t*. The intersegmental membrane is, moreover, raised into a vertical fold *f* (f. 163 and 164), which stands in connection with the vaginal ridge.

a. *P. aegeus ormenus*: f. 165 to 166, 176.

The *female* of this subspecies is polymorphic. As in the case of *P. polytes*, we have found no characters in the genital armature peculiar to one or the other of

the *female* forms. The specimens figured are from near Dorey, Dutch New Guinea. In f. 166 the left lateral ridge is not drawn; the ventral process of this specimen is at the apex much deeper sinuate than that of f. 164, and the lateral process is much broader and multidentate, while the process is not dentate in f. 163 and 164. The anal segment and the supravaginal tubercle *t* is represented by f. 176.

b. *P. aegeus aegeus* ; f. 167 to 169.

The *female* of this subspecies is monomorphic in colour and pattern. The variability of the vaginal armature is illustrated by f. 167 to 169. The ventral process is slenderer at the base than in *aegeus ormenus*, and the lateral process has mostly on the outer side a slightly raised carina (f. 168 and 169). In f. 167 the teeth of the lateral and ventral processes, and in f. 169 those of the lateral process, are mostly obliterated; the dentition of the lateral process represented in f. 168 is restricted to the upper edge.

20. **Papilio rumanzovius** ; f. 170 and 178.

There are four series of species of Papilios which are closely allied to one another, the groups of *P. memnon*, *P. aegeus*, *P. deiphobus*, and *P. lampsacus*. We represent for comparison the *female* sexual armature of a species of the first three groups; the close relationship of the insects in question finds an expression in the similarity of the genital armature of *male* and *female*.

F. 170 is taken from a specimen of *P. rumanzovius* ♀-f. *rumanzovius*. The ventral process is broadest towards the base, its apex is irregularly truncate, the dentition of the process of *aegeus* (f. 166 to 169) is absent ; the median keel on the ventral side of the process of *aegeus* is here separated into a number of irregular, longitudinal, slightly raised folds and wrinkles. The lateral process is less high and leans over dorsally. The supravaginal tubercle, which in *aegeus* (f. 176) is small, and near which the membrane is inobviously folded, is in *rumanzovius* large (f. 178), and the membrane between it and the anal segment (ix. + x.) is regularly and heavily folded transversely, the folds being limited laterally by a longitudinal fold.

21. **Papilio memnon**; f. 171 to 175, 177.

Like *P. polytes* and *P. aegeus ormenus*, this species has a polymorphic *female* in most localities; we have examined a number of tailed and tailless individuals from North India, Java, Nias, and Borneo, and come to the same conclusions as in the case of the two before-mentioned Papilios, that the subspecies are extremely slightly different in the *female* genital armature, and that the various forms of the *female* of each subspecies do not exhibit any characters in the vaginal apparatus peculiar to one or the other of the forms. The individual variability is as great, or even greater, than in *ormenus*.

The chief features by which the vaginal armature of *memnon* can be distinguished from that of *aegeus*, to which it comes rather near, are as follows: the ventral process is broader basally, and the median keel of the underside (ventral side) is widened out laterally into two ridges which rise under a small angle from the plane of the main process (f. 173, *m*). The lateral process (*b*) is higher than in *P. aegeus*, and divides very often at its dorsal edge in an outer (f. 174 and

175, *o*) and inner ridge (*u*). The outline of the ventral and lateral ridges is very variable, as f. 172 to 175 show.

The supravaginal tubercle and the anal segment are represented in f. 177; the tubercle is similar to that of *P. aegeus*, but it is surrounded by two rather heavy folds which in *aegeus* are scarcely marked.

22. **Papilio alcinous**; f. 179 and 180.

The vaginal orifice is more ventral than in the preceding species, and the armature is very simple. Just above the vagina the membrane is smooth and more strongly chitinised, and bears a roundish impression (f. 179, *i*). From the lower edge of the eighth segment downwards extends a broad fold, *f*, which is also more chitinised than the rest of the intersegmental membrane, especially at two points where the fold has a bulbose appearance.

We have examined but two individuals each of the Chinese *P. alcinous confusus* and the Japanese *P. alcinous alcinous*, and find some obvious distinguishing characters between the two subspecies. In the Chinese form (f. 180) the membrane underneath the orifice of the vagina is strongly folded longitudinally, in the Japanese insect the membrane is smooth there; the supravaginal impression *i* is in *confusus* small, in *alcinous* large; the lateral fold is in *confusus* extended down to the ventral side as a conspicuously raised fold, while in *alcinous* the ventral portion of the fold is only slightly raised. A specimen from the Loo Choo Islands we unfortunately could not compare.

In the so-called nauseous species of *Papilio* allied to *alcinous*, *philoxenus*, and *aristolochiae* the vaginal armature is as a rule very simple.

23. **Papilio podalirius**; f. 181.

We figure the end of the abdomen of this European species for two reasons: first, because it enables the reader who is not acquainted with the exotic Papilios to compare the two common European species; and secondly, because the form of the eighth segment is entirely different from that of the Asiatic *P. antiphates*, *aristeus*, etc., which bear a superficial resemblance in pattern to *P. podalirius*.

The vaginal orifice is more dorsal, or rather apical, than in the preceding and following species here dealt with; the membrane round the orifice is strongly chitinised, forming a round plate-like organ, the edge of which is raised; the middle portion of the organ gradually raises and is highest just underneath the vaginal orifice; near the ventral edge of the eighth segment the edge of the discus-like organ fuses together with a strong oblique fold which is parallel to the ventral margin of that segment. The latter itself is incomplete, there being no ventral plate to it, but the posterior lateral angles almost meet above the vagina; the segment thus stands in development intermediate between the preceding species and the species here following. In the American allies of *P. podalirius* (*P. ajax*, etc.) the eighth segment is as in *podalirius* (or nearly so), and not as in *antiphates* and *aristeus*, which have it as in f. 182 (or nearly so). In *P. leosthenes* from Australia the segment agrees on the whole also with that of *podalirius*, and has also in *P. mandarinus* no ventral plate. Hence, in the development of the eighth abdominal segment *podalirius*, *leosthenes*, *ajax*, would be more nearly related to one another than to *aristeus*, *antheus*, etc., a statement which stands in direct opposition to the kind of relation at which Professor Eimer arrives by his interpretation of the wing-pattern; while, on the other hand, the absence of a ventral

connection of the lateral plates of the summit in *podalirius*, *mandarinus*, *ajax*, *leosthenes* is, to a certain extent, in favour of Eimer's opinion that there is a close relationship between the first two and between the last two species.

24. **Papilio sarpedon**; f. 182 to 184.

The ventral portion of the eighth segment covers the vaginal region roof-like. The intersegmental membrane bears a vertical strong fold (*f*), and there is between the fold and the vaginal orifice a strongly chitinised, smooth, impression (*i*). The margin of the orifice of the vagina is slightly raised laterally and produced ventrally into a process (*a*), the form of which will be seen from f. 183, which represents the organ viewed from the dorsal side. F. 182 and 183 are drawn from a Japanese individual. F. 184 is taken from a specimen of *P. sarpedon choredon* from Queensland; the process is broader at the base, and the angles at the apical sinus are more rounded; the difference between f. 183 and 184 is slight, but seems to be fairly constant. We have not found any difference between the processes of *P. sarpedon sarpedon*, *sarpedon semifasciatus*, *sarpedon teredon*, and *sarpedon milon* (!). The individual variation in the form of the process is extremely slight in the specimens examined.

25. **Papilio aristeus**; f. 185 and 186.

We have examined some Queenslandian *females* of *P. aristeus parmatus*, and a *female* of *P. aristeus hermocrates* from Kalao (between Celebes and Flores); both subspecies agree in the form of the eighth segment and in the genital armature, but in *hermocrates* the outline of the ventral (median) piece of the summit is indicated by a fine ridge. F. 185 and 186 are taken from a Queensland example.

The vaginal armature consists of two chitinised lappets (f. 186, *a* and a^1) which protrude ventrally, and of which the lateral edge runs upwards as a strong ridge, which is homologous to the vertical fold of f. 182, to the ventral margin of the eighth segment.

26. **Papilio macfarlanei**; f. 187 and 188.

At each side of the vagina there is a broad and strongly chitinised ridge (*f*), homologous to the vertical fold of f. 182, and bearing on the upperside a covering of irregularly folded small lappets. The margin of the vaginal orifice is ventrally produced into a bifurcate process (*a* in f. 187 and 188) which corresponds to the two lappets of fig. 186.

27. **Papilio agamemnon**; f. 189.

The apparatus is similar to that of *P. macfarlanei*, but the fork-like process has no stem and is connected with the folded intersegmental membrane (*n*) by a short bar visible in f. 189 between the two branches of the fork. We have not noticed any variability in the armature of this species.

Though our researches on the genital armature of the *female* sex of *Papilio* are quite incomplete, we are nevertheless justified in drawing some general conclusions from the facts of variation illustrated by f. 156 to 189.

(1) The prehensile apparatus consists of the armature of the orifice of the vagina, and the special folding of the intersegmental membrane.

(2) The folds of the intersegmental membrane cannot be studied from the dried-up individuals in such a manner that one perceives the minute differences between the folds of the individuals; to this purpose it is necessary to compare live specimens, or material preserved in an adequate fluid. The armature of the valve of the *male* is during copulation pressed against the intersegmental membrane of the *female*, and the spines, hooks, processes, etc., of the valve find a hold on the ridge-like folds of the intersegmental membrane; this is plainly visible in a ♂ and ♀ of *P. memnon* in the Tring Museum which are still united to one another. The special armature of the vagina takes hold on the internal portion of the ninth segment of the *male* and on the scaphium. There is sometimes a peculiarly shaped, broad, vertical, chitinous plate underneath the scaphium, for example in the *males* of the yellow *Troides* (= *Ornithoptera*), such as *T. helenus*, to which a long and strong ventral hook in the *female* corresponds.

(3) One would expect that the variation of the harpe in the *male* is in the same species accompanied by a corresponding variation in the *female* in those parts which during copulation are in contact with the harpe; hence the variation in the *female* genital apparatus parallel to the variation in the *male* harpe must be searched for in the special kind of folding of the intersegmental membrane, while the variation in the outline of the processes and ridges at the mouth of the vagina can have nothing to do with an adaptation to the special form of the harpe.

(4) In the only species examined in which the harpes vary very conspicuously according to locality, in *P. alcinous*, the intersegmental fold of the ♀ on which the harpe takes a hold is found to be different in the Chinese and the Japanese subspecies.

(5) Though the individual variation of the vaginal armature is often great (*P. aegeus* and *memnon*), a variation according to locality is not observed, or is slight.

(6) In species with polymorphic *females* the vaginal armature is the same in the various *females* (apart from individual variability).

III.—CONCLUSIONS.

The demonstration of the kind and the extent of the variation of the genital armature in both sexes of some species of *Papilio* which is contained in the preceding chapter, notwithstanding the fact that our researches are still incomplete and our notes on the vaginal apparatus even preliminary, enables us to compare the variation of the genital armature with that of other organs and to draw with safety some general conclusions. If we almost restrict the comparison to the colour, pattern, and shape of the wings, mentioning only the prominent characters of the respective insects, we do so in order to avoid unnecessary detail, and secondly, because the distinguishing characters of species, subspecies, and aberrations of butterflies as given in the works of Lepidopterists refer especially to the wings.

As the true basis of work in Natural History is the comparison of specimen with specimen of the lowest classificatory entity, the species, a study of the genital armature has to begin with the comparison of the armature of such individuals as are doubtless specifically the same. To determine the limits of variation of the genital armature of a species is a difficult task. Though the number of specimens of the commoner species could easily be enlarged without any great

pecuniary sacrifice, the student of the variation of an internal organ, which is not visible without dissection, is at a great disadvantage compared with the student of external characters, because his series of individuals is always taken at random ; he has no security whatever that, among the hundreds of specimens which perhaps are at his disposal, there are really individuals which in the genital armature represent the extremes of that species, or come near the extremes ; while, on the other hand, the specimens conspicuously aberrant in wing-pattern, or colour, or shape, are recognised and preserved by collectors, which gradually results in an accumulation of individuals which fairly represent the various degrees, inclusive of the more extreme ones, of the variation of the species in external characters. Hence it is by no means to be wondered at that there are so many individuals known which in external characters stand far outside the *usual* limits of variation of the respective species, while the internal genital armature seemed to vary only within very narrow limits. On the contrary, it must surprise us that we nevertheless *did* succeed in finding among our specimens such individuals as exhibit in the genital organs characters so widely divergent from the normal of the respective race of *Papilio* that the individual not only forms a transition to another geographical representative, but goes in the development of the peculiar character even beyond allied forms. The specimen of *P. sarpedon sarpedon* (f. 101, 102, 103) and those of *P. alcinous* figured on Pl. VI. of Vol. II. of this journal (f. 11 and 13) are such "unusual" varieties, which perhaps are in nature not rarer than individuals that in external characters come close to, or are identical with, one of the allied forms; and we have no doubt that a continued investigation in the matter will bring to light varieties in the genital armature which in the degree of divergency are equal to so-called sports. The individual variability found in our series of British *P. machaon* to amount to 40 per cent. in the gradual increase of the length of the prehensile portion of the harpe, and in Palaearctic *machaon* to 70 per cent., is quantitatively scarcely inferior to the variation exhibited in external characters, and the same applies to the other Papilios dealt with in the preceding chapter. In the *female* genital armature we meet with an equally great variability in many of the species, especially in all those which have a more complicated armature ; the variability of the complicated apparatus, which consists of spines, hooks, dentate ridges, and so on, appears generally to be greater than that of a simpler armature, because the difference between the apparatus of two individuals is more easily perceivable in a complicated than in a simple organ, even if the difference in the latter expressed in proportional numbers is greater than in the former.

If we group the individuals of a species from one locality according to the similarity in the genital armature, and then again according to a conspicuous external character, the first series of groups and the second are not the same ; we have found again and again that specimens similar in a certain character in colour, pattern, or shape of wings have no particularity in the genital armature in common by which they are distinguished from the individuals that do not possess that external character ; specimens aberrant in wing-pattern may be normal in the genital armature, and individuals abnormal in the latter may be normal in the former. The harpe of *P. aegeus armenus* with a band on the forewing is the same as in the aberration without the band; *P. eachenor eachenor* ab. *eutropius* does not differ in the harpe from the ordinary *male* ; *P. polytes borealis* ab. *thibetanus* has a normal harpe, and so on. Still more obvious is the independence of the variation of the genital armature in the species with polymorphic *females* ; the various *females*

of *memnon*, tailed and tailless, those of *polytes*, and also those of *aegeus ormenus*, though individually very variable in the vaginal armature, agree with one another (respectively) in these organs. Marked dimorphism, in which the two forms are not connected by intergradations (tailed and tailless *female* of *P. memnon*), we have not noticed in the genital armature, unless f. 171 and 173, in which the lateral ridge is not divided, and f. 174 and 175, in which the lateral ridge is divided into the two ridges *o* and *u*, represent a kind of dimorphism ; both the simple and the divided ridge occur in tailed as well as in tailless individuals of *P. memnon* : intergradations between the two developments of the lateral ridge are unknown to us, but may occur.

Of equally great interest are those cases in which a specimen of a certain subspecies resembles another subspecies externally, but stands further away from this subspecies in the genital armature than another specimen does that externally is dissimilar to the subspecies. We recall to mind the two individuals of *P. aristeus hermocrates* from the Shan States mentioned on p. 487, and add that, if variation in pattern and variation in the sexual organs were in any way connected with one another, one would have expected that the paler individual resembling certain Sikkim specimens of *anticrates* had the dorsal lobe of the valve broader than the other individual, which in pattern is like dark Philippine examples ; as, however, just the reverse is the case, the broader dorsal lobe of the valve and the narrower and shorter black bands of *anticrates*, and the narrower dorsal lobe and more extended black bands of *hermocrates*, must be considered as independent characters.

It is possible that there are species in which a great variability, resp. constancy, of the pattern of the wing is associated with a great variability, resp. constancy, in the sexual armature, but so much is certain that in all the species we have examined there is no correlation between the directions in which the wings and the sexual armature vary. Hence we may pronounce it as a general law *that the direction of the variation of the genital armature within a species of Papilio is entirely independent of the variation of the wings.*

We need scarcely mention that this law applies also to other *Lepidoptera* ; our researches in groups other than *Papilio* are, however, so limited that we prefer for the present to express the law as above. It would be of great interest to study the variation of the genital armature of specimens which have artificially been exposed to transmuting factors, such as heat and cold, and to compare the results with those arrived at by the examination of the individuals roaming at large. Most probably the artificially produced colour-varieties will be normal in the genital armature. To this conclusion we are led by the experience gained from the examination of seasonally dimorphic species. We paid special attention to the copulatory apparatus of such species with the hope of finding in one or the other *Papilio* differences in the apparatus of the spring and summer brood (or broods), but completely failed to come across a species which, both in the wing-markings and in the sexual organs, showed seasonal dimorphism. The spring forms of the Japanese *P. machaon*, *P. xuthus*, and *P. sarpedon* are in the harpe and the vaginal armature the same as the differently coloured respective summer forms, and so it is with the Sikkimese species which exhibit in the wings a marked seasonal dimorphism (*P. sarpedon*, *clearchus*, *eurypylus*, *bathycles*). In the case of winter and summer forms it is therefore evident that the influences which bring about a change in the wings have no apparent effect on the sexual armature. This corroborates the above statement of the independence of the variation of the sexual

organs and the wing-pattern, and opens a wide field for theoretical research, inviting at the same time to a comparison of the seasonal with the geographical variation.

In the introduction we have mentioned the degrees of geographical variation observed in Papilios ; the lower degrees, called above localised aberration, concern the colour, pattern, and shape of the wings, and cannot be expected to be noticeable in the genital armature without long-continued research: we have therefore to do only with the higher degrees of geographical variation of a species which is termed *subspecific* variation.

The valve, when of the usual more or less triangular outline, does not exhibit obvious subspecific variation; while the variation according to locality is conspicuous, when the valve is divided into lobes, as is the case in *P. sarpedon*, *aristeus*, and others. The variation is such that the specimens from a certain locality are generally well distinguished from the specimens of a certain other locality; but if we take individuals from all the various districts inhabited by the respective species, the lines of delimitation of the various forms become mostly obscure and disappear. North Indian specimens of *sarpedon* and individuals from Sambawa are at once distinguished by the form of the valval lobes, but examples from Lombok, Java, and Sumatra overbridge the gap; Queenslandian and Sikkim *aristeus* are in the dorsal lobe of the valve quite dissimilar, but specimens from the interjacent countries form a continuous series of intergradations between those two extremes. The armature of the valve varies in a similar way. We have cases in which the prehensile organ of part of the individuals of the various localities has some peculiarity; thus in Great Britain the prehensile portion of the harpe of a good many specimens of *P. machaon* is long, while in many individuals from Syria the dentate portion is very short; the subspecific difference in the harpe of *P. aegeus* from New Guinea and Australia is very slight and applies only to part of the specimens. In other species the differences between the individuals from various districts become more constant, so that with very few exceptions it is possible to tell from the examination of the harpe from which place a respective specimen came. While in other cases again, such as *P. bathycles*, the individuals examined were constantly different in the harpe according to locality.

The localised peculiarity in the harpe is, therefore, found in many, or in nearly all, or in all the individuals from the respective locality, and when the distinguishing character applies to all the specimens, there occur intergradations either in other places (*P. aristeus*), or intergradations are unknown (*P. bathycles*).

In the *female* sex the armature at the mouth of the vagina does not vary so obviously according to locality as the harpe of the *male* does ; but when the difference in the harpes of the subspecies is very conspicuous, as in *P. alcinous alcinous* and *P. alcinous confusus*, the difference in the corresponding part of the vaginal bulb is also prominent.

If we keep in mind that the variation of the copulatory organs is independent of the variation of the wing-characters, it is to be expected that a division of a species into subspecies will result in a different number of subspecies according as we take for the basis of division solely the wing-characters, or the genital armature, or both united; and it would likewise not be surprising if in a certain case the number of subspecies inhabiting a certain region would by both divisions be the same, but the lines of division be different. Among the species we have examined the latter phenomenon did not occur ; when the numbers of the subspecies

were the same, the limits of division were also the same, whether the delimitation of each subspecies was carried out according to the wing-characters, or according to the apparatus of copulation. This result is most probably owing to the areas to which the various subspecies of the Papilios examined are restricted being mostly islands.

Hence we can accept it as a general rule applying to most subspecies that the distinguishing characters taken from the wings are associated with distinguishing characters in the genital armature, at least in the *male* sex. There are, however, many exceptions to this rule, in so far as a good number of subspecies characterised by some certain peculiarity in the wings have no peculiarity in the apparatus of copulation. The Chinese specimens of *P. sarpedon*, so very conspicuously aberrant in pattern, are in the valve and harpe identical with the Indian and Japanese form of *sarpedon*; the Moluccan subspecies of *P. aristeus*, though in the extent of the markings very different from the Queenslandian representative, is in the sexual organs the same; so that in an arrangement of the forms according to the development of the apparatus of copulation of the *male*, *P. aristeus aristeus* and *P. aristeus parmatus*, and *P. sarpedon sarpedon* and *P. sarpedon semifasciatus*, would have to be united. We meet, further, many subspecies which in external characters are conspicuously and almost constantly different, while there is only a slight and very inconstant character of distinction in the genital apparatus. We have found it correct in all the species examined that, if in a given species the character of distinction of a certain subspecies lies in one only of two independently varying organs, wings and apparatus of copulation, it is invariably the wing which exhibits the character by which the subspecies is distinguished. This coincides in a remarkable manner with the above observation that seasonal dimorphism does not affect the sexual armature in the case of the North Indian and Japanese Papilios, and renders it certain that the effect of (seasonally or geographically) isolated transmuting factors is first noticeable in the wing-markings, and that accordingly the transmutation of a species begins with a change in the wing-markings. Hence it is also correct to say that in an evolutionistic sense the wing-markings are less constant than the genital armature, and that consequently a difference in the latter constantly met with in the individuals of two forms of *Papilio* is much more likely to be of specific value than a difference in the wing-pattern, a conclusion which borders closely upon one of the main objects of our researches, the question as to the classificatory value of the sexual armature, which we will now briefly discuss.

A. Taxonomic Value of the Organs of Copulation.

As our researches have proved that there is a certain amount of individual variation in the sexual armature, the limits of which can, as we have seen above, only be determined by continued examination of a large material, and as we further have found that there is geographical polymorphism in the organs in question in which the localised forms are connected by intergradations (*P. sarpedon sarpedon* and *adonarensis*, *P. aristeus hermocrates* and *anticrates*), the premisses of the discussion of the question which characters are and which are not of specific value are precisely the same as in the case of external characters. Referring to what we have said in the introduction about our means of recognition of specific distinctness, it will be sufficient to recall to mind the fact that the presence of a character in a certain form not met with in other forms is *a priori* not a proof of the respective form being

specifically distinct from its allies, and that it is circumstantial evidence which has to guide us, in the absence of experiments, in our judgment. Now, what is the evidence we derive from the examination of the organs of copulation?

We know the larval and imaginal state of a good many Papilios, and are able to base on our knowledge of their organisation, quite apart from the characters of the organs of copulation, a classification in which the most nearly allied species are, with a certain degree of correctness, grouped together. If we now compare of a well-studied group such forms about the specific distinctness of which we do not entertain any doubt—if, for example, we examine the sexual armature of *P. memnon*, *mayo*, *oenomaus*, *polymnestor*, *lampsacus*, *rumanzovius*, etc., which in their general organisation are all more or less closely allied to *P. memnon*, or take for examination *P. antiphates* and *androcles*, or *P. aristolochiae* and *P. polydorus*, or the various yellow species of *Troides* (= *Ornithoptera*)—the first thing we notice is that the imagines of each species exhibit, besides the distinguishing characters in colour and structure externally visible, also characters in the genital armature peculiar to the respective species. As we have not found amongst all those species the specific distinctness of which we could deduce from characters other than such of the organs of copulation a single exception to that rule, we hope we are justified in generalising the statement that every species of *Papilio* is different from every other species in the sexual armature; and this generalisation we believe the more confidently to be correct as also in other groups of *Lepidoptera* specifically distinct forms are characterised by some peculiarity in the copulatory organs, although the difference between allied species is sometimes—for example, among *Aganaidae*—very slight. If the generalisation is correct—*i.e.* if every form that is, according to our definition of the term "species," specifically distinct, which, we repeat, can only be *proved* by experiment, and we will assume the generalisation to be correct—then it follows necessarily that forms which are identical in the genital armature are also specifically identical. If we apply this conclusion to the species of *Papilio* externally polymorphic, it is evident that the genital armature of *male* and *female* is an excellent criterion of specific identity. The various varieties of the *male* of *P. aegeus ormenus* from New Guinea, of *Troides priamus poseidon* from the same country, of *P. memnon*, and so on, many of which have been described as distinct species, are thus easily demonstrated to be specifically the same. Still more important is the application to the *female* sex. The numerous species with polymorphic *females* which so often are quite unlike each other, as in the case of *P. memnon*, *P. aegeus ormenus*, *P. polytes*, and the African *P. phorcas* and *merope*, and some American species—an examination of the genital apparatus of a number of specimens will at once make it clear whether the forms in question belong certainly to one species, or whether they eventually can belong to more species. We say intentionally "a number of specimens," for the examination of one example of each form is quite inadequate, and may lead to entirely erroneous conclusions. F. 171 and 173 give an excellent illustration, the first being taken from a tailless example of *P. memnon agenor* from Sikkim, and the other from a tailed specimen from the same locality. Now, considering that f. 167 represents a species very different from *memnon*, it would by no means be preposterous to conclude, if one had to judge only from the three figures and the conspicuous external differences of the specimens, that f. 171 and 173 represented likewise specifically different Papilios. It will generally be quite sufficient to examine a number of individuals of one of the forms, and to determine thus the probable limits of variation; the vaginal apparatus

of a specimen of another form, if specifically the same as the first, then will most probably come within the limits of variation of the first ; if it stands outside those limits one has to examine some more specimens. It is perhaps not unnecessary to repeat that the tailed and tailless *females* of *P. memnon* have been *proved* by rearing to belong to one species.

The second point which strikes one when comparing the sexual armature of species of the same group or closely allied groups, and which is of no less great practical consequence, concerns the fact that the species which we must regard as more or less close relatives on the ground of their general organisation bear in the structure of the organs of copulation (inclusive of the modified eighth segment of the *female*) a greater resemblance to one another than to the species which stand further away in the system. Representative species, such as *P. aristeus* and *rhesus*: *aegeus*, *tydeus*, *gambrisius*, *inopinatus* ; *euchenor* and *depilis*, etc., have the organs in question built up after exactly the same plan, and the differences exhibited by these representative species in the organs of copulation are often not only far less obvious than the external differences of the species, but are sometimes so slight that the degree of divergence between two species is less than the degree of divergency between the extreme individuals of one of the two species; we refer for illustration to the figures given of the harpes of *P. aegeus* and *inopinatus*, *polytes* and *ambrax*. In less closely related species the similarity in the sexual armature is not so great as in those representative species which are phylogenetically younger forms ; the organs are more divergently developed, and the peculiar modification of one or the other part of the apparatus often obscures the actual homology, so that the organs superficially compared are very dissimilar in appearance. Nevertheless a comparative study at once shows that the superficially dissimilar apparatus are developments of the same type. In *P. sarpedon* and *cloanthus* the close relationship of the valves and harpes (f. 96 and 149) is obvious. In *aristeus* (with *rhesus*, f. 72 to 82) the organs are more strongly modified, but the homology of the single parts with those of *P. cloanthus* is not difficult to perceive ; *antiphates* has the organs again similar to those of *aristeus*, and the externally very dissimilar *P. delesserti*, *leucothoë*, and *xenocles* resemble *aristeus* in the structure of the *male* organs to a surprising extent, the principal prehensile parts of the valve consisting in these species, as in *aristeus* and *antiphates*, of a ventral dentate ridge, a subdorsal process, and the dorsal lobe of the bipartite valve, which parts respectively are homologous to *e*, *c*, *b* of f. 72 (*aristeus*). The vaginal armature agrees in this respect with the *male* armature ; here again the most closely allied species have a greater similarity in the organs in question to one another than to less nearly related species : *P. ambrax* and *polytes* (f. 161 and 160) ; *P. aegeus*, *rumanzovius*, and *memnon* (f. 166, 170, and 171) ; *P. sarpedon*, *aristeus*, *agamemnon*, and *macfarlanei* (f. 182 to 187) illustrate this fact sufficiently. Although it would seem to follow from these statements that the degree of blood-relationship of two species to a third could easily be made out from the degree of similarity in the form of their organs of copulation, this inference of the facts would nevertheless be hasty and most probably erroneous, if we generalised the conclusion so as to apply to every species. Our researches convince us that it is true that in every group of closely allied species of *Papilio* the characters of the three independently variable organs, wing, harpe of *male*, and the vaginal armature of *female*, are such that each of these organs of every species is morphologically closer related to the respective organ of every other species of the group than to that of any species standing outside the group.

But within the group a species could very well be nearly related to another in the pattern of the wing, while it comes in the structure of the copulatory organs of the *male* or *female* closer to a third species, so that the relationship of the species *inter se* would appear to be different according as we take as the standard of arrangement the deviation in the one or the other organ.

If, however, it is true that the species which belong to the same group (of allied species) are in the genital armature more similar to one another than to the species of other groups, we have consequently to conclude that the organs of copulation are a safe guide to determine to which group a species belongs, which means that these organs can be made use of in generic classification. The great help which the genital armature affords to the systematist is beautifully illustrated by those species which bear to each other a superficial resemblance in pattern, such as *P. clytia* and *leucothöe* or *macareus*, *P. rhesus* and *philolaus*, which on the ground of the alleged relationship in pattern have been considered allied species. Though a careful examination of the wing-markings soon convinces us that we have here and in many other Papilios to do with an analogous development in pattern, as in the case of mimetic forms, which does not indicate blood-relationship, the demonstration of the dissimilarity in the morphology of the organs of copulation of those superficially similar species will be a more convincing guide in which direction the actual relationship is to be sought for.

Having thus arrived at the two conclusions, firstly, that identity in the sexual armature means specific identity, and secondly, that close relationship in these organs points to generic identity, the question arises, whether there are in the organs of copulation of specifically distinct Papilios, as opposed to specifically non-distinct forms, characters which *a priori* could be recognised as being of specific value, and hence would enable us to draw up a general rule applying to every case by which specifically distinct forms could be distinguished from specifically identical forms. The occurrence of individual and geographical variation in the copulatory organs, the latter kind of variation always associated with an independent variation in the wing-markings, renders it alone highly improbable that a general distinction between specific and subspecific characters is possible. A comparison, however, of the degree of divergency between subspecies with the degree of divergency between closely allied species proves that the quantitative amount of divergency between specifically identical forms can be superior to the quantitative amount of divergency between allied species. *P. inopinatus* differs in the harpe (f. 12) not so much from certain examples of *P. aegeus* as some of the latter do from one another (f. 4, 5); the difference between the harpe of *P. polytes polytes* (f. 18) and *P. polytes alphenor* (f. 33) is greater than that between *P. polytes* and *P. ambrax* (f. 35, 37); the difference between *P. aristeus parmatus* and *P. aristeus anticrates* in the harpes (f. 73, 75, 81, 83) is not inferior to the difference between *P. aristeus anticrates* and *P. rhesus*, which latter is considered to be a species distinct from *aristeus* (f. 82, 84). If, however, there are such cases like these in which that difference which is the greater in quantity is the smaller in quality (in respect to specific distinctness or non-distinctness), it consequently follows that it is impossible to say *a priori* which degree of quantitative divergence in the organs of copulation is in all Papilios of specific value. Hence a peculiarity observed in the sexual armature of an individual can be an aberrational, a subspecific, or a specific peculiarity; which of the three it actually is, we can learn only from a careful weighing of all the evidence. We have said in the introduction that the evidence

remains quite incomplete as long as we do not know the limits of variation of the forms in question ; as these limits, however, can be made out, to a certain degree of correctness, only by comparing many individuals, it becomes self-evident that the question whether a certain peculiar character found in the genital armature of an individual or a number of individuals indicates specific distinctness or not, can only be decided with a certain degree of correctness when the variation of the sexual armature of the allied forms is known, *i.e.* after the examination of a great material.

When we said above that the degree of relationship between a number of closely allied forms could very well appear different according as we take the sexual armature or the wing-pattern as a guide in the arrangement of the forms, we did not give illustrations, because we had to recur to the phenomenon. If it really is true that there are cases in which two forms are in colour and markings the most closely related, while the structure of the genital armature stands in opposition to this relationship, pointing in quite a different direction, a comparison of the characters of the wings and the characters of the apparatus of copulation of the most closely allied forms, which are always geographical representative forms, with the aim of deducing the different relationship as indicated by similarities in the one or in the other organ, must throw a highly interesting light upon those questions which relate to the probable history of the geographical distribution and the origin of those forms.

B. Phenomena in the Variation of the Organs of Copulation Relating to Some Questions of the Geographical Distribution of Animals.

When we speak here of representative forms, we do so regardless of their being specifically distinct from one another or not ; whether a geographical representative has reached the degree of divergent development which we call specific, or is still a subspecies, is of no importance for the following discussion ; the important point is, that there are differences between the representative forms.

Now, when we see that some Indian and Australian representatives are very similar in colour to one another and dissimilar to the forms inhabiting the interjacent countries, does that mean that the Indian and the Australian forms have separated after the more dissimilar representatives had branched off? When we find the Celebensian mountain form of *P. sarpedon* to bear a much greater resemblance in colour to the form inhabiting the Sunda Islands than to the form found on Celebes at lower elevations, is it correct to conclude that the Celebensian mountain form is a descendant of the Sunda Island form and indicates that there was at a former period a closer connection between Celebes and the Sunda Islands ? When we observe in a great number of cases that the Javanese forms are similar to those from Malacca, while the forms from Sumatra and Borneo again are similar to one another, have we to infer from this fact that there was at one time a land-connection between Malacca and Java independent of Sumatra and Borneo ? When West Africa and Madagascar are inhabited by two representatives with a narrow and interrupted band, while the East African form has a broad and uninterrupted band, can we conclude that the Madagascar form is the ancestor (or descendant) of the West African form ? When, finally, we find Central America, the Greater Antilles, the Lesser Antilles, and Venezuela inhabited each by a representative bird or Papilio, and notice that in colour the forms from the first and third and the forms from the second and fourth localities are respectively similar, are we justified in so interpreting the fact as to say the Lesser Antilles have received the bird or insect from

Central America, while the form of the Greater Antilles is an immigrant from Venezuela? We are not going to deny that in a given case applying to one or the other of those questions an affirmative answer could be in accordance with the actual history of the origin of the respective form; but we shall endeavour to explain that similarities between representative forms are capable of being explained otherwise, and that there are many cases in which the agreement of two forms in respect to a certain character *must* be explained otherwise. Let us then inquire into the facts brought to light by our researches on the Eastern Papilios. As in the body of this paper the facts we have to refer to have been more fully dealt with, it will suffice to mention them here briefly without going in for a description of the organs concerned.

Papilio alcinous alcinous from Japan is represented on the Loo Choo Islands by *P. alcinous loochooanus* and in China by *P. alcinous confusus*. There are two prominent characters by which the forms are distinguished: *alcinous* has a black head and a dentate harpe, *loochooanus* a red head and a dentate harpe, and *confusus* a red head and a non-dentate harpe. In the colour of the head, therefore, *loochooanus* agrees with *confusus*, while in the harpe it agrees with *alcinous*; hence the relationship deducible from the similarity in colour of the head is directly opposed to the relationship indicated by the harpe, and it would be equally incorrect to say that *loochooanus* is a descendant of *confusus* on account of the similarity in colour, or to conclude that it has descended from *alcinous* because the harpes are the same; there would be just as much probability of correctness, if we consider only the naked facts here adduced, in the assumption that *alcinous* is the offspring of *loochooanus*, which itself descended from *confusus*, or that the reverse expresses the phylogenetic connection between the three forms, or that the three localities were inhabited at a former period by one form which later on became differentiated into the present three Papilios.

Papilio bathycles chiron from Sikkim, Assam, and Burma, and *P. bathycles bathycloides* from Malacca, Sumatra, and Borneo, are not always distinguishable in pattern, there occurring often specimens which, according to the wing-markings, could be regarded as belonging either to the one or to the other subspecies.

The Javanese representative *P. bathycles bathycles* stands in pattern not so close to *bathycloides* as this does to *chiron*. In the harpes *bathycloides* and *bathycles* come very near each other, while *chiron* exhibits a conspicuous difference from both in the development of the dorsal process (f. 46 to 50). Here again the form inhabiting the interjacent districts is more similar in the *male* copulatory organs to the one, in colour to the other representative.

The three subspecies of *P. cloanthus* inhabiting respectively China (*clymenus*), North India and Burma (*cloanthus*), and Sumatra (*sumatranus*), when arranged according to the similarity in pattern, would stand thus: *clymenus—cloanthus—sumatranus*, whereas in an arrangement according to the development of the harpe *cloanthus* would come first: *cloanthus—clymenus—sumatranus*.

The numerous subspecies of *P. sarpedon* provide us with a number of interesting facts. The Papuan form *choredon* of *sarpedon* inhabiting Australia and New Guinea (inclusive of the islands near it) bears in colour and pattern a rather close resemblance to the specimens of the spring brood of *sarpedon sarpedon* from North India, but is distinguished from the Indian form in the shape of the valve and harpe, in which organs *choredon* is similar to *anthedon* from the Southern Moluccas. The latter, however, differs in colour from *choredon*, agreeing in that

respect with *dodingensis* from the Northern Moluccas, which again has the harpe and valve different from those of *anthedon*, and is moreover distinguished from its colour-ally by the presence of an additional red spot on the underside of the hind-wing. This spot is present only in *dodingensis* and the two Celebensian forms, *milon* found at lower elevations, and *monticolus* discovered recently at higher elevations on Mount Bonthain. The mountain form *monticolus* agrees in colour with *sarpedon sarpedon* from India and the Sunda Islands, also with the three representatives from the lesser Sunda Islands, comes in the shape of the band of the forewing near *dodingensis*, agrees in the size of the third spot with *timorensis*, stands in the *male* genital armature intermediate between *milon* and *dodingensis*, and hence differs in this respect obviously from *sarpedon*, has the before-mentioned red spot like *milon* and *dodingensis*, and differs from *milon* conspicuously in the shape of the wings, in which it agrees with *sarpedon* from the greater Sunda Islands. Would it really be possible to infer from such characters which contradict each other, pointing each in a certain direction of its own, the history of the origin of *choredon*, *dodingensis*, *monticolus*, etc.? Does not such a mixture of relations in opposite directions rather indicate that the similarities and dissimilarities found in representative forms are no signs of a closer or less close phylogenetic connection, and that we have to search for another explanation of the phenomena which will meet the contradiction of the characters?

Papilio aristeus anticrates from North India resembles the Queenslandian representative *parmatus* so much in pattern that Professor Eimer in his somewhat superficial work on the Papilios allied to *podalirius* ("Schwalbenschwänze") did not perceive the slight differences; whereas in the development of the valve and harpe *anticrates* and *parmatus* are opposite extremes. The forms inhabiting the interjacent countries are all much darker, and therefore have a closer resemblance to each other than to *anticrates* and *parmatus* (apart from some intergraduate examples). Hence the forms geographically widest apart would, according to the colour, be the nearest "related." The valve and harpe, however, are in *parmatus* exactly as in the externally different *aristeus* from the Moluccas, which again could be interpreted as being an expression of close relationship. In *hermocrates* from Burma, Borneo, the Philippine Islands, and the lesser Sunda Islands, the genital armature stands somewhat intermediate between that of *anticrates* and *parmatus*, but agrees in the form of the ventral dentate ridge obviously better with that of the first. As *hermocrates* and *aristeus* are connected by intergradations (occurring in Burma) in the wing-pattern as well as in the genital armature, an arrangement of the four allied forms according to the similarity in pattern would be thus: *parmatus* (Queensland and New Guinea)—*anticrates* (India)—*hermocrates* (Borneo, Philippines, lesser Sunda Islands)—*aristeus* (Moluccas); while the arrangement according to the similarity in the organs of copulation would be this: *anticrates*—*hermocrates*—*aristeus*—*parmatus*.

The representative occurring on the island of Celebes (and some islands south of it) is treated as a distinct species (by Eimer even as belonging to a widely different group). In the wing-markings it agrees best with *hermocrates*, but has mostly one band less; in the forewings being falcate it comes again closer to *hermocrates*, which is also geographically the nearest form, than to *aristeus*, *anticrates*, or *parmatus*. As *rhesus* is an exaggerated development of *P. aristeus*, differing from it in a similar way as *androcles* (Celebes) does from *antiphates* (India and Malayan Islands, Philippines, Moluccas), it sounds very reasonable to consider

it to have developed from that form of *P. aristeus* to which it comes nearest in the before-mentioned points, namely from *P. aristeus hermocrates*. An examination of the valve of the *male* shows, however, that there is also very good reason to deduce *rhesus* from *P. aristeus aristeus* or *parmatus*. The ventral dentate ridge is in the eastern forms (*rhesus*, *aristeus*, *parmatus*) half-ring-shaped (f. 83, 84), and at a glance distinguishable from the smaller, only slightly curved, ridge of the western forms (*anticrates* and *hermocrates*, f. 73, 74); as intergradations in the two kinds of ridge are unknown (although we have examined a great many individuals), the constant difference in the ridge would be regarded by many systematists as justifying a specific separation of the western forms from the eastern ones, in which case *P. rhesus* agreeing in the ridge very well with the eastern forms, apart from minor differences, would appear to be closer allied to *aristeus* and *parmatus* than to *hermocrates* and *anticrates*, and hence could be considered a descendant of *P. aristeus aristeus* from the Moluccas.

If we take *A*, *B*, *C* as three geographical representatives, a_1 and a_2 as the different degrees of development of the wings of these forms, and b_1 and b_2 as the different degrees of development of the organs of copulation, the several cases above adduced, which we think sufficiently illustrate the questions we are to deal with, can be put diagrammatically as follows :—

A	*B*	*C*
a_1	a_1	a_2
b_1	b_2	b_2

The dilemma arising from the contradiction of the characters of geographical representatives allows a satisfactory solution, if we take into account, firstly, that according to the theory of evolution the peculiar modifications of the organs of a certain animal are partly inherited and partly acquired, and that therefore a similarity between two forms, and a dissimilarity, *a priori* neither prove nor disprove a close phylogenetic connection of the forms; and secondly, that when the similarity between two forms is due to inheritance the character common to the two forms is inherited either by both independently from the common ancestor, from which also other forms which have lost that character have descended, or by one of the two forms from the other. The conclusions generally deduced in systematic and other works from the similarity and dissimilarity of geographical representatives in respect to the Geographical Distribution of Animals as a science (not as a mere statement of facts) are to our mind mostly based on the erroneous assumptions, firstly, that every similarity is due to inheritance, and secondly, that the presence of a peculiarity in two forms must necessarily be due to the common character being inherited by one of the two forms from the other. Let us, then, briefly inquire into the question of the probable origin of the similarities and dissimilarities of allied forms, and try to arrive at a correct estimate of their actual value in our judgment of the relationship of the forms in which they are observed.

If we recall to mind that the development of a species into more species is possible only by means of isolated transforming factors associated with a more or less complete prevention of the affected portion of the species from interbreeding with the original stock, the distinguishing characters of locally separated allied forms, which we must regard as the outcome of the transformation of a common ancestral form, must be due to the effect of isolated evolutionistic factors of any kind present in the district inhabited by each single representative form. It is quite possible that when a species separates thus, first into subspecies and then into

representative species, one of the descendant forms remains identical with the original form; but considering that in all widely distributed groups of representative forms a considerable time must have elapsed before the insects could spread over the whole area—for instance, from North-West India to the Solomon Islands—it is at least in such cases more probable that the form now inhabiting the country where the ancestral form lived has also more or less changed in characters. And this is the more likely to be true as we know from experiments that the time required to bring about a change in colour in *Lepidoptera* is very short, and as we further know that a change, within a short time, has taken place in the famous Porto Santo rabbits, some birds, and a great number of plants. From the comparison of seasonal forms, which are the more different the greater the contrast of the seasons is, with artificially produced varieties, we can with safety conclude that the degree of divergency of representative forms largely (not entirely) depends on the intensity of the transmuting factors, and that therefore a wider gap between two otherwise allied forms does not necessarily imply that the two animals or plants have been separated for a longer time than less different allies. As it is also well known that the intensity of the biological factors does not gradually increase or decrease as we proceed from one (geographical) extremity of the range of a group of representative forms to the other extremity, it is evident that the degree of diversity of two forms can be independent of the geographical position of the areas inhabited, and that the more similar forms can live widely apart, while the more dissimilar forms may live closer together.

Though the differences between representative forms are the effect of the action of some kind of local biological factors, it does not follow with necessity that the respective factors are found in every place where a certain form now occurs; on the contrary, we have instances that species when living under different conditions do not show any change in their characters. For example, the island of Kalao, south of Celebes, is inhabited by the Celebensian *Papilio rhesus*, and the Kalao individuals are to our knowledge not distinguishable from the Celebes *rhesus*. The other species of *Papilio* found on Kalao (and Djampea, which is close by) are all conspicuously different from the Celebensian representatives, and have mostly developed to peculiar forms not known (as such) from anywhere else; hence there must be biological factors peculiar to those islands which have not had any effect on *P. rhesus*. That *rhesus* is a true Celebensian insect (*i.e.* originated from the ancestor of *P. aristeus* on Celebes) is virtually proved by its characters being quite analogous to those of many other Celebensian forms. Curiously enough, on the island of Djampea, which lies north of Kalao and therefore is somewhat closer to Celebes, Mr. A. Everett obtained no specimens of *rhesus*, but a long series of the Malayan representative *P. aristeus hermocrates*, during the same month when he found a good series of individuals of *P. rhesus* and no *hermocrates* on Kalao. The fact that *rhesus* is the same on Celebes and Kalao admits three explanations: (1) The biological (transmuting) factors are in respect to *rhesus* the same on both islands, which would mean that on Djampea, as inhabited by a representative, the corresponding factors must be different. (2) The biological factors are different on Celebes and Kalao, but the characters acquired by *rhesus* under the action of the Celebensian factors have become inheritable. (3) The characters of *rhesus* and its representatives are not acquired under the influence of biological factors.

If, however, a change in the biological factors does not necessarily imply that a change in the characters of every living being will take place, it is intelligible

that in geographical representatives, which live under the influence of different biological factors, one or the other character can remain unaffected. When this takes place independently in several forms which represent each other, the preserved character of the common ancestor renders those forms more similar to each other than to the other representatives which live under conditions that have modified the respective character, while the actual blood-relationship is the same between all the forms. On the other hand, it could also be thought possible that, when a species gradually spreads over a larger area and develops into a number of representative forms, now and again a character acquired by a new form *A* occurring in locality *M* will remain unaltered in form *B* living in locality *N* which is a descendant of *A* ; in this case the presence of the same character in forms *A* and *B* would imply that the forms are closer connected with one another than *B* is with any other ally except its own descendants. However, if we admit this case to occur, we should maintain that an acquired character is inheritable when the conditions which have brought it into appearance are absent, and we thus should decide offhand the much-contested question whether acquired characters are or are not inheritable. Notwithstanding we believe that ultimately the inheritance of acquired characters will be proved, the contest clearly shows that it is in every case a mere assumption, if we conclude from the presence of the same character or similar characters in two representative forms that one of the two is the parent, the other the daughter form.

If divergency is the effect of transmuting factors, could not similarity also be the outcome of biological factors in different districts? Many facts, for instance the similarity of desert forms, point to an affirmative answer; but we have an almost certain proof furnished us by the experiments* of Standfuss, who succeeded in breeding under artificial conditions from ordinary European *Lepidoptera* such forms as come close to their geographical representatives. As Standfuss was able to produce from our common *Vanessa antiopa* specimens similar to the Central American form (*thomsoni*), there can no longer be any doubt that a similarity in a character of the representative forms of a species can come about in widely separated countries, and will come about when the conditions are favourable.

Taking into account all the points here adduced, it seems to us obvious that all the evidence points to one end, namely, that the similarities and dissimilarities exhibited by representative forms are not an expression of closer or less close phylogenetic connection, but an expression of the similar or dissimilar effect of the action of the different and similar biological factors on the organs in every locality. If we apply this conclusion, which is a necessary consequence of the assumption that the theory of evolution is correct, to the facts observed in the Papilios, there is no longer any contradiction in the characters of the wing and the characters of the organs of copulation. That *Papilio aristeus anticrates* from India agrees with the Papuan representative in the colour, but disagrees with it entirely in the harpe, that the Chinese *P. eloanthus* is in the harpe more similar to the Sumatran than to the North Indian form, that *P. sarpedon teredon* from Ceylon and South India agrees best in the wings and genital armature with the forms occurring on the lesser Sunda Islands and disagrees widely with the form inhabiting all the interjacent countries, that the Nicobar form of *P. agamemnon* is in the presence of a series of red spots on the underside of the hindwing similar to the representative from the

* Standfuss, *Handbuch für Schmetterlingssammler* 1896.

Solomon Islands (!), and so on, is no more miraculous than the fact that there *is* seasonal and local variation.

Now, when we observe, for instance, that the Chinese *P. eurypylus* agrees best with the Andaman form of that species, and that the Chinese *P. antiphates* comes close to the Ceylon form, while in both cases the representative inhabiting North India, Burma, and Tenasserim is different, it would certainly sound preposterous to explain the similarity in characters by assuming that there was at a former period a land-connection between Ceylon, the Andaman Islands, and China independent of Continental India. If we concede that this explanation cannot possibly be accepted, and that consequently the similarity finds a correct explanation in the assumption that it is merely the consequence of the similar effect of the biological factors—the effect is positive in respect to the characters which are modified, and negative in respect to the characters which are not modified—of Ceylon, the Andamans, and China, it is not difficult to perceive what great bearings the questions here discussed have on the Geographical Distribution of Animals. Before proceeding to draw the consequences, let us for a moment consider what is the aim of the study of the Distribution of Animals.

"If we keep in view . . . that the present distribution of animals upon the several parts of the earth's surface is the final product of . . . the wonderful revolutions in organic and inorganic nature," says Wallace,* . . . "it will be evident that the study of the distribution of animals and plants may add greatly to our knowledge of the past history of our globe. It may reveal to us, in a manner which no other evidence can, which are the oldest and most permanent features of the earth's surface, and which the newest. It may indicate the existence of islands or continents now sunk beneath the ocean, and which have left no record of their existence save the animal and vegetable productions which have migrated to adjacent lands. It thus becomes an important adjunct to geology. . . . Our present study may often enable us, not only to say where lands must have recently disappeared, but also to form some judgment as to their extent, and the time that has elapsed since their submersion." Indeed, the distribution of animals and plants, especially if the extinct forms are also taken into account, illustrates wonderfully the past history of the earth's surface, and the main object of the study of the distribution of animals and plants is to arrive at conclusions as to the probable past changes in the geological features of the earth. This has so plainly been recognised by nearly all recent systematists, as a glance in a volume of the *Proceedings of the Zoological Society* or of the *Ibis* will show, that, when dealing with a certain group of animals from a certain locality, they endeavour to draw from the affinities in the fauna of the respective district with that of other districts conclusions relating to the geological history of the locality, and it is very generally assumed that similarity in the components of the fauna of two areas means close geological connection, while great dissimilarity means long geological separation. So true this is in a great many cases, so erroneous is the generalisation. Nevertheless it has very often been entirely lost sight of that the present distribution of animals and plants is, to use Wallace's words, "the final product of revolutions in inorganic *and organic* nature," and that accordingly the differences in the fauna of neighbouring districts and the similarities in the fauna of geographically widely separate areas can be quite independent of the geological history of the region in question. If we now recall to mind what we have said above about the similarity

* *Distribution of Animals* 1876, p. 7.

and dissimilarity in the characters of representative forms, it will be evident that the difference in the fauna of neighbouring districts is due to two kinds of entirely different factors, *geological* and *biological* factors, and that the study of the geographical distribution of animals and plants consists of two branches—the *geological branch*, which has to do with such discrepancies in the fauna and flora as allow conclusions to be drawn as to the geological transformation of the *districts* in question, and the *biological branch*, which has to do with those other differences from which we can draw conclusions as to the transformation of the *animals* and *plants* in question. And now we can extend our former conclusion that differences in the characters of representative forms which stand in close phylogenetic connection are an expression of the differences in the biological factors of the districts concerned, to those forms which are representatives in a biological sense and exclude each other in consequence of a similarity in habits, and again to those which cannot exist beside one another in the same district, because they are so different in habits that they require a respectively different environment. It is certainly conceivable that the absence of woodpeckers, which abound in the Indo-Malayan Region, from the lesser Sunda Islands (and all the islands farther east) could be due to the presence of cockatoos, which are, like those, hole-breeders, though we do not maintain that this similarity in habits is the actual reason of the two widely different groups of birds excluding each other in that region ; while, again, the discrepancy in the composition of the West African from the East African fauna is readily explained by the former being a wet forest country, the latter an open and dry country, and the affinities which the West African forest region has in the fauna with the Indo-Malayan Region, and the analogous affinities of East Africa with Western India, are consequences of similar physiographical conditions of the countries, just as the difference in the characters of the West African, East African, and Malagassic morphologically allied representative forms—which I shall call *morphological* representatives, as distinctive of *biological* representatives—are due to differences in the transmuting factors of the respective districts. The contrast in which these explanations of faunistic discrepancies stand to the explanation of those discrepancies which are caused by geological factors is strikingly illustrated by a comparison of the fauna of Madagascar with that of Africa, in so far as we have rightly to conclude from the absence of the large *Carnivora* and *Ungulata*, so abundant in Africa, from Madagascar that this island must already have been isolated from Africa by a wide sea-arm at that time when those animals immigrated from the North into the Aethiopian Region.

The difference in the fauna of various districts is further dependent on the fact that different animals are, as said before, affected by the transmuting factors of a certain locality in a different degree, so that often some forms are, while some are not, modified in characters. We have consequently to take into account also the physiological constitution of the animals when treating upon zoogeographical questions. Hence it is evident that the result of the division of the earth's surface in zoogeographical areas must be different according as we take the faunistic discrepancies depending on the geological factors as the base of division, or those differences which are caused by the biological factors; and again, if we take the biological division, it is obvious that the extent of the areas must be quite different according as to which animals are taken into consideration.

Although *Wallace* has emphasised, throughout his *Geographical Distribution of Animals*, the high importance of the geological branch of zoogeography relating to

the past history of the earth and its inhabitants, the minor zoogeographical districts have by most authors been delimitated according to differences which are the effect of biological factors. Considering, however, that different environment, such as forest, open land and desert, fresh and salt water, naturally gives subsistence to different animals, and that therefore physiographically different districts *a priori* are known to have a different fauna, the division of the earth's surface in such zoogeographical districts as are identical with physiographical districts (Sharpe's West African Subregion = district covered with forest; Merriam's Sonoran Subregion of North America = arid country) is as such of very little value, concerning more the geographer than the zoologist. And taking further into account that we now know perfectly well that in every district where the physiographical (and meteorological) conditions are different from those of other districts these differences are accompanied by modifications of the characters of some of the animals, the simple statement that a certain number of the inhabitants are different from the representative forms of the adjacent districts is, like the mere record of the discrepancy in the composition of the fauna, of little consequence for science, as from those statements as such no new general conclusions can be drawn. The biological branch of the study of the geographical distribution of animals, therefore, must have another aim, and that is to be to Zoology what the geological branch is to Geology, namely an adjunctive science which, by a comparative study of the differences in the environment and those in the animals, may help greatly to find the causal connection between the modifications in the organs of the animals and in the environment (in the widest sense), and thus could reveal to us the history of the descent of the forms of animals.

For the sake of illustration let us apply these conclusions to the *Papilio* fauna of a small area, for instance the lesser Sunda Islands. We select this group of islands for two reasons: firstly, because the discrepancy existing between their fauna and that of the larger Sunda Islands has been accounted for by Wallace by geological factors (*Wallace's line*); and secondly, because our conclusions derived from the Papilios stand in opposition to those which Wallace derived from the avifauna. As a complete exposition of the zoogeographical relations of the islands between Lombok and Timor * would be much too extensive for our present purpose, we will restrict the discussion chiefly to the two questions: (1) what conclusions can we draw from the composition of the *Papilio* fauna of the lesser Sunda Islands with respect to the geological history of the group of islands? and (2) is there anything in the distinguishing characters of the Papilios which can serve to solve a question relating to the phylogeny of animals?

The islands of Lombok, Sambawa, Sumba eastward as far as Letti and Moa, are inhabited by fifty odd different forms of *Papilio*, which we can arrange in eighteen series of closely allied representatives. Of these eighteen series one (*canopus*-series) is distributed farther east over the Tenimber Islands and North Australia to the New Hebrides, but has also some allies in the Indo-Malayan Region; the *peranthus*-series occurs from Java to New Guinea, but is absent from Australia; another, *haliphron*-series, is found in Celebes and not in the Indo-Malayan Region; a fourth, *antiphates*-series, is found all over the Indo-Malayan Region, Celebes, and the Northern Moluccas, but is absent from the Southern Moluccas, Australia, New Guinea, and the islands farther east. Seven series reappear in the Indo-Malayan

* Compare also Doherty, *The Butterflies of Sumba and Sambawa*, in *Journ. As. Soc. Beng.* 1891; Pagenstecher, *Ueber die Lepidopteren von Sumba und Sambawa*, in *Jahrb. Nass. Ver. Nat.* 1896.

and Papuan Regions; while again seven series are found in the Indo-Malayan Region, three of them also in Celebes, all seven being absent from the Papuan Region.

The lesser Sunda Islands have therefore not a single series of representatives which is purely Australian. From this fact we have to conclude that the immigration of the *Papilio* fauna cannot have taken place from Australia; and as the physiographical and meteorological conditions of the islands resemble in many respects more those of Northern Australia than those of the larger Sunda Islands, the reason why no Australian types immigrated cannot lie in the biological conditions of the islands, and hence must be accounted for by the assumption of another barrier against immigration. This barrier most probably was, at the time when the lesser Sunda Islands became first populated by Papilios, the same which we perceive at the present epoch, namely the wide Timor Sea separating Timor from Australia.

If we leave out of consideration as being indifferent the types which occur in the Indo-Malayan and Papuan Regions, there remain eight series of representatives which the lesser Sunda Islands have in common with the Indo-Malayan Region, and which are absent from Australia and New Guinea, four of them being represented also on Celebes, and one also on the Northern Moluccas; opposite these eight types stands one single Celebensian type that is absent from the Indo-Malayan Region. The Indo-Malayan element, therefore, is so strongly predominating that we must assume that there never existed any mechanical barrier of consequence preventing migration of the Papilios from the greater to the lesser Sunda Islands (or in the opposite direction).

Nevertheless there is a marked discrepancy in the fauna of the nearest of the larger Sunda Islands, Java, and the lesser Sunda Islands, as fourteen Javan types are not represented on any of the islands east of the Strait of Lombok, while six types occurring on the lesser Sunda Islands (except Lombok) are not known to have a representative on Java. From the fact that out of the eighteen series of representatives of the lesser Sunda Islands twelve occur on Java it is evident that the absence of fourteen Javan types from the lesser Sunda Islands, and the absence of six lesser Sunda Islands types (five of which are represented in other parts of the Indo-Malayan subregion) from Java, cannot acceptably be explained by the suggestion that there existed at a former period a very much wider strait between the lesser Sunda Islands and Java than there is now. And taking into account the *Papilio* fauna of Lombok alone,* which island has not a single *Papilio* type that is absent from Java, it is obvious that there is no evidence in favour of the assumption that the Strait of Lombok has changed in width since the appearance of the Papilios on the Malayan islands. If we exclude Lombok from the lesser Sunda Islands, and compare the *Papilio* fauna of the rest of the islands with that of Java, there is an important numerical discrepancy which amounts to more than 60 per cent. of the total number of the series of representative forms (as opposed to the total number of representative forms) inhabiting Java and the lesser Sunda Islands. As this amount † is very high compared with the numerical discrepancy

* The island has recently been visited by three explorers (W. Doherty, A. Everett, and H. Fruhstorfer).

† As Flores is lepidopterologically almost a blank the numbers may become quite different in consequence of the exploration of this large island. The absence of many types from small islands which are found on neighbouring large islands is quite natural, considering that the small islands do not afford so great a variety in the conditions of life as would be required by a multitude of diverse inhabitants.

between Sumatra and Java (about 38 per cent. of the total number), and that between Sambawa and Timor (33 per cent. of the total number), and is not much inferior to the amount of discrepancy between the lesser Sunda Islands and Australia (65 per cent.), the lesser Sunda Islands can be considered as a faunistic district in opposition to the greater Sunda Islands and Australia ; and it is very interesting to note that almost the same amount of numerical discrepancy must in the case of the lesser Sunda Islands and Java be accounted for by biological factors, while in the case of the lesser Sunda Islands and Australia the only acceptable explanation is the assumption of the existence of a geological barrier between Australia and Timor at the time when the lesser Sunda Islands became populated by Papilios.

Turning now our attention to the second question proposed above to be discussed, we note that the characters of the forty-seven specifically or subspecifically different representative forms of *Papilio* occurring on the lesser Sunda Islands are such that forty-one of the forms are not found (as such) outside the group of islands, and hence are "peculiar" to the group. As these forty-one forms are so distributed that every island has some of its own and others in common with other islands of the group, while not a single form is identical on all the islands and at the same time distinguished by some peculiarity from the representative occurring on Java, Borneo, or in Australia, each island is in fact a small faunistic district, and the question arises whether the faunistic peculiarity exhibited by each island is not due, instead of to differences in the biological conditions existing on each island, to the mechanical separation of the islands by arms of sea, and hence finally would have to be referred to the action of geological factors. In the introduction we have endeavoured to show on *a priori* grounds that mechanical geographical separation as such cannot give rise to a new form ; let us now consider the *a posteriori* reasons which speak against the origin of forms by mechanical isolation.

The widely distributed *Papilio sarpedon* has on the lesser Sunda Islands developed into three subspecies, one inhabiting Adonara, Sambawa, and Lombok—specimens from the latter island come very close to those from Java—a second found on Sumba, and a third occurring on Timor and Wetter. The external characters of the Timor form are such that it agrees in the shape of the hindwing best with the representative from Ceylon, in the breadth of the band of the forewing with the Australian form, and in the special shape of the anterior portion of the band with *monticolus* from Celebes, while it bears also great affinities to the forms from Sumba and Adonara. Setting apart all the reasons brought forward against the theory of isolation in the introduction, and conceding, for the sake of argument, that geographical isolation of aberrational specimens could lead to the origin of a new form of animal without the help of any biological factor, the combination of different affinities in the wing-characters of the Timorese, Sumbanese, or Adonaranese *sarpedon* forms might be thought due to the first specimens immigrated into each island having accidentally possessed the respective combination of characters. As a combination of characters such as exhibited by *P. sarpedon timorensis* is not found even in a less obvious degree in any specimen of *sarpedon* from the larger Sunda Islands and Australia we have seen, and therefore must be very rare, it is certainly scarcely probable that just such specimens which had that combination of characters should have happened to be the first to come to Timor ; and this applies to all those localised forms, not only of the lesser Sunda Islands, but also of all other districts, the characters of which point in different directions. The improbability, however,

changes into impossibility, if we take further into account the characters of the organs of copulation. We know from the researches laid down in the body of this paper that the genital armature varies quite independently from the wings and their markings, and that therefore the association of distinguishing characters relating to the wings with such found in the organs of copulation in morphological representatives has nothing to do with correlative development; in not a single case have we observed that a certain aberrational wing-character constantly reappearing among the individuals of a certain geographical form of *Papilio* is accompanied by an aberrational character in the organs of copulation. As, however, most geographical races are distinguished by characters of the wings and characters of the genital armature, it is evident that the explanation of the peculiarities in the wing-markings of a representative form by mechanical isolation of parent specimens which accidentally possessed those peculiarities (in a lower degree) is not an explanation of the presence of the peculiarities in the organs of copulation of the respective form. In order to account for the fact that *P. sarpedon timorensis* is (in the sexual armature of the *male*) different from all other forms of *sarpedon*, and comes in these organs nearest to the Ceylonese, Sumbanese, and Australian forms, and disagrees considerably with the representatives from Adonara, Sambawa, Lombok, and the Indo-Malayan Region, the theory of isolation would have to assume that the ancestral specimens of *timorensis*, no matter whether they immigrated into Timor from Australia or from the Malayan islands, must have been distinguished by a rare mixture of external peculiarities combined with an equally rare character in the organs of copulation. The rarity of such a combination in aberrations—in fact we never have found an aberrational individual in which the characters of both the wings and genital armature pointed in the direction of one representative form, instead of in different directions—is directly opposed to the fact that most geographical races exhibit that combination ; this contradiction can only be solved by abandoning the assumption that the association of distinguishing characters of the wings with such of the sexual organs in localised forms is due to the geographical isolation of ancestral individuals which accidentally possessed such a combination of characters, and by accepting as the final cause of the presence of those characters the modifying action of isolated biological factors peculiar to the district where the peculiar form has originated.

If we thus attribute the existence of differences in the characters of the specimens of the same species inhabiting different districts to the presence of a difference in the biological factors of the districts, the degree of divergency of the forms is dependent on the degree of sensitiveness of the species to the action of the external biological factors, as maintained by Darwin, and after him by Weismann and others, in several places ; further, on the intensity of the factors and the time they have been active ; and thirdly, on the degree and duration of mechanical isolation as a prevention of the annihilating effect of intercrossing. As a difference in the physiological constitution of various species can be proved only by rearing them under exactly the same external conditions, and as we do not know in the case of species found in the same small island whether they actually do exist under the same external influences, it is not possible for us to decide with any degree of certainty whether the difference in the amount of divergency exhibited by the forms occurring in the same district is due to the different physiological constitution of the species differently affected, or to differences in the special external conditions under which each species perhaps exists. Nor are we able to say whether the greater diversity

exhibited by a certain form is due to the form having come under the influence of the biological factors of the respective district at an earlier period than another form which shows a less high degree of divergency, unless the sensitiveness of the forms has been tested by experiment. And again, the higher or lesser degree of geographical isolation, though often corresponding to the greater or lesser diversity of the isolated forms, is a factor the actual influence of which it is in a given case scarcely possible to estimate rightly. The great diversity of the representative of *Papilio peranthus* on the island of Sumba compared with the lesser diversity between the representatives inhabiting Java, Sambawa, Timor, Kalao and Djampea, Celebes, etc.; the high degree of specialisation of the representative of *Papilio memnon* on Timor compared with the lesser degree of divergency of the forms occurring on Sumba, Sambawa, Lombok, Java, etc.; the absence of a difference between some Lombok and Java forms of *Papilio* which on the other lesser Sunda Islands have developed divergently, compared with the presence of a difference in other Lombok forms; the great similarity between the specimens of *Papilio sarpedon* found in the area extending from N.W. India to Lombok, the gradual transition to the more divergent Adonara form, and the obvious divergency in the pattern and shape of the wings and the sexual armature (of the ♂) of the forms inhabiting Sumba, Timor, and Wetter respectively, compared with the great diversity of so many forms in N. India, Sumatra, Java, Lombok, Sambawa, and Adonara; the identity of the Malayan form of *Papilio aristeus* on the Philippines, Borneo, the lesser Sunda Islands, and the island of Djampea, compared with the great diversity exhibited in the same area by *Papilio memnon* and other species, and so on, are phenomena which seem to us most readily explainable by the surmise that the diverse species are sensitive in a different degree to the external biological factors; while the surprisingly great divergency of so many Celebensian Papilios must be attributed to a high intensity of the biological factors on that island and to a high degree of geographical isolation. However, it does not appear to us very probable that the narrow sea between Celebes and Borneo is a sufficiently effective barrier to prevent passive migration * of the widespread and common low-land Papilios of Borneo, such as *P. agamemnon*, *sarpedon*, *polytes*, etc., from Borneo to Celebes; and the same could be said of New Guinea, New Britain, and other islands. In fact the absence of intergraduate specimens between two representative forms in localities which are geographically close together—the intergradations may occur in other localities—makes it manifest to us that, as the effect of the biological factors would in these cases be annihilated, or at least much lessened, by specimens of the old stock coming into the country in consequence of the insufficiency of the geographical barrier, there must be another factor active to assist the external biological factors to such a degree that the migration of fresh individuals, if it does not take place very often, is not able to prevent divergent development. Now, recalling to mind the kind of variation in the scent-organs found to exist in a certain moth, as mentioned on p. 435, it is evident that where such a variation takes place in the geographical forms of a species the difference in the organs of smell and scent must be of great influence as preventing (to a certain extent) intercrossing between racial

* Passive migration by means of hurricanes seems to occur often among birds, as the records of foreign birds found in England prove; in the case of *Lepidoptera* the power of resistance is certainly slighter, but the effect of migration in respect to intercrossing with specimens of the same species in the new locality will often be annihilated in consequence of the new-comers having too much suffered to be fit for propagation.

forms, so that the distinguishing characters can accumulate in spite of the occasional immigration of specimens of the old stock. As we shall have to deal with this kind of physiological selection, which in fact is a kind of sexual selection, in another place when treating upon the variation of glandular organs in *Lepidoptera*, we do not now enter upon a discussion of that factor. The variation of *Lepidoptera* explained in the present paper points, however, to a further factor being active, the importance of which as a means of prevention of intercrossing has been recognised as far back as 1849, and we shall try now, on the ground of our researches, to estimate the influence of geographical polymorphism in the sexual organs upon the divergent development of the *Lepidoptera*.

C. Mechanical Selection.

The genital armature of *Lepidoptera* has the function of a special prehensile apparatus during copulation. As such apparatus is found in all *Lepidoptera*, we can conclude that its function is of high importance for the act of copulation. When, however, a physiologically important organ is found to be of a different structure in every two species, it is likewise correct to conclude that the difference in the structure has some physiological significance. Hence we think that the inference to be drawn from the fact that the copulatory organs are different in different species has to be that the specialisation in structure means a specialisation in the function as prehensile organ—*i.e.* that, as with the help of the apparatus the *male* has to take a hold on the *female* and the *female* on the *male*, the organs of the sexes of the same species are best adapted to each other. This inference implies that specimens of diverse species can less easily copulate than specimens of the same species, and that there might be cases in which copulation between different species would be impossible in consequence of the highly divergent specialisation of the organs of copulation. A similar view has been held by the earlier writers on the subject, Siebold* and Dufour,† the latter giving expression to his opinion in the well-known sentence that "*l'armure copulatrice . . . est la garantie de la conservation des types, la sauvegarde de la légitimité de l'espèce.*"

The different development of the organs of copulation is here alleged to be a means of prevention of intercrossing between specifically different specimens, and the same has more recently been said by Escherich,‡ Hoffer,§ and others. Though we know from experience that Escherich's assertion that an effective copulation between diverse species is never possible is erroneous, and that therefore Verhoeff‖ is right in rejecting this part of Escherich's theory, it remains nevertheless evident that under the premiss that the *male* and *female* of one species really are adapted to each other in respect to the genital armature, specimens which are not adapted to each other cannot so easily unite in copulation, and that even when a union is effected the penis will sometimes be prevented from entering the vagina in consequence of the vaginal armature, to which the organs of that *male* are not adapted, being a mechanical barrier. Before, however, this conclusion can be accepted, it has to be ascertained whether the actual structure of the *female* and *male* genital armature is in accordance with the above premiss.

Gosse¶ was quite right in expecting to find that "every peculiarity in the

* *Vergl. Anat.* Berlin, 1848. § 354. note 2.
† *Ann. Sc. Nat.* (3). I. 1844. p. 253.
‡ *Verh. z. b. Ges. Wien.* 1892. p. 234.
§ *Mitth. Nat. Ver. Steiermark.* 1888.
‖ *Ent. Nachr.* 1893. p. 44.
¶ *Trans. Linn. Soc. Lond.* (2). II. 1883. p. 279.

prehensile organs of the *male* would have a corresponding peculiarity in that part of the *female* body which they were formed to grasp," but he failed to discover "the corresponding peculiarity in the *female*," as he laboured under the erroneous assumption that "it is the *exterior* of the final segments of the *female* abdomen that are seized *in coitu*." We have been able to show in the body of this paper that the *male* claspers seize in copulation the protruding vaginal bulb, taking hold on chitinised folds and ridges, and not the terminal segments ; and we have further been able to demonstrate the following two important points :—

(1) We have a pair of *Papilio memnon* united *in coitu*, from which we see clearly that the harpe of the *male* fits exactly the lateral ridge of the vaginal bulb of the *female*, while the high and broad processes at the mouth of the vagina, besides being a guide to the penis, take hold on the internal parts of the ninth segment of the *male*. When uniting artificially *males* and *females* of other species, we find that the organs of one sex fit those of the other of the same species, while the copulatory organs of different species, for instance of a *male* of *P. machaon* and a *female* of *P. podalirius*, or of *memnon* and *helenus*, do not fit each other. We are therefore justified in concluding that the organs of the sexes of the same species are better adapted to each other than to the organs of other species.

(2) The vaginal armature is in every species of *Papilio* examined different from that of every other species examined. As our researches, only part of which have been laid down in this paper, relate to a great many species of various groups of *Papilio* and other *Lepidoptera*, we can safely say that the *females* of every species are, like the *males*, in the sexual armature distinguished from the *females* of every other species. A comparison of the figures on Pl. XIX. will show that the divergency between the apparatus of representatives of diverse groups is in every respect so great, that it is readily conceivable that a *male* the apparatus of which is adapted to such organs as represented by f. 181 cannot effectively copulate with a *female* the organs of which are so different as those represented by f. 163, 179, or 182.

The position of the vaginal orifice and the lateral fold of the vaginal bulb, the number, length, and position of the ridges and processes at the orifice of the vagina, and the development of the eighth segment of the *female*, as well as the special structure of the clasping organs of the *male*, are in diverse groups of *Papilio* so widely different that there can be no doubt that the divergency in the organs of copulation has rightly been interpreted by Siebold as a means of prevention of intercrossing. It is obvious that the more the organs of different species resemble each other the less they will be able to prevent copulation. In closely allied species, therefore, the effect of this mechanical barrier against intercrossing will generally be less great than in the case of more diverse forms; but we must recall to mind that even in the most closely related species, such as *Papilio cuchenor* and *depilis* (f. 51 and 65), the organs of copulation, though built up after the same plan, can in the position and direction of the spines, hooks, and ridges of the harpe be so different that the prehensile organs of the *male* come in contact during copulation with quite different points of the vaginal region of the *female*, and that it is accordingly also in such cases obvious that an intercrossing is not possible without violence. In groups of *Lepidoptera* in which the genital armature is very simple the effect as a mechanical barrier must necessarily be very slight ; this seems to us to be one reason why specimens of diverse species of *Saturnidae*, for instance, copulate much easier than is the case with specifically different individuals in other groups.

Notwithstanding it is manifest that the difficulty to obtain hybrids is in many cases to be attributed to the diverse development of the copulatory organs, the question is of very little importance as long as we take into account only an intercrossing between species and species. According to our definition, specifically distinct animals or plants cannot fuse together; the appearance of hybrids has no influence on the evolution of the species which have produced them, though they may obscure the fact of the specific distinctness of the parents.* The barrier between species is the degree of diversity already attained, and as this barrier is absolute, the presence of any other barrier must be indifferent. The question as to the evolutionistic influence of the peculiar development of the copulatory organs, therefore, does not relate to those forms which have already attained that degree of diversity which renders a fusion with other forms impossible, but to those lower degrees of diversity which are still able to fuse together under favourable circumstances. Hence we have to inquire whether the variation of the copulatory organs within the limits of a species is such that the difference in the organs in question between varieties of the same species can be thought to be a barrier against the sexual intercourse between the varieties.

The effect of the divergency of the copulatory organs in respect to prevention of intercrossing can very well be compared with that of geographical isolation, as the effect of both the morphological and the geographical factor depends on the extent of the mechanical barrier. The Atlantic Ocean is certainly an effective barrier between the Nearctic and Palaearctic Regions, although even such a wide sea cannot absolutely prevent a migration from one region to the other; the Ganges Valley which separates the North Indian from the South Indian fauna, and the straits between the various islands of the Indo-Australian Archipelago, are barriers which render the occurrence of an intercrossing between specimens born on the opposite sides of the barrier, though by no means impossible, doubtless very rare; in fact every barrier which isolates to any degree, however small the degree may be, a number of specimens *A* from other specimens *B* renders the intercourse of the two sets of individuals with one another less probable than the copulation of the specimens of each set *inter se*, and hence is a barrier against intercrossing. If, therefore, the varieties of the same species exhibit in both sexes any diversity in the the organs of copulation, we can rightly infer that this diversity will act like a geographical barrier, isolating the varieties from one another to a certain extent according as the anatomical diversity is great or slight. As our researches have proved that the premiss of this conclusion is correct as regards the Eastern Papilios, namely that there are varieties which differ in the genital armature from other varieties of the same species in both sexes, it is manifest that the diversity in the genital armature of the Papilios has a great bearing upon the divergent development of the varieties.

We have found that there is individual and geographical variation in the genital armature of the Eastern Papilios. As regards individual variation, it is obvious that specimens which have any marked peculiarity in the prehensile organs, additional hooks or ridges, in which they deviate from the normal, will be at a disadvantage in

* As besides the mechanical barrier against intercrossing there is, in most species with highly developed organs of sense, a psychological barrier active, hybrids must in the state of nature be very rare in comparison with the number of specimens which are not hybrids. Specimens connecting two supposed distinct species have not rarely been treated as hybrids, though the natural conclusion from the regular occurrence of such intergradations would be that the supposed distinct species form one, di- or polymorphic, species, provided that the reverse has not been *proved*.

respect to propagation compared with the normal specimens in which copulation is more facilitated ; monstrosities and sports in respect to the genital armature, in short every specimen with an anomalous development of the organs of copulation is less favoured than the rest of the individuals. Such abnormal individuals have, therefore, the same position in the struggle for propagation, as in the struggle for existence those specimens have which are less adapted to the circumstances of life than their cospecific rivals. If it is right to conclude in the latter case that the struggle for existence leads in the long run to a survival of the fit (*Romanes*), we can apply the same inference to our special question and say that the specimens abnormal in the genital organs will in the struggle for propagation succumb, and that consequently the anomalies in the organs of copulation will become rarer and rarer, the individuals acquiring gradually by breeding in and in the same form of prehensile organs, comparatively few specimens deviating widely from the normal. It is apparent that the mechanical selection thus effected will end in a comparatively great constancy of the prehensile apparatus.* A number of the forms of *Papilio* dealt with in this paper have attained a remarkably high degree of constancy in the genital armature, for instance several forms of *P. sarpedon* and *P. aristeus*, *P. alcinous confusus*. As the conclusion applies to every segregate form of *Papilio*, it is evident that, when a species develops divergently into geographical races, each race (or some of them) can, and will, acquire a special normal form of the genital armature, if the evolutionistic factors of the locality affect the organs of copulation. Many species have not yet attained that degree of divergent ramification. The geographical forms of *Papilio aegeus*, *machaon*, some of the races of *P. sarpedon*, namely *sarpedon sarpedon* and *sarpedon semifasciatus*, the two eastern races of *P. aristeus*, *P. aristeus aristeus* and *P. aristeus parmatus*, and others, we have found to be identical or almost so with one another in the genital armature. In the geographical forms of other species the specialisation in the prehensile organs is already visible, but not very conspicuous, as in *P. cloanthus clymenus* and *P. cloanthus cloanthus* ; while in others again the degree of divergency in the organs of copulation of geographical races is so high that the normal of one form differs from the normal of the other so much that the one stands far outside the usual limits of variation of the other. Now, when it happens that forms so diverse in the genital armature inhabit neighbouring districts, as is the case with *P. sarpedon teredon* (S. India), *P. sarpedon sarpedon* (N. India to the Philippines and Java), and *P. sarpedon milon* (Celebes); *P. alcinous confusus* (China and Formosa) and *P. alcinous loochooanus* (Loo Choo Islands) ; *P. bathycles chiron* (N. India to Burma) and *P. bathycles bathycloides* (Malacca), it is manifest that the occasional (passive or active) migration of specimens from one district to the other, which we must concede to occur, as otherwise the wide range of many species would not be explainable, can have no great retarding effect on the divergent development of the forms, since an effective copulation of the immigrants with the occupants of the district is improbable, and as further, if copulation should occasionally be effective, the characters of the descendants of the new-comers will soon get swamped away by mechanical selection. Thus it is conceivable that, when a certain degree of divergency is attained by geographical races, mechanical selection will greatly help to accelerate evolution, and that it is able to prevent retrograde development when the geographical barrier which formerly separated two forms has, in consequence of

* Marked dimorphism in the organs of copulation to which the variation of the organs could also lead does not seem to occur ; see p. 499.

geological revolutions, become so changed that the isolation is much more incomplete than it formerly was. And when the comparatively great diversity in the organs of copulation has become so constant that intergradations in these organs between two respective subspecies seldom occur in the area occupied by these forms, though the subspecies may be connected with one another by intergraduate forms inhabiting other districts, it is possible that, when the districts of the two subspecies, if geographically close together, like the Bornean and Philippine Islands, become so extended that they overlap, the two diverse subspecies may live together without immediate and complete fusion.

It will have been noted that the effect attributed to mechanical selection is twofold. The variation of the genital armature caused by transmuting factors of any kind is so guided by mechanical selection that every incipient species will acquire a special armature of its own. As the variation of the organs of copulation is independent of that of the wing-pattern, mechanical selection does not directly affect the latter; but its indirect influence must be of importance, when the special genital armature acquired by mechanical selection has become so specialised that it is, like local isolation, a means of prevention of intercrossing.

In consequence of the demonstration of individual and geographical variation of the organs of copulation it becomes very probable that Eimer's * interesting suggestion is correct, that the variation of a species concerns also egg and sperm. If geographical and individual variation in these cells would be demonstrable as in the case of the ectodermal sexual organs, we should most probably find that the variation in the size and form of the sperm and in the structure of the micropyle apparatus † of the egg is independent of the characters of the wing and sexual armature, and that accordingly similar conclusions could be drawn as in the case of the organs of copulation. As diversity in sperm and egg would partly or totally prevent fecundation, infertility between certain individuals of the same race and between the specimens of diverse races would be the result of the variation, and hence the demonstration of the occurrence of such variation would give an actual base to Romanes's theory of physiological selection, and thus supply one explanation of that hitherto unsolved question how the general infertility between species has come about.

"The real difficulty," says Darwin,‡ "in our present subject is not, as it appears to me, why domestic varieties have not become mutually infertile when crossed, but why this has so generally occurred with natural varieties, as soon as they have been permanently modified in a sufficient degree to take rank as a species. We are far from precisely knowing the cause; nor is this surprising, seeing how profoundly ignorant we are in regard to the normal and abnormal action of the reproductive system."

We observe that the cause of infertility adduced by us would not be physiological diversity, but mechanical impossibility of fertilisation. Mechanical selection acting in a similar way as in the case of the organs of copulation in the direction of adapting within each race sperm to egg by excluding extreme varietal specimens from propagation, would raise a barrier between the diverse subspecies which would admit an independent development ending in specific distinctness of mutually infertile forms. Mechanical selection acts upon variation caused by other factors, and is, therefore, like mechanical geographical isolation, a preservative, not a productive factor.

* *Arth. bei Schmett.* II. 1895. p. 15.

† Standfuss, *Handb. f. Schmetterlingssammler* 1896.

‡ *Origin of Species* 6th ed. London, 1888. p. 36.

LIST OF INSECTS MENTIONED IN THIS PAPER.

Acherontia atropos, in Hübner, *Samml. Eur. Schm.* II. *Sphing.* f. 63 (1798-1805).
Callimorpha dominula dominula, in Esper, *Eur. Schm.* IV. t. 83. f. 1. 2 (1786).
,, *dominula persona*, in Hübner, *Samml. Eur. Schm.* III. f. 319-322 (1798—1805).
Euploea rhadamanthus, in Distant, *Rhop. Mal.* 1885. t. 4. f. 4. 5 (as *diocletianus*).
Gonopteryx cleopatra, in Hübner, *Samml. Eur. Schm.* f. 445. 446 (1798—1805).
,, *rhamni*, *ibid.* f. 442-444.
Hepialus humuli hethlandicus, in *Entomol.* 1880. t. 3.
,, *humuli humuli*, in Esper, *Eur. Schmett.* IV. t. 80. f. 1 (♂). 2 (♀). (1786).
Ornithoptera, see *Troides*.
Papilio aegeus, in Novit. Zool. 1895. p. 304.
,, *aegeus adrastus*, in *Reise Novara*, *Lep.* I. t. 16. f. a (1865).
,, *aegeus aegeus*, in Staud. & Schatz, *Exot. Schmett.* I. t. 4 (1884).
,, *aegeus bismarckianus*, in Novit. Zool. 1895. p. 308.
,, *aegeus keianus*, in Novit. Zool. 1896. p. 422.
,, *aegeus ormenus*, in Novit. Zool. 1895. p. 306.
,, *aegeus ormenus* ♂-ab. *ormenus*, in *Voyage Coquille*, *Ins.* t. 14. f. 3 (1829).
,, *aegeus ormenus* ♂-ab. *othello*, in Novit. Zool. 1894. p. 332. n. 3.
,, *aegeus ormenus* ♂-ab. *pandion*, in *Trans. Linn. Soc. Lond.* XXV. p. 56. n. 72 (1865).
,, *agamemnon*, in Novit. Zool. 1895. p. 447.
,, *agamemnon argynnus*, in *Ann. Mag. N. H.* (6). II. p. 235 (1888).
,, *agamemnon neopommeranius*, in *Berl. Ent. Zeitschr.* XXXI. t. 6. f. 4 (1887).
,, *alcinous*, in Novit. Zool. 1895. p. 267. t. VI. f. 1-20, 32-38.
,, *alcinous alcinous*, in Klug, *Neue Schmett. Ins. Samml. Berlin* 1836. t. 1 (♂, ♀).
,, *alcinous confusus*, in Novit. Zool. 1895. p. 269.
,, *alcinous loochooanus*, in Novit. Zool. 1896. p. 421.
,, *ambrax*, in Novit. Zool. 1895. p. 354.
,, *ambrax ambrax*, in Dehaan, *Verh. Nat. Gesch. Ned. overz. bez.* 1840. t. 7. f. 1 (♂). 2 (♀).
,, *antiphates*, in Novit. Zool. 1895. p. 410.
,, *aristeus*, in Novit. Zool. 1895. p. 418.
,, *aristeus anticrates*, in Gray, *Cat. Lep. Ins. B. M.* I. t. 3. f. 3 (1842).
,, *aristeus aristeus*, in Cramer, *Pap. Exot.* IV. t. 318. f. E. F (1782).
,, *aristeus hermocrates*, in *Reise Novara*, *Lep.* I. t. 12. f. E (1865).
,, *aristeus parmatus*, in Gray, *l.c.* t. 3. f. 2 (1842).
,, *aristolochiae*, in Novit. Zool. 1895. p. 245.
,, *aristolochiae antiphus*, in Donovan, *Ins. of India* t. 15. f. 2 (1800).
,, *aristolochiae aristolochiae*, in Distant, *Rhop. Mal.* 1885. t. 31. f. 6. 7 (as *diphilus*).
,, *aristolochiae austrosundanus*, in Novit. Zool. 1895. p. 249.
,, *bathycles*, in Novit. Zool. 1895. p. 437.
,, *bathycles bathycles*, in *Nov. Act. Ac. Nat. Cur.* 1831. t. 14. f. 6. 7.
,, *bathycles bathycloides*, in *Berl. Ent. Zeitschr.* XXVIII. t. 10. f. 3 (1884).
,, *bathycles chiron*, in *Trans. Linn. Soc. Lond.* XXV. p. 66. note (1865).
,, *bathycles chiron* ab. *chironides*, in *Berl. Ent. Zeitschr.* XXVIII. t. 10. f. 4 (1884).
,, *canopus*, in Novit. Zool. 1895. p. 341.
,, *caunus*, in Novit. Zool. 1895. p. 376.
,, *caunus aegialus*, in Distant, *Rhop. Mal.* 1885. t. 27B. f. 5.
,, *caunus caunus*, in Westwood, *Cab. Or. Ent.* 1848. t. 9. f. 2. 2*.
,, *caunus mendax*, in Haase, *Unters. üb. Mimicry* 1893. t. 8. f. 53.
,, *cloanthus*, in Novit. Zool. 1895. p. 445.
,, *cloanthus cloanthus*, in Westwood, *Arc. Ent.* 1841. t. 11. f. 2.

Papilio cloanthus clymenus, in Leech, *Butt. from China and Japan* 1893. t. 32. f. 2.
.. *cloanthus sumatranus*, in *Iris* VI. 1894. p. 27.
.. *clytia*, in Novit. Zool. 1895. p. 364.
.. *deiphobus*, in Clerck, *Icones* II. t. 25. f. 1 (1764).
.. *deiphontes*, in Staud. & Schatz, *Exot. Schmett.* I. t. 5 (♂,♀) (1884).
.. *deippylus*, in *Verh. z. b. Ges. Wien.* 1864. p. 323. n. 455.
.. *depilis*, in Novit. Zool. 1895. p. 339.
.. *depilis depilis*, in Novit. Zool. 1895. p. 340 (N. Britain, *nec* N. Ireland).
.. *depilis novohibernicus*, in Novit. Zool. 1896. p. 422.
.. *echidna*, in Dehaan, *l.c.* t. 8. f. 6.
.. *euchenor*, in Novit. Zool. 1895. p. 339.
.. *euchenor euchenor*, in *Voyage Coquille*, *Ins.* t. 13. f. 3 (1829).
.. *euchenor godarti*, in *Ann. Sc. Phys. Nat. Lyon.* 1856. p. 398 (♂, *nec* ♀).
.. *euchenor obsolescens*, in Novit. Zool. 1895. p. 339.
.. *eurypylus*, in Novit. Zool. 1895. p. 429.
.. *gambrisius*, in Cramer, *l.c.* II. t. 157. f. A. B (1779).
.. *inopinatus*, in Smith & Kirby, *Rhop. Exot., Pap.* 1893. t. 12. f. 1 (♂). 2 (♀).
.. *lowi*, in *P. Z. S.* 1873. t. 33. f. 6 (♂).
.. *macfarlanei*, in Novit. Zool. 1895. p. 446.
.. *machaon*, in Novit. Zool. 1895. p. 272.
.. *machaon flavus*, in Tutt, *Brit. Butt.* 1896. p. 218; as *machaon* in Barrett, *Lep. Brit. Isl.* 1893. t. 1. f. 1. 1a.
.. *machaon hippocrates*, in Pryer, *Rhop. Nih.* 1886. t. 1. f. 1A. 1B.
.. *machaon machaon*, in Roesel, *Ins. Belust.* I. 2. 1746. t. 1.
.. *machaon sphyrus*, in Novit. Zool. 1895. p. 275.
.. *mandarinus*, in Novit. Zool. 1895. p. 408.
.. *mayo*, in *P. Z. S.* 1873. t. 63. f. 1 (♂).
.. *memnon*, in Novit. Zool. 1895. p. 312.
.. *memnon agenor*, in Distant, *Rhop. Mal.* 1885. t. 27B. f. 7; t. 28. f. 1-7; t. 29. f. 1. 4. 5; under various names.
.. *memnon memnon*, in *Trans. Linn. Soc. Lond.* XXV. t. 1. f. 1. 2. 3. 4 (1865).
.. *nomius*, in Novit. Zool. 1895. p. 421.
.. *paradoxus*, in Novit. Zool. 1895. p. 371.
.. *paron*, in Smith & Kirby, *Rhop. Exot., Pap.* 1893. t. 31. f. 3. 4.
.. *peranthus*, in Novit. Zool. 1895. p. 391.
.. *phestus*, in *Voyage Coquille*, *Ins*1829. t. 14. f. 2. A. B.
.. *podalirius*, in Novit. Zool. 1895. p. 402.
.. *polytes*, in Novit. Zool. 1895. p. 343.
.. *polytes alcindor*, in Oberthür, *Et. d'Ent.* IV. 1879. t. 6. f. 4 (♀); Novit. Zool. 1895. p. 350.
.. *polytes alphenor*, in Cramer, *l.c.* I. t. 90. f. B (♀) (1779); ♂ as *ledebouria* in Kotzebue's *Reise* III. t. 3. f. 7 (1821).
.. *polytes borealis*, in Novit. Zool. 1895. p. 348.
.. *polytes borealis* ab. *thibetanus*, in Oberthür, *l.c.* XIII. 1886. p. 14.
.. *polytes nicanor*, in Staud. & Schatz, *Exot. Schmett.* I. 1884. t. 3 (♂, ♀).
.. *polytes nikobarus*, in *Verh. z. b. Ges. Wien.* 1862. p. 483. n. 112.
.. *polytes perversus*, in Novit. Zool. 1895. p. 353.
.. *polytes polytes*, in Distant, *l.c.* t. 33. f. 7-10.
.. *polytes theseus*, in *Trans. Linn. Soc. Lond.* XXV. t. 2. f. 2. 4. 7 (1865).
.. *rhesus*, in Eimer, *Artb. u. Verwandtsch. Schmett.* 1889. t. 4. f. 6.
.. *rumanzovius*, in Kotzebue's *Reise* III. 1821. t. 2. f. 4a. 4b (♀); ♂ as *krusensternia*, *ibid.* t. 3. f. 5a. 5b.

Papilio sarpedon, in Novit. Zool. 1895. p. 441.
„ *sarpedon adonarensis*, Novit. Zool. 1896. p. 324.
„ *sarpedon anthedon*, in Staud. & Schatz, *Exot. Schmett.* I. 1884. t. 6.
„ *sarpedon choredon*, in Scott, *Austr. Lep.* II. 1890. t. 17.
„ *sarpedon dodingensis*, in Novit. Zool. 1896. p. 323.
„ *sarpedon impar*, in Novit. Zool. 1895. p. 443.
„ *sarpedon imparilis*, in Novit. Zool. 1895. p. 443.
„ *sarpedon isander*, in Smith & Kirby, *Rhop. Exot.* I. 1888. *Pap.* t. 6. f. 3.
„ *sarpedon jugans*, in Novit. Zool. 1896. p. 324.
„ *sarpedon milon*, in *Trans. Linn. Soc. Lond.* XXV. 1865. t. 7. f. 2 (as *miletus*).
„ *sarpedon monticolus*, in *Societas Entomol.* 1896. p. 20.
„ *sarpedon sarpedon*, in Distant, *Rhop. Mal.* 1885. t. 22. f. 6.
„ *sarpedon semifasciatus*, in *Trans. Ent. Soc. Lond.* 1889. t. 7. f. 2 (as *sarpedon* var.)
„ *sarpedon teredon*, in Moore, *Lep. Ceyl.* I. 1882. t. 62. f. 1.
„ *sarpedon teredon* ab. *thermodusa*, in *P. Z. S.* 1885. p. 146. n. 145.
„ *sarpedon timorensis*, in Novit. Zool. 1896. p. 323.
„ *semperi*, in Semper, *Tagf. Philipp.* 18.
„ *tydeus*, in *Reise Novara*, *Lep.* I. 1865. t. 16. f. c; t. 17. f. a.
Pieris rapae ab. loc. *novangliae*, in Scudder, *Butt. New Engl.* II. 1889. p. 1207.
Plusiotis aurora ab. *aurora*, in *P. Z. S.* 1875. t. 23. f. 7.
„ *aurora* ab. *chrysopedila*, in *Biol. Centr. Amer.*, *Col.* II. t. 16. f. 12 (1888).
Polyommatus phlaeas, in Hübner, *Samml. Eur. Schm.* I. f. 362. 363 (1798—1805).
Troides croesus, in *P. Z. S.* 1859. t. 68. 69.
„ *lydius*, in *Reise Novara*, *Lep.* I. 1865. t. 3. f. a. b.
„ *priamus*, in Novit. Zool. 1895. p. 183.
„ *priamus euphorion*, in Rippon, *Icon. Ornith.* 1890. t. 2.
„ *priamus poseidon*, in Westwood, *Cab. Or. Ent.* 1848. t. 11 (♂).
„ *priamus priamus*, in Cramer, *Pap. Ex.* I. 1775. t. 23. f. A, B.
„ *priamus urvillianus*, in *Voyage Coquille* 1829. *Ins.* t. 13. f. 1. 2.
„ *tithonus*, in Dehaan, *l.c.* t. 1. f. 1.

ON MAMMALS COLLECTED BY MR. ALBERT MEEK ON WOODLARK ISLAND, AND ON KIRIWINA IN THE TROBRIAND GROUP.

By OLDFIELD THOMAS.

MR. ALBERT MEEK has continued his explorations of the islands east of New Guinea by making collections on two islands hitherto entirely unvisited by mammal collectors. The most interesting of these is Woodlark Island, situated east of the D'Entrecasteaux group, towards the Solomons, where he found a new Cuscus and a new bat, while on Kiriwina he found a new subspecies of the Cuscus genus besides several other animals of interest.*

The present paper contains an account of all the mammals obtained at the two islands, and may be considered as a continuation of that on his Fergusson Island mammals, published in the NOVITATES for 1895.†

Specimens of most of the species referred to are in both the Tring and British Museums.

1. **Pteropus conspicillatus** Gould.

Kiriwina Island. Many specimens.

"Eyes hazel."—A. S. M.

There is considerable variation among the specimens in the extent and definition of the light rings round the eyes.

2. **Pteropus hypomelanus** Temm.

Kiriwina Island.

"Eyes hazel."

3. **Cephalotes peronii** Geoff.

Kiriwina Island.

"Eyes hazel."

4. **Harpyia major** Dobs.

Kiriwina and Woodlark Islands.

"Eyes hazel."

5. **Carponycteris crassa** Thos.

Kiriwina and Woodlark Islands.

6. **Hipposiderus tricuspidatus** Temm.

Woodlark Island.

7. **Hipposiderus cervinus** Gould.

Kiriwina Island.

8. **Emballonura nigrescens** Gray.

Woodlark Island.

* For lists of ornithological collections made in these islands, see *antea*, pp. 234-251

† Nov. Zool. II. p. 163 (1895).

9. **Emballonura meeki** sp. nov.

a—c. Three *males.* Kiriwina Island.

Small *Emballonura* with very lobate lips, widely separated nostrils, and lower incisors divided from canines.

Muzzle obtuse, the tip scarcely projecting beyond the lower lip. Nostrils narrow, oblique, widely separated, their inner margins notched. Lips much produced laterally, the lower ones especially widely expanded into broad thin lobes. Front of lower lip with a broad groove, margined by thickened ridges. Ears narrow, pointed; their inner margins slightly but irregularly convex; tip narrowly rounded off, with a slight concavity just below; a small projection opposite the base of the tragus; basal lobule running forward to below the angle of the mouth. Tragus not unlike that of *E. semicaudata*, slightly expanded above, its outer margin straight, its inner faintly concave; a distinct projection at its outer base.

Wings from the metatarsi. Calcars as long as the tibiae.

Upper incisors small, in pairs on each side of a space equal to their distance from one another; more widely separated from the canines. Anterior upper premolar minute, close behind the canine. Lower incisors in a group in the front of the jaw, separated from the canines. Anterior lower premolar half the height of the canine and second premolar, which equal each other.

Dimensions of the type, an adult *male*:—Forearm 38 mm. Head and body 40; tail 11·5; ear 13·5; tragus on inner margin 2·6; thumb including claw 6·4; tibia 14·6; hind-foot 6; calcar 13·5; length of interfemoral in middle line 29.

Type: Brit. Mus. 96.10.5.12.

This species is widely distinct from any of the species described in Dobson's Catalogue, and does not indeed fall into either of the two groups he recognises. For by its separated nostrils it belongs to "*Mosia*," while its anteriorly grouped lower incisors bring it into the subgenus *Emballonura*. The obtuse muzzle, the wide lobes to the lower lips, and the pointed ears will also readily separate it from the two species, *E. raffrayana* Dobs. and *E. beccarii* Pet. & Dor., described since the appearance of the Catalogue.

10. **Mus browni** Alst. (?).

Woodlark Island.

This is the most natural species to find in Woodlark Island, as it occurs all over the Papuan Archipelago. Several names have been applied to forms belonging to the same group, but whether any or all of these are valid cannot be now determined for want of material. The Pacific Rat (*Mus exulans*) and the Maori Rat (*Mus maorium*) are both near allies to the present animal.

11. **Macropus agilis** Gould (?).

Two young specimens. Kiriwina Island.

These specimens are rather browner than usual, but, so far as can be made out on such young specimens, agree in all essential particulars with Papuan examples of Gould's species.

12. **Petaurus breviceps papuanus** Thos.

Several specimens. Fergusson Island.

13. **Phalanger lullulae** * sp. nov.

Many specimens. Woodlark Island.

A small Cuscus of the *Ph. orientalis* group, spotted with white as in *Ph. ornatus*, but without rufous on forequarters or belly.

Size small, barely exceeding that of *Ph. breviceps*. Sexes almost exactly alike, both in size, coloration, and even in the cranial characters. Ears small, rounded, not so absolutely naked inside as is normal in the group, as there are a few thinly scattered hairs on the internal surface of the ear-conch ; nothing like, however, the thick hairiness found in the *Ph. maculatus* group. Fur very close and woolly. General colour (of both sexes) dull brown, irregularly mottled with spots of yellow or white, which increase in number on the sides and belly, so that the latter may be said to be white mottled with brown.

Chest and inner sides of limbs more white, but in the *female* the dark predominates on the lower part of the belly and inner sides of the hind-limbs. Throughout, however, the mottling is so irregular that no exact description can be drawn up. A dark nuchal or dorsal streak present, but very irregular, most distinct on the crown. Tail rather more than a third hairy above, the difference between the upper and lower extension of the fur rather less than two inches. Mammae four.

Skull on the whole very like that of *Ph. orientalis*, but the zygomata distinctly converge forwards, so that there is a sort of elbow at their hinder ends, just external to the glenoid fossae, and at this point the zygomatic breadth is decidedly greater than in front. The supraorbital crests are rather intermediate in character between those of *Ph. orientalis* and *Ph. breviceps*, more transversely developed than in the latter, less than in the former. Nasal notch deeper than in *Ph. orientalis*, almost as in *Ph. ornatus*.

Teeth apparently as usual, the upper canines pressed close against i^3, not separated as in *Ph. ornatus*. In all of the three skulls examined there are only two upper premolars, no small teeth being present between the usual anterior and posterior ones ; below, the greatest number of the small intermediate teeth present is three.

Dimensions of the type, an adult *male*, in skin :—Head and body 375 ; tail 275 ; hind-foot 51. A specimen in spirit has the ear 21·5 and lower leg 84 mm.

Skull : basal length 68 ; greatest breadth 48·5 ; nasals, length 28, greatest breadth 11; interorbital breadth 12·2 ; intertemporal constriction 8·3 ; palate length 41; palatal foramen 5·6. Teeth, horizontal length of $\underline{p^4}$ 4·6 ; length of $\underline{ms^{1-3}}$ 13.

Type : Brit. Mus. 96.11.5.24. Paratypes in British and Tring Museums.

It is difficult to decide whether this very distinct Cuscus is most nearly allied to *Ph. orientalis* or *Ph. ornatus*. It resembles the latter in its white spotting and deeper nasal notch, but is without any trace of the handsome rufous or orange on the forequarters and belly, and its canine is as in *Ph. orientalis*. Its supraorbital ledges also have more resemblance to those of *Ph. orientalis* than to the very remarkable ones of *Ph. ornatus*.

14. **Phalanger orientalis kiriwinae** subsp. nov.

Many specimens. Kiriwina Island, Trobriand group.

Closely allied to the Fergusson Island subsp. *intercastellanus*, but rather larger, and with a different structure of the interorbital region.

* Lullula, a woodlark.

In this form the adult *female* is a pale silvery grey all over above, while below the belly is only a little paler, and there is no defined white middle part to the belly as there is in New Guinea examples of subsp. *typicus*. The dorsal line is strongly marked, and there is a yellowish suffusion on the fore-back on each side of the line, and also on the rump just at the root of the tail. Young specimens are similar, and so are the young *males*, but in the latter sex as the animal gets older the general colour gets paler,* first anteriorly and then throughout, until it is almost white, with just a thin sprinkling of darker hairs among the white. The old *male* in the Tring Museum represents this last stage. The dorsal line still remains conspicuous, which is not the case in the well-known albinistic examples of this species. Also in adult and old *males* the underside of the neck gradually gets suffused with rufous brown, probably glandular in its origin.

The series brought home by Mr. Meek is very interesting as showing the way in which, while the *females* always retain their grey colour, the *males*, which are at first like the *females*, gradually become in age quite different.

The single specimen of subsp. *intercastellanus* available is a very old *male*, older than any of the examples of *kiriwinae*, but its general colour is still greyish, and it has no trace of the glandular darkening on the throat.

The skull of *kiriwinae* is longer and rather slenderer than that of *intercastellanus*, and has a much narrower interorbital and intertemporal region, which is especially noticeable as this part becomes narrower with age, and the type of *intercastellanus* is extremely old. The postorbital processes do not overhang the orbits so far laterally, but seem to be situated farther forwards as compared to the brain-case. Another curious peculiarity present in all the specimens is that the zygomata are bowed inwards anteriorly opposite the ascending portion of the malar, so as to form a distinct concavity in their outline at this point. In the two Tring specimens, which still contain their skulls, this concavity can be distinctly felt beneath the skin. It is also noticeable that in old *females* the supraorbital crests are almost as well developed, so that the animal is consequently as "cavifrons" as in the *males*.

Altogether the Kiriwina Cuscus, although undoubtedly very closely allied both to the typical *Ph. orientalis* and to subsp. *intercastellanus*, seems sufficiently distinct as a local race to deserve a subspecific name.

The following are the skull-measurements of the adult *male* selected as the type (Brit. Mus. 96.11.5.15):—Extreme length from back of occipital crest 92·3; basal length (*c*) 84; greatest breadth 58; nasals, length 35·5, greatest breadth 13; interorbital breadth 11·6; tip to tip of postorbital processes 12·2; intertemporal breadth 4; palate length 49; palatal foramen 6·2. Horizontal length of $\underline{p}^4$ 4·8; length of $\overline{ms}^{1-3}$ 15.

Of this form there are a fine pair in the Tring Museum, and three *males* of different ages and an adult *female* in the British Museum.

15. **Perameles** sp. (probably **P. doryana** Quoy & Gaim).

One young specimen. Woodlark Island.

This Bandicoot is unfortunately too young for certain determination.

* This *appears* to be the general course of the colour change, but one fact rather militates against the correctness of the above account, namely, that on the whitish anterior back of the oldest British Museum specimen (the type) some patches of new hairs are coming up *grey*, exactly the reverse of what should be the case. I can at present suggest no explanation of this curious anomaly.

CONTRIBUTIONS TO THE ORNITHOLOGY OF THE PAPUAN ISLANDS.

By THE HON. WALTER ROTHSCHILD and ERNST HARTERT.

(Unless signed otherwise, the work of these "contributions" is so divided that Walter Rothschild works out the families *Paradiseidae*, *Ptilonorhynchidae*, and *Rallidae*, while E. Hartert is responsible for the rest.)

VI.*

ON SOME SKINS COLLECTED FROM APRIL TO JUNE ON MOUNT VICTORIA, OWEN STANLEY MOUNTAINS, MOSTLY AT ELEVATIONS OF FROM 5000 TO 7000 FEET.

1-9. Of true *Paradiseidae* the collection contained specimens of the following species :—

Craspedophora intercedens, *Lophorina minor*, *Epimachus meyeri*, *Parotia lawesi*, *Paradisea raggiana*, *P. rudolphi*, *Seleucides nigricans*, *Cicinnurus regius*, *Diphyllodes hunsteini*. W. R.

10. **Loria loriae** Salvad. (*antea*, p. 252).

Adult *male* and immature *male* from Mount Victoria. The immature *male* has the abdomen, back, and wings mixed with greenish feathers, showing that the young *male* is, in colour, similar to the adult *female*. The wing of the *male* measures 100 mm. W. R.

11. **Cnemophilus macgregorii** de Vis.

Only one adult *male* of this magnificent bird has hitherto been known. It was well described by Mr. de Vis and beautifully figured in the *Ibis*. The present collection contains one adult *male*, wing 106 mm., and a specimen which is evidently an immature *male*. It is olive above, tinged and mixed with pale brownish yellow. Quills with the outer webs pale rufous brown, the inner webs dusky brown, each wing having a few fresh feathers like those of the adult *male*. The tail has a few fresh feathers which are like those of the old *male*, while the rest is dark brown. Underparts black, mixed with yellowish olive feathers on the abdomen, and still more on the throat. The peculiar crest on the forehead is already developed, and has the same beautiful golden sheen in a certain light which is visible in the old *male*. W. R.

12. **Amblyornis inornata** (Schleg.).

Two *males* with crests and two specimens without crests, evidently young *males*, for they differ from *females* from Arfak in having the feathers of the crown and occiput much longer and narrower, and the under wing-coverts of a deeper orange. Undoubted *females* of this form, which I consider identical with *A. inornata* from Arfak (see *antea*, pp. 11-13), are not yet recorded. W. R.

* For Nos. I., II., III. see *antea*, pp. 8-20; for Nos. IV., V., pp. 233-255.

13. **Aeluroedus melanocephalus** Rams.

Wing 155 mm. W. R.

14. **Amalocichla sclateriana** de Vis.

A skin of this remarkable Timeliine form, well agreeing with de Vis' description in the Annual Report on British New Guinea, 1892, p. 95, except that the upper tail-coverts are of the same rufous brown colour as the back, and the under tail-coverts are buff with slaty bases, while de Vis says, "Upper and under tail-coverts rufous." This curious bird reminds one very much of the South American *Grallariae*. E. H.

15. **Eupetes leucostictus** Scl.

Two skins from Mount Victoria, not differing materially from a skin from Arfak, though more material is necessary to judge finally of their identity. E. H.

16. **Melirrhophetes belfordi** de Vis.

Two skins from Mount Victoria. They are in every respect entirely similar to the *male* mentioned *antea*, p. 16, and another *male* from the Oriori District, except that the broad malar stripes and the feathers above the eye are not so white, but rather buff. One of them, no doubt a *female*, is much smaller; the wing, which measures from 147 to 151 mm. in the *males*, measuring only 126 mm. E. H.

17. **Melirrhophetes ochromelas batesi** (Sharpe).

The differences between this form and *M. ochrom. typ.* are very slight indeed and hardly worthy of a name. See *antea*, p. 16. E. H.

18. **Melilestes megarhynchus** (G. R. Gray).

One skin in moult, showing the remainder of the immature whitish and dark striped plumage on the chin and along the middle of the breast and abdomen. E. H

19. **Ptilotis polygramma** Gray.

One adult skin. E. H.

20. **Ptilotis salvadorii** sp. nov.

Closely allied to *Pt. subfrenata* Salvad. from the Arfak Mountains, but evidently distinct, having no grey forehead, the colour above being the same from the base of the culmen to the back. Above blackish brown, with olive edges to the feathers; browner and paler on the rump. Behind the eye a large bare spot, followed by a large black patch which extends down the neck. From the praeocular region to the ear-coverts a golden yellow line of hair-like feathers. Beyond the eyes some white feathers with black tips. Wings deep brown, outwardly edged with yellowish olive-green, inwardly with pale cinnamon. Tail deep brown, with greenish outer edges. Chin blackish brown. Underparts dingy greyish brown, with an olive-greenish wash. Feathers of abdomen with some pale buffy tips. Thighs and under tail-coverts greyish brown, with buff edges. Under wing-coverts pale cinnamon. Total length about 175 to 185 mm.; wing 93 to 98; tail 85 to 95;

culmen 25 to 26 ; tarsus 23 to 25 mm. Two specimens, quite alike in colour, but one larger, probably *male* and *female*. Although I have not seen *P. subfrenata* I have no doubt, from Salvadori's descriptions, that this form is different. It is named in honour of the author of the immortal *Ornithologia Papuasia*. E. H.

21. **Melipotes fumigatus** A. B. Meyer.

1886. *M. fumigatus* A. B. Meyer in *Zeitschr. f. ges. Ornith.* III. p. 22. t. IV. fig. 1.

1895. *M. atriceps* Grant in *Bull. B. O. C.* No. XXXI.

A skin of this rare bird agrees perfectly with the type of *M. atriceps* in the British Museum, but I find that it has been described long ago as *M. fumigatus*. E. H.

22. **Pachycephala schlegeli obscurior** Hartert.

Two skins confirming my observations made on p. 15 of this volume. It may be added that the colour above is slightly darker, but that the size of the black spot on the chin is apparently not quite constant. E. H.

23. **Graucalus longicauda** de Vis.

One skin of this rare bird, which is a very good species. It is described in the "Report on Birds from British New Guinea," dated August 23rd, 1889, forming part of the Governor's Annual Official Reports. The head and neck are of a glossy purplish black, the tail and wings black with a very slight gloss. There is a brownish wash on the sides of the body and here and there on the back, but this is probably due to nonage. The under tail-coverts are darker and more ashy than the grey breast, abdomen, back, and upper wing-coverts. Wing 175 ; tail 165 mm. Sex not known. E. H.

24. **Campochaera sloetii** (Schleg.).

One specimen, well agreeing with the descriptions of the *female*. E. H.

25. **Mellopitta lugubris** (Rosenb.).

One skin. The breast and abdomen with many irregular patches of rusty brown feathers, also the hind-neck and hinder part of the crown with dark brown feathers, which are evidently the remainder of the plumage of the young bird. Besides these I cannot see differences from *M. lugubris* from Arfak. E. H.

26. **Aegotheles rufescens** Salvad.

Of this species, which has been described by Salvadori in *Ann. Mus. Civ. Genova*, XXXVI. p. 71, from a single skin from the Moroka District, this collection contained one specimen, which seems to be somewhat immature. This species does not stand very far from *Ae. albertisi*. More material is very much wanted to better understand the species of this genus. E. H.

27. **Glossoptilus goldiei** Salvad.

A beautiful *male*. Wing 108 mm. E. H.

28. **Psittacella brehmi pallida** A. B. Meyer.

See *antea*, pp. 18, 255.

29. **Psittacella picta** Rothsch.

See *Bull. B. O. Club* for October 1896. The species will be figured in the *Ibis* for January 1897.

30. **Neopsittacus musschenbroeki** Schleg.

A fine *male* from Mount Victoria. It is very interesting to see that this species occurs together with the following species. E. H.

31. **Neopsittacus pullicauda** Hartert.

Several skins confirm the correctness of my former observations (see *antea*, p. 17). This species differs from *N. musschenbroeki* in having the hinder part of the crown, occiput, and nape darker (nearly green), the tail below dark olive-green, instead of orange, the red colour on the abdomen more extended towards the sides of the body. The occurrence of both *N. musschenbroeki* and *N. pullicauda* on the same mountain seems to forbid to look upon the latter as merely a subspecies, though it may be that they inhabit different elevations. E. H.

32. **Ninox dimorpha** (Salvad.).

A skin which agrees in every detail with Salvadori's descriptions and with a skin from Dutch New Guinea. E. H.

33. **Falco severus** Horsf. (an subsp.?).

An adult, or at least fairly old bird, and a young one with large longitudinal spots below. Messrs. Meyer & Wiglesworth have (in *Abh. und Ber. Mus. Dresden*, 1892-93, No. 3, p. 6) separated the New Guinea birds of this species as *F. severus papuanus* (see *antea*, p. 256). It seems to be doubtful whether that form can be upheld. The wing and tail are said to be uniform below; this, however, is a sign of greater age, and our Philippine skins are uniform on these parts, while our New Guinea ones are not. Skins from the Philippines are darker below, and just as dark above as the New Guinea skins. The young New Guinea bird is very distinctly barred on the wings and tail. The only difference between specimens from New Guinea and from other places I can see is a slightly darker colour of the tail above. E. H.

34. **Rallicula forbesi** Sharpe.

Three skins. One immature, with the top of the head darker, the feathers of the back and upper wing-coverts with small buff spots near the tips of both webs. W. R.

The two following birds were collected west of Port Moresby:—

1. **Seleucides nigricans** (Shaw).

Evidently common about sixty miles inland from Port Chalmers, west of Port Moresby. In the old *male* everything below the breast-shield is orange-yellow, there being no white colour on the bird at all. This seems to be a lowland species. W. R.

2. **Henicopernis longicauda** (Garn.).

Popo inlet, west of Port Moresby. "Iris yellow." E. H.

VII.

LIST OF A COLLECTION OF BIRDSKINS MADE IN THE ARU ISLANDS BY CAPTAIN CAYLEY WEBSTER FROM MAY TO JULY 1896.

1. *Paradisea apoda* L. One *female*. "Iris pale yellow."—2. *Aelurioedus melanotis* Gray.—3. *Cicinnurus regius* (L.). The Aru skins do not differ perceptibly from those of other countries, though on the whole the wing is a few millimetres longer. (W.R.)—4. *Manucodia atra* (Less.).—5. *Macrocorax fuscicapillus* (Gray).—6. *Mino dumonti* Less. White bar in the wing rather narrow.—7. *Oriolus flavocinctus* (King).—8. *Dicruropsis carbonaria* (Müll.). Wing 147 mm.—9. *Graucalus caeruleogriseus* (Gray).—10. *Graucalus melanops* (Lath.).—11. *Artamus leucogaster* (Valenc.). Two specimens with remarkably short wings!—12. *Cracticus quoyi* (Less.).—13. *Cracticus cassicus*.

14. **Rhectes analogus** A. B. Meyer, or **R. aruensis** Sharpe.

In *Zeitschr. f. ges. Orn.* I. p. 285 (1884) Dr. A. B. Meyer separated some Aru specimens from *R. analogus* under the name of *R. aruensis*. The skin before us seems to agree with Meyer's birds, but Dr. R. B. Sharpe in *Ibis*, 1888, p. 437, declares that Meyer's *R. analogus* is only the young of his *R. aruensis*. See also Salvadori, *Agg. Orn. Papuasia*, II. p. 97 (1890). E. H.

15. **Rhectes ferrugineus brevipennis** subsp. nov.

Aru specimens have the wing very short, only 128 mm. All individuals of our very large series from New Guinea have the wings decidedly longer. A. B. Meyer, in *Zeitschr. f. ges. Orn.* I. p. 285 (1884), had already pointed out this difference, and it is only on account of his corroboration of our observation that we dare to bestow a subspecific term on this form. E. H.

16. **Philemon novaeguineae aruensis** A. B. Meyer.

Four skins from Dobbo, unfortunately not sexed. One of these, probably an old *male*, has a very long bill and a very high hump. These four birds have the bill 46, 46, 48, and 53 mm. long; their height at hump is 18, 19, 20, and 24 mm. Three specimens of *Ph. novaeguineae subtuberosus* (*antea*, p. 238) have the bill 43, 45, 45 mm. long, and their height at hump is 14, 15, 17 mm. E. H.

17. *Pitta novaeguineae* Müll. & Schleg.—18. *Macropteryx mystacea* (Temm.). Wings 222—224 mm.—19. *Podargus ocellatus* Q. & G.—20. *Eurystomus australis* Sw.—21. *Tanysiptera hydrocharis* Gray.—22. *Halcyon sordidus* Gould. The loral spot cannot be called pure white, but has a distinct though faint buffy tinge. Wing 116 mm. See *antea*, p. 244.

23. **Syma torotoro tentelare** subsp. nov.

Females from Aru have the black spot on the head in or behind the middle of the crown about 15 mm. or more away from the base of the bill, while in specimens from Northern Dutch New Guinea this spot is generally larger and extends almost

or quite to the base of the culmen. The *males* of the Aru form do not differ perceptibly from *S. torotoro typica*.

Specimens from Fergusson Island are rather dark below, but a young individual from Waigiu is similar in this respect. In one of the Fergusson *females* the head-spot is placed more backwards than usual, and thus it seems somewhat to point towards the Aru subspecies. According to Salvadori (*Orn. Papuasia*, I. p. 485) *females* from Naiabui in S.E. New Guinea resemble those of Aru, and therefore most likely belong to the same subspecies. Another species has been recently described as *S. megarhyncha* by Salvadori from the Owen Stanley Mountains.

The last form of the genus *Syma* is called *S. flavirostris* and inhabits North Queensland. In the *Catalogue of Birds*, Vol. XVII. p. 197, it is said to differ from *S. torotoro* in wanting the black mark along the tip of the culmen—and this statement has been made before. However, it is quite wrong, the fully adult *S. torotoro* never having any black mark on the culmen, a character peculiar to immature birds of *S. torotoro* only. On the other hand, I have not yet seen a *Syma flavirostris* quite without a black mark, and I believe that even the most adult birds have it. In any case it is a bad character for distinguishing these species, the much lighter and more greenish colour of the upper parts being the best distinguishing character of the Queensland form. The subspecific name proposed above is the native name of the bird in Aru, as *Torotoro* is its name in Dorey. E. H.

24. **Sauromarptis gaudichaud** (Q. & G.).

No distinction from typical skins of New Guinea. There is certainly not more white on the back; on the contrary, some of our birds from New Guinea (we have now thirty-six without duplicates) show *more* white on the back. The blue of the rump of most of our Aru birds is rather dark, while it is certainly paler in most of the skins from S.E. New Guinea, but not constantly. The so-called *Sauromarptis kubaryi* seems to differ in *no way* from *S. gaudichaud typica*.

W. R. & E. H.

25. *Sauromarptis tyro* (Gray).—26. *Microglossus aterrimus* (Gm.). Wing only 330 mm.—27. *Cyclopsittacus aruensis* (Schleg.).—28. *Trichoglossus nigrogularis* Gray. Large and fine birds; wings 150, 152, 153 mm.

29. **Chalcopsittacus scintillatus** (Temm.).

The majority of the Aru specimens have the breast more washed with brown and have very dark orange stripes along the shafts of the feathers on the breast as well as on the hind-neck, but the British Museum possesses specimens from New Guinea that are just like our Aru skins. The plumage of the sexes and different ages of this bird are not yet properly known. Some birds (? *females*) have the rump distinctly bluish, some have no orange stripes at all.

W. R. & E. H.

30. **Eclectus pectoralis aruensis** (Gray).

Specimens from the Aru Islands have the tail in both sexes very prominently tipped with yellow. I do not find this so much in any other specimens from other

localities. The Aru Island birds are also rather large (♂ wing 263—269), and I believe they can stand as a subspecies. Cf. Gray, *P. Z. S.* 1858, p. 182; Salvadori, *Orn. Papuas.* I. p. 201.

Specimens from the Solomon Islands seem smallest of all, next coming those from Fergusson, New Ireland, and New Britain. E. H.

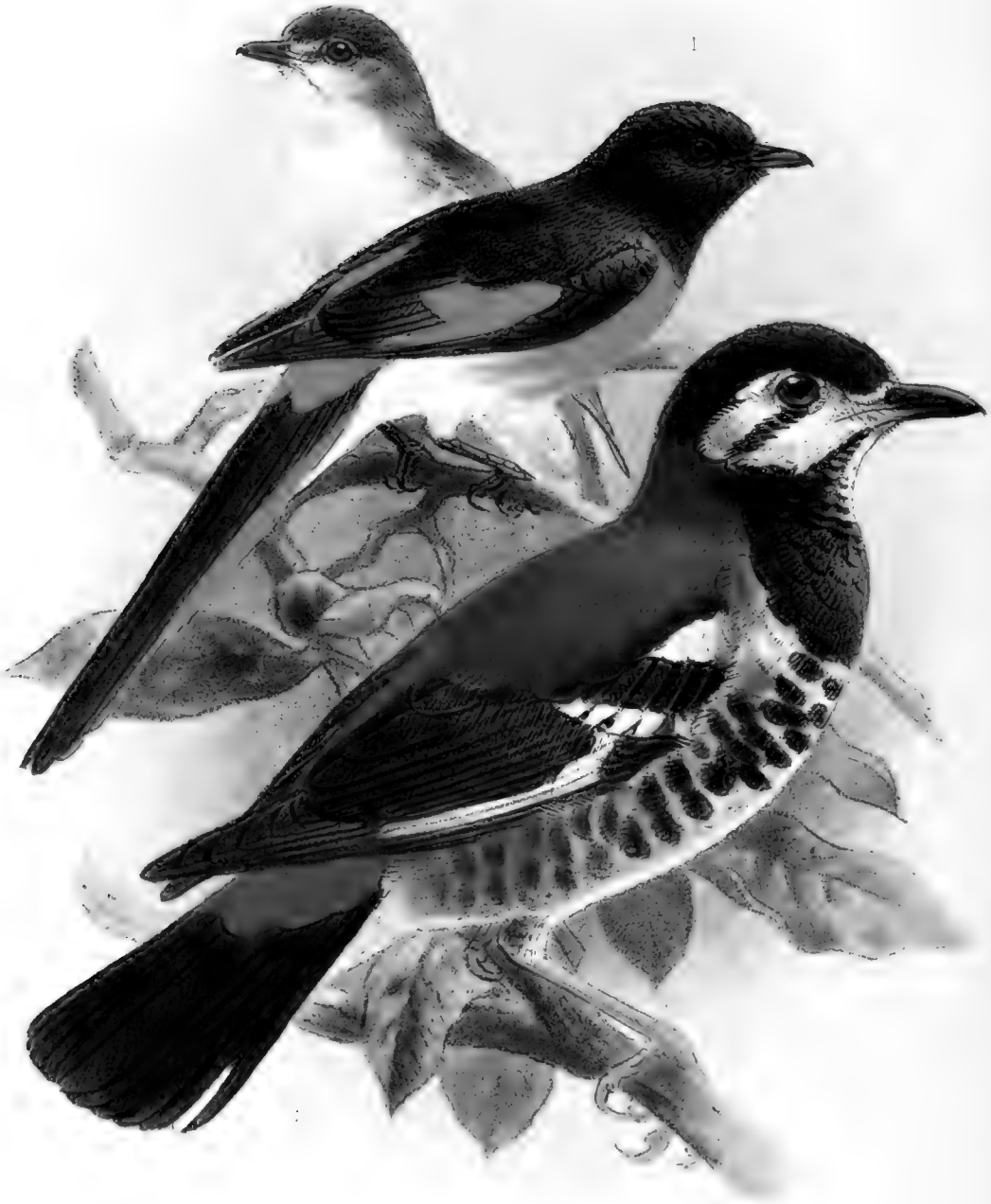
31. *Ptilopus aurantiifrons* Gray.—32. *Pt. wallacei* Gray.—33. *Pt. superbus* (Temm. & Knip).—34. *Pt. iozonus* Gray. "Iris yellow."—35. *Pt. coronulatus* Gray. "Iris orange."—36. *Myristicivora bicolor* (Scop.).—37. *Carpophaga zoeae* (Less.). "Iris straw-colour."—38. *C. pinon* (Q. & G.). "Iris red; feet coral-red; bill greyish; naked space round eye red."—39. *Chalcophaps stephani* Rchb. Hitherto, I believe, only doubtfully known from the Aru Islands. E. H.

40. **Macropygia** sp.

There are before us four skins of a *Macropygia* from Dobbo and Wannambai. According to Salvadori's Catalogue of the Pigeons in the British Museum they would belong to *M. doreya* Bp., and Salvadori has identified the Aru specimens that came before him with the latter species. To us they seem to agree much better with *M. batchianensis*, and to be merely a form of that species with a less rufous chin and longer wings. The wings of the adult *males* measure 173—175 mm. From all we can see at present we must conclude that our Aru specimens differ from *M. doreya typica* and that they are nearer to *M. batchianensis*; further that *M. doreya*, *M. cinereiceps*, *M. griseinucha*, *M. batchianensis*, and *M. goldiei* are more or less connected by intermediate specimens and merely subspecies of one and the same species, but that a large material with exact localities will be necessary before one can come to definite conclusions about them.

W. R. & E. H.

41. *Baza reinwardti* Müll. & Schleg.—42. *Haliastur girrenera* Vieill.—43. *Nycticorax caledonicus* (Gm.).



AN ACCOUNT OF THE COLLECTIONS OF BIRDS MADE BY MR. WILLIAM DOHERTY IN THE EASTERN ARCHIPELAGO.

By ERNST HARTERT.

(Plates XI. and XII.).

I.—INTRODUCTION.

LITTLE did I dream when in 1888, coming from the Kinta District in the interior of Perak in the Malay Peninsula, by a most fortunate accident I met the then already well-known entomologist Mr. William Doherty, who was just leaving Thaiping for Padang Ringas, that he might eventually become one of the most energetic *ornithological* collectors of the end of the century. He travelled then without a gun, and afterwards when we made together our pleasant trip to Upper Assam he never showed any inclination to collect birds. Only about a year ago in Tring, before leaving for his present journey, he decided that he would also try to collect birds. As he was going to start for some of the most interesting places of the Dutch East Indies, Mr. Rothschild and I were very glad to hear of his plans, and we tried to instruct our friend as much as we could in the few days' time there was. We did not know to what extent the bird-collecting would be carried out, but our expectations were not too great, as we hardly thought the great field of entomology which Doherty cultivated would allow him much time for vertebrates also. Now, to judge from the rich material of birdskins he sent to the Tring Museum in less than nine months' time, and considering that they are his first attempts, it would seem that Doherty is destined to become one of the most successful ornithological collectors of our days. Part of his success is probably due to the fact that he follows our advice in searching chiefly for the less conspicuous little forms, which are passed over by many of the collectors, and to the truly astonishing amount of special ornithological knowledge he acquired, and which enables him to look out for the more interesting forms in their proper places.

II.—ON BIRDS FROM EAST JAVA.

(*With footnote on a new genus by the Hon. Walter Rothschild.*)

Doherty's first trip in 1896 was one of about two weeks to *Mount Arjuno*, an enormous old volcano in the eastern part of Java, south of Surabaya, which he ascended to the top. He writes: "Birds are very scarce on the top of Arjuno, and the weather was dreadful. I send only about sixteen species taken from 8300 to over 10,000 feet, the upper part of the mountain from 10,000 to 11,000 feet having produced nothing. I was camping in a hut in a valley, called Lali Jiwo, 8300 feet high, the highest building in Java, and collected up to the summit of Arjuno, 11,000 feet, and the crater of Welirang, 10,000 feet, where I got some of the best birds. I am sorry to say that some of them do not seem to be really high-elevation species, but may have come from below, as *Aethopyga mystacalis* and *Buchanga cineracea*, but some must be very rare."

I give a full list of these birds, as we know really very little of the exact altitudes and localities of many of the Javan birds, and as there are some rare and new species in this first little bird-collection of Mr. Doherty.

These birds were all collected in January.

1. **Merula javanica** (Horsf.).

Mount Arjuno at 8000 and 8300 feet. Wings in three adult *males* 125, 125, 128 mm. See Büttikofer's notes on this bird in *Notes Leyden Museum*, XV. p. 107 (1893). I have here retained, for the sake of convenience, the generic name "*Merula*" for this bird, though I do not now believe that there is any scientific foundation for that genus.

2. **Cettia montana** (Horsf.).

Differs from *C. oreophila* Sharpe from Kina Balu in Borneo in having a shorter tarsus and being less brown above. Differs from *C. seebohmi* Grant of Luzon in having a much more olive and less rufous tail, wings, and forehead, from *C. cantillans* and its allies in being smaller and more of a dark olive colour.

It is dark brownish olive above from the forehead to the tip of the tail. Below whitish, with a brown wash along the sides of the body and across the middle of the breast. Wing-quills deep brownish olive, with narrow brown margins to the outer webs, and whitish borders to the inner webs. Under wing-coverts white. In the rather full and broad wing the fourth, fifth, sixth, and seventh primaries are almost equal and longest. Wing : ♂ 53, ♀ 49 mm. ; tail : ♂ 57 (♀ not measurable on account of moult) ; tarsus 21 ; culmen 14 mm.

One ♂ from an elevation of 7500, one ♀ from between 9000 and 10,000 feet, on Mount Arjuno, East Java, in January 1896.

This is the *Sylvia montana* of Horsfield. It is quite omitted from the *Catalogue of Birds*, and the only mention I can find of it is that it is quoted, without explanation, as *Cettia montana* (Horsf.) in Whitehead's *Exploration of Kina Balu*, p. 258. The type of Horsfield's *S. montana* is in the British Museum, and it is evidently the same as the bird from Arjuno, so I think it the best course to accept Horsfield's name, to avoid synonyms, though one would be fully justified to do away with Horsfield's name altogether, and to doubt the identity of the skin in the British Museum with Horsfield's type, as the description of the underparts ("olivaceo-testacea") is totally wrong. This is what Mr. Grant wrote me about the species, and I have, besides, examined the specimens myself :—

Cettia montana (Horsf.).

Sylvia montana Horsfield, *Trans. Linn. Soc.* XIII. p. 156 (1821).

Although no mention of this species is made in the *Catalogue of Birds*, Vol. V., there is, in addition to Horsfield's type, a second example in the British Museum collected by Wallace in 1861 and marked "♀. West Java." In the type the shape of the wing is as follows : first primary quill much shorter than the second ; second much shorter than the third, which is about equal to the tenth; sixth slightly the longest. In Wallace's specimen the wings and tail are in moult, but the shape of the wing appears to be similar to the above. In both specimens the whitish eye-brow stripe, commencing above the lores and extending above the ear-coverts, is well marked ; the middle of the throat and breast pale whitish buff, inclining to whitish on the belly; the sides of the chest and breast, the sides, flanks, and under tail-coverts brownish buff ; the upper parts, including the wings and tail, dark brownish olive ; and the cheeks and sides of the throat are similar, but the basal

part of the feathers inclines to whitish buff, giving these parts a suffused brownish buff appearance.

The type of *C. montana* (Horsf.) measures : total length 5·1 inches ; wing 2·2 : tail 2·25 ; tarsus 0·88.

The *male* type of *C. oreophila* Sharpe measures : total length 4·8 inches : wing 2·1 ; tail 2·25 ; tarsus 0·95.

Both these species are most nearly allied to *Cettia seebohmi* Grant (cf. *Ibis*, 1894, pp. 507, 508). As in that species both have the sixth primary quill longest ; but *C. seebohmi* is easily distinguished by its rufous wings and nearly white underparts. W. R. Ogilvie Grant.

3. **Pomatorhinus montanus** Horsf.

Several skins from elevations of from 8000 to nearly 10,000 feet. In all these the white stripe behind the eye is narrower than in nearly all the skins in the British Museum, and does not fully join the white feathers in front of the eye. These same peculiarities are visible in examples from Bali. If more material with exact localities becomes available it may turn out that Java is inhabited by several forms of this species.

Stasiasticus * gen. nov.

It is only with great hesitation that I create a new genus for this little bird, but there seems no help for it, as its structure does not agree with that of any other form known to me. It resembles very much the genus *Androphilus* Sharpe, but differs from it in having much smaller and feebler legs and feet, in having twelve, not ten, tail-feathers, and a somewhat differently shaped wing. I should have united it with *Pseudotharraleus* Grant (*Ibis*, 1895, pp. 448, 449), if it had not so considerably smaller and feebler legs and feet and a quite differently shaped wing. It is also, in my opinion, not very far from *Cettia* (Seebohm, *Cat. B. Brit. Mus.* V. p. 133), a genus of which I believe that it is wrongly placed in the *Catalogue of Birds*, the structure of its wing, the number of tail-feathers (ten), the eggs, and the rich plumage of the rump suggesting a place among the "*Timeliidae*." It differs, however, from *Cettia* in having twelve (not ten) tail-feathers, and no bristles on the gape.†

* στασιαστικός = seditious.—E. H.

† When discussing with Mr. Hartert the affinities of the new Java bird I was struck with the apparent similarity of it and of some of the allied genera with *Sphenoeacus*, a genus which, in my opinion, belongs to the same group of *Timeliidae*, and which cannot stand very far from *Pseudotharraleus* and *Stasiasticus*, the latter, however, being widely separated from it by the shorter, broader, and more rounded tail, and the less powerful feet. While investigating these questions I found that only the New Zealand species of *Sphenoeacus* have ten tail-feathers, the African ones not. The African species, besides having twelve tail-feathers, have the operculum over the nostrils bare of feathers, while it is feathered in the New Zealand ones ; the outer webs of the tail-feathers are fuller and more connected, while they are very lax and separate in the species from New Zealand, and have a longer and stronger wing. There is, therefore, no doubt that *Sphenoeacus* is not only placed wrong in the key given by Sharpe (*Cat. B. Brit. Mus.* VII. p. 93), but that it is more reasonally divided into two genera, as Sharpe would have done if he had counted the tail-feathers of the African *Sphenoeacus* and noticed the other differences. The generic name being founded on the African species, it becomes necessary to create a new name for the New Zealand group, which I propose to call

Bowdleria gen. nov.

in remembrance of Dr. Bowdler Sharpe's invaluable *Catalogue of the Timeliidae*.—Walter Rothschild.

In this new genus the bill is shorter than the head, the nostrils in front of the feathers at the base of the bill, and protected by a membrane, but apparently (unless damaged by a string) rather open in front. The wing is short, round, and soft. The first primary is of about half the length of the second, the second a little more than three-quarters of the third, the fourth, fifth, and sixth subequal and longest, the seventh very little shorter than the sixth, the following ones gradually shorter; the secondaries as long and shorter than the second primary. Plumage rich and soft; the upper and under tail-coverts full, broad, soft, and long, nearly or quite half as long as the tail. Tarsus longer than toes; tarsus covered with large scutellae, which in one of the two specimens are more fused on the upper part. Tail graduated; rectrices broad, soft, and somewhat pointed at the tips.

4. **Stasiasticus montis** sp. nov.

♂. Above dark olive-brown with a rufous tinge, more visible on the back, upper wing-coverts, and outer edges of quills; tail more olive. Feathers of chin and upper throat white with blackish bases and tips, those of fore-neck blackish with whitish fringes; breast and abdomen white along the middle. Sides of neck grey; sides of breast and abdomen olive-brown. Under wing-coverts dusky with dirty white borders. Under tail-coverts brown with white borders, the basal ones slightly tinged with rufous olive. L. t. ca. 155 mm.; al. 55; caud. 66; rectr. exter. 33; tars. 20; culm. 13—14.

Two specimens, both marked ♂, from between 9000 and 10,000 feet, on Mount Arjuno.

5. **Sitta azurea** Less.

Shot at 3000, 8000, and 9000 feet. *Male* and *female* do not differ if the birds before me are properly sexed. If they are, then the birds described as "*females* and immature birds" by Gadow, *Cat. B. Brit. Mus.* VIII. p. 357, are all immature birds, and not adult *females*.

6. **Aethopyga mystacalis** (Temm.).

At 3000 feet.

7. **Aethopyga eximia** (Horsf.).

At 9500 feet.

8. **Chalcoparia singalensis** (Gm.).

One *female*, 3000 feet. Throat very dark.

9. **Zosterops javanica** (Horsf.).

At nearly 10,000 feet.

10. **Zosterops citrinella** Bp.

Two *males*, shot at 8000 and 10,000 feet above the sea, belong to *Z. citrinella* of Timor, but they are also the same as *Z. neglecta*, Seebohm in *Bull. B. O. C.* I. p. xxvi., and Whitehead, *Explor. Mt. Kina Balu*, App. p. 261 (1893).

Z. neglecta has never been properly described, but only diagnosed as follows: "Similis *Z. palpebrosae*, sed magis olivascens, et macula anteoculari obscuriore

distinguenda." Whitehead tells us that he collected it about 5500 feet high on the spurs of Bromo, an active volcano in Eastern Java. Had I not been able, thanks to the trouble Mr. Grant took for me, to see the types in the Seebohm collection, I could certainly not have known whether my birds were the same as *Z. neglecta* or not, but after having seen them I find that they are the same species, though the types are in worn plumage and not very old. They are greenish above, like *Z. palpebrosa*; rump and upper tail-coverts lighter and more yellow. In front of the eyes is a distinct yellow spot, and from the base of the bill to the eye a black line. Chin and throat yellow, more golden on the upper throat. Abdomen and flanks very pale brownish, lighter and with an indistinct yellow line in the middle. Under tail-coverts pale yellow. Wing 57—58 mm.; tail 41—42; tarsus 16; culmen 13.

11. **Pycnonotus bimaculatus** (Horsf.).

At 8000 and 9000 feet elevation.

12. **Dicrurus cineraceus** (Horsf.).

One from 3000 and one from between 9000 and 10,000 feet.

Oates in *Fauna Brit. Ind., Birds*, I. p. 318, says that this species occurs from the Brahmaputra to Northern Tenasserim, that it "reappears" in Java, Lombok, and Palawan, and that it is "not found" in any portion of the Malay Peninsula. This statement may be, I am afraid, premature, as our knowledge of the ornis of the Malay Peninsula is not yet sufficient for such theories. The Tring Museum possesses one skin, collected by Col. Bingham in the Thoungyeen Valley, which seems to agree with our typical Java birds.

13. **Dissemurus platurus** (Vieill.).

At 3000 feet. The racquets are distinctly twisted, and it is in my opinion impossible to unite this bird with the large Indian form, but it seems next to hopeless to clear up the synonymy of these forms. The present form may perhaps with more safety be called *D. formosus* Cab. Cf. Sharpe, *Cat. B. Brit. Mus.* III. p. 258; Hart., Novit. Zool. I. p. 476, etc.

14. **Pericrocotus miniatus** (Temm.).

One young *male* at 5500 feet.

15. **Graucalus larvatus** (S. Müll.).

Between 9000 and 10,000 feet. Both sexes. Sharpe's description of his supposed *male* in *Cat. B.* VI. p. 11, is that of a young *male* or a *female*, and the sexes are *not* alike, the *male* having the whole throat black, the *female* not (Hartert, *Ornis*, 1891).

16. **Tephrodornis virgatus** Sw.

3000 feet.

17. **Stoparola indigo** (Horsf.).

♂, 3000 feet.

18. **Muscicapula westermanni** Sharpe.

Between 9000 and 10,000 feet.

19. **Rhipidura euryura** S. Müll.

At 3000 feet (Büttik., *Notes Leyden Mus.* XV. p. 91). Genus *Neomyias* Sharpe, *Cat. B. Brit. Mus.* IV. p. 342.

20. **Collocalia linchi** Horsf. & Moore.

At 8000 feet.

21. **Gecinus puniceus** (Horsf.).

At 3000 feet. Hargitt, *Cat. B. Brit. Mus.* XVIII. p. 65, has remarked that specimens from the Malay Peninsula, Sumatra, and Borneo have "the orbital region less dusky and the sides of the face and neck of a paler green." This I find not only to be true, but in addition to it I find that the back is more of a *yellowish* green, and the rump much more golden. I therefore think the Java form must be separated as *Gecinus puniceus typicus*, while the birds from Malacca, Borneo, and Sumatra (type) may be called

Gecinus puniceus observandus subsp. nov.

22. **Chotorhea javensis** (Horsf.).

3000 feet.

23. **Cyanops armillaris** (Temm.).

3000 feet. These two barbets are named in this way in the *Catalogue of Birds* (Vol. XIX., Shelley), but I do not consider this generic separation useful or convenient, nor is there sufficient reason for it, I believe.

24. **Ptilinopus porphyreus** (Temm.).

1824. *Columba porphyrea* "Reinw." in Temm., *Pl. Col.* 106.

1827. *C. roseicollis* Wagl., *Syst. Av. Columba*, No. 27.

Mount Arjuno, 3000 feet.

In *Cat. B. Brit. Mus.* XXI. p. 75, Count Salvadori rejected the name *porphyrea* on account of there being a *Columba porphyracea* "Forst." published in 1821; but the two names are different enough, I think, to avoid confusion.

III.—LIST OF THE BIRDS OF BALI.

Doherty writes from Bali, March 12th: "Last night we arrived here from Sumba in a thoroughly exhausted state, partly from hard work under unusually hard conditions, and partly from a storm, the most tremendous I have ever weathered, which made it very difficult for us to get away from Sumba, owing to the surf, and which pursued us almost through Lombok Straits." In April he writes, amongst other things: "I thought Bali would be a great success, and a nice, pleasant, easy place, where we would all get strong. Instead of that, we never have had such constant and varied sickness. Travelling was difficult and dear, and there was no food to be bought. The people hate us all, I think, and in my whole stay I succeeded in buying just two ducks and five young chickens. The ducks cover the land, you know—queer things that walk quite upright. Both Ram Persad and I on different occasions met tigers face to face. There were hardly any butterflies,

though the season should have been right, and the country was beautiful—fine forest of enormous trees, the largest I have seen in the East, I think. Of the birds about one-half are from low country, and the other half from the mountains, mostly from a place named Gitgit, from 2000 to 4000 feet." With regard to the birds collected in Bali, he writes: "I imagine that the Balinese fauna is very much smaller than the Javanese; many whole genera of conspicuous forms, which one cannot easily overlook, not extending so far East. The problem regarding Bali is, of course, how many forms of the Timor group extend so far West, and whether these forms are the remains of an original fauna of Australian affinities, or are merely immigrants from Lombok, etc. The ancient stratified rocks of Southern Lombok seem to be continued across the large table-topped island of Penida, in Lombok Straits, to the peninsula of Badong, in S.E. Bali, where cockatoos are found, though not commonly. Besides the Balinese birds sent, I also shot *Corvus* (*Corone*) *macrorhynchus* and the magnificent *Aquila* (*Neopus*) *malayensis*, but did not think them worth sending. Of a *Motacilla* we got eight *females* (two sent), but never a *male*."

The following list is the first list of Bali birds ever published, so far as I know, as Wallace stayed in the island not more than two days, and collected there only a few birds.* This list is therefore particularly interesting, and it is sufficiently large to allow some comparison with the Lombok list, which will follow thereafter.

The very careful notes on the colour of the eyes, bill, feet, etc., of the birds have in nearly every case been copied verbatim, and added in signs of quotation.

From all we can see, the "sexing" is done with the greatest care.

The Bali collection was brought together in March and April.

1. **Geocichla rubecula** Gould.

♂ ad. Bali, low country. "Eyes deep umber; bill black; feet pale brownish horn-colour; claws dark brown" (W. Doherty). ♂ juv. in first plumage, but wing-quills and rectrices evidently already moulted. Top of the head and back brown, with rusty shaft-stripes; rump and upper tail-coverts uniform brown; chin and upper throat pale rusty; feathers of the chest, breast, and abdomen pale rusty rufous, with bases and tips blackish: under tail-coverts white, blackish at base.

Geocichla rubecula Gould has hitherto only been known from Java. It differs from *G. citrina* of India in being smaller (wing of the Bali skin 110 mm.), of a darker grey above, of a very much deeper rufous on the head and below. Perhaps the white patch on the upper wing-coverts is also larger. The *male* from Bali is like

* I am much obliged to Mr. Wallace, who most kindly gave me the following list of the birds collected by him in Bali on June 13th and 14th, 1856, which I publish here, using his own names. They are: *Copsychus amoenus, Oriolus horsfieldi, Megalaema rosea, Chrysonotus tiga, Sturnopastor jalla, Ploceus hypoxanthus, Munia punctularia, Ptilotis limbata.*

A skin of the latter species from the Gould collection has been enumerated in the *Catalogue of Birds*, IX. p. 237, as collected in Bali by Mr. Wallace, but as this author (*Malay Archipelago*, I. p. 203) expressly says that *Meliphagidae* were not found in Bali, I supposed an error with regard to the skin in the Museum, and wrote to Mr. Wallace for an explanation, and this is what he most kindly answered me: "I am very glad you wrote to me about the *Ptilotis limbata*, because I seem myself to have overlooked the fact that I found it in Bali. The reason must be, I think, that I only obtained one specimen there, and by some mistake of my agent it got misplaced from my private collection (which was afterwards placed in the British Museum), and was bought by Mr. Gould. I find in my original notes that *Ptilotis limbata* was obtained by me both in Bali and Lombok, and specimens from both localities should have been kept in my private collection. When I came home, not finding the species among my skins from Bali, I must have forgotten the fact, and thus made the mistake you refer to in my *Malay Archipelago*."

specimens from Java, and indeed of a very deep rufous colour, perhaps even deeper than most of the Java birds.

I have been inclined to consider *G. rubecula* as merely a subspecies of *G. citrina*, but it can perhaps just as well stand as a species. *G. innotata* Blyth, from Burma, on the other hand, seems to deserve not more than subspecific rank. Cf. Seebohm, *Cat. B. Brit. Mus.* V. pp. 174 and 176; Hartert, *Ornis*, 1891 (p. 2 of article "Ueber eine kleine Vogelsammlung," etc.).

2. **Pratincola caprata** (L.).

Both sexes from the low country. ♂ ad. "Iris deep umber; bill and feet black." ♀. "Iris deep brown."

3. **Phylloscopus borealis** (Blas.).

These birds were still common in March in the low country. They are quite typical, I think, but one of them is a perfect giant, with the wing fully 76 mm., while the other five skins have their wings only 64 to 72 mm. long, the larger ones evidently being *males*. "Iris deep brown; feet greenish olive."

4. **Copsychu saularis amoenus** (Horsf.).

Both sexes from the low country. An immature *male* from Bali, of this form, was collected by Wallace, and is in the British Museum. The specimens from Bali are pure *amoenus*, quite black below, except some white tips to the under tail-coverts and a few white feathers on the sides of the vent. The three outer rectrices are nearly quite white. "Iris dark brown."

5. **Enicurus leschenaulti** (Vieill.).

♂, 2000 to 3000 feet. "Iris very deep brown; bill black; feet pinkish white."

6. **Pomatorhinus montanus** Horsf.

Three skins, from 2000 to 3000 feet. They are exactly like those from Mount Arjuno in East Java. See *antea*, p. 539. "Iris pale yellow; bill pale orange; culmen black near the base; feet dark greenish."

7. **Turdinus (Trichostoma) sepiarius** Horsf.

2000 to 3000 feet. "Iris light red-brown; feet dull slate-colour; maxilla blackish; mandible pale slaty grey with dark line below."

8. **Brachypteryx leucophrys** (Temm.).

An adult *female* and a young *male*, between 2000 and 3000 feet. The young bird has rusty spots to the centres of the feathers above, the feathers of the breast rusty with dark margins.

9. **Cyanoderma melanothorax** (Temm.).

Myiothera m., Temm., *Pl. Col.* II. pl. 185; *Cyanoderma m.*, Sharpe in *Notes Leyden Museum* VI. (1884); *C. m.*, Vorderm. in *Tijdschrift Nederl. Ind.* 1885, p. 338.

Two *males* of this rare bird were shot in Bali, one in the low country, one between 2000 and 3000 feet. "Iris dark red-brown; bill black above, bluish below;

a large blue naked patch on each side of the neck." This latter character is very well visible in the skins. While the skin is whitish in other places of the body, these bare patches are slaty black in the skins. It is partly on this peculiarity that Count Salvadori founded his genus *Cyanoderma*, the "type" being *C. erythropterum*, which has also a dark blue patch of skin on the side of the neck. Much more is this found in *Macronus ptilosus*, and it seems suggestive of being blown up at times. This blue patch of skin is not found in *Mixornis* proper, and the bill in the latter is less straight and the nostrils differently shaped and much more open. It is therefore advisable to separate *Cyanoderma* from *Mixornis*. On the other hand, the Indian species *ruficeps*, *rufifrons*, and *pyrrhops* have no bare blue patch on the neck, and agree in the bill and nostrils more with *Cyanoderma* than with *Mixornis*. They are best separated as *Stachyridopsis* Sharpe (see Oates, *Fauna Brit. Ind. Birds* I.), but the three genera *Mixornis*, *Cyanoderma*, *Stachyridopsis* are closely allied and must be placed close together. With regard to Dr. Vorderman's description of his specimen from Mount Salak, it must be said that the black spots on the side of the neck do *not* join those of the crop-region, but are widely separated, part of the skin between being naked and blue. Otherwise Vorderman's description is very good.

10. **Orthotomus sepium** Horsf.

Low country. ♂. "Iris very pale reddish brown; feet of the same colour."

11. **Prinia familiaris** Horsf.

Common in the low country. "Eyelids red; feet pale reddish; bill black."

12. **Parus atriceps** Horsf.

1 ♀ ad., 1 ♂ juv., 2000 to 3000 feet and low country. ♀ ad. "Iris very dark brown; bill black; commissure brown; feet pale slaty blue." In every respect like *Parus atriceps typicus* from Java. The young bird is tinged with yellow on the abdomen.

13. **Dicaeum flammeum** (Sparrm.).

Met with in the low country.

14. **Dicaeum trigonostigma** (Scop.).

A single *male* from between 2000 and 3000 feet. It is somewhat pale below, but this is probably only an individual character.

15. **Cinnyris pectoralis** (Horsf.).

Low country and 2000 to 3000 feet. "Iris deep brown; bill and feet black."

16. **Anthreptes malaccensis** (Scop.).

In the low country and between 2000 and 3000 feet. The *females* (two) are grey above, like the Eastern form (*A. m. chlorogaster*), but they are in abraded plumage and some new feathers are greenish. The *male* is not at all like the Eastern form, but quite like *A. m. typica*.

17. **Arachnothera affinis** (Horsf.).

2000 to 3000 feet. "Iris dark brown; bill blackish, paler, and somewhat reddish below; feet pale purplish reddish."

18. **Zosterops fallax** Sharpe.

Between 2000 and 3000 feet. "Iris light brown ; feet greenish yellow : soles pale orange."

19. **Criniger gularis** (Horsf.).

Low country and 2000 to 3000 feet. "Iris scarlet; feet rufous grey; beak slaty blackish, pale horn-colour below." The *males* have considerably larger beaks and longer wings.

20. **Pycnonotus analis** (Horsf.).

In the low country. "Iris dark brown ; bill and feet black."

21. **Aegithina tiphia scapularis** (Horsf.).

Common in the low country. "Iris pale yellowish ; feet slaty blue ; bill slaty blue, darker on the culmen."

22. **Motacilla flava** L.

Two from the low country.

23. **Mirafra javanica** Horsf.

One *male*, low country. In rather abraded plumage. It may possibly be *M. parva* ?

24. **Ploceus manyar** (Horsf.).

Not rare in the low country. ♂ ad. "Iris umber-brown ; bill nearly black ; feet pale brown, slightly reddish."

25. **Munia oryzivora** (L.).

Low country. "Iris scarlet ; bill basally purple-pink, terminally bluish horn ; feet and eyelids pale purple-pink."

26. **Munia maja** (L.).

Low country and between 2000 and 3000 feet. Common. "Iris very deep brown ; bill pale blue ; feet slaty blue."

27. **Uroloncha leucogastroides** (Horsf. & Moore).

2000 to 3000 feet. "Iris deep brown."

28. **Calornis chalybea** (Horsf.).

Several skins from Bali, 2000 to 3000 feet, gave me considerable trouble. They are somewhat dark in colour, have very small beaks, the culmen measuring only 19 mm., the bill from the tip to the beginning of the nostril 11 mm., the wing 95 to 98 mm. They have much smaller bills than any of the specimens before me from Sumatra, the Malay Peninsula, Cachar, and the Natuna Islands (these latter having the largest beaks), but they agree with a skin collected in Java by Messrs. Geisler. There is no doubt that *C. chalybea affinis* Hay is a good subspecies, though connected with *C. c. typica* of Java by many intermediate forms.

29. **Gracupica tertia** sp. nov.

♂ ad. *Gracupica* capite, collo, gastraeo toto subcaudalibusque, remigibus ad basin, tectricibus primariis, basi apicibusque rectricum (duabus mediis paullum modo), subalaribus albis; notaeo schistaceo-griseo, remigibus rectricibusque nigris, secondariis caudaque, aeneo splendentibus. L. t. ca. 210 mm.; al. 131; caud. 80; culm. 25; tars. 24 mm.

One single *male*, Bali, low country.

This excellent new species differs from *Gracupica melanoptera* (Daud.), an inhabitant of Java, in having the entire back, rump, upper wing- and upper tail-coverts slaty grey instead of white. There is also a mixture of grey on the flanks, and the feathers on the sides of the body and the lower abdomen have grey bases.

30. **Eulabes javanensis** (Osbeck) **typicus**.

At 2000 to 3000 feet. "Beak orange, yellow at the tip: feet and wattles yellow" (W. D.).

31. **Artamus leucogaster** (Valenc.).

2000 to 3000 feet.

32. **Dicrurus cineraceus** (Horsf.).

Low country and 2000 to 3000 feet. "Iris scarlet; beak and feet black."

33. **Dicrurus longus** Bp. (?).

There are several skins of a *Dicrurus*, very much like *D. ater* Herm. from India, but evidently much smaller, with shorter tail and wings, although all the skins are moulting, and it is, therefore, not worth while to give detailed measurements. If, as I have no doubt, the Java bird differs from *D. ater* of India, the name *D. longus* must stand for it, as there is no reason at all why *D. macrocercus* of Vieillot should "pertain to the Java bird alone." The Bali birds belong most likely to the form inhabiting Java. Cf. Walden, *B. Burma*, p. 129; Sharpe, *Cat. B. Brit. Mus.* III. p. 246. The iris of the Bali specimens is dark red-brown; bill and feet black.

34. **Chibia bimaensis** (Bp.).

Both sexes from low country. ♀. "Iris deep brown: bill and feet black." This is one of the invaders from the Timor group into the Balinese fauna.

35. **Oriolus maculatus** Vieill.

♂ ♀. 2000 to 3000 feet and in the low country.

36. **Crypsirhina varians** (Lath.).

In the low country. "Iris bright light blue; bill and feet black." Another specimen: "Iris pearl-white, transparent bluish towards the pupil."

37. **Lanius bentet** Horsf.

A good series from the lowlands. "Iris dark brown; bill black; base of mandible pale." Like specimens from Java. It seems that Sumatran specimens are mostly (or all?) paler rufous on the rump and upper tail-coverts.

38. **Lanius superciliosus** Lath.

Low country.

39. **Pachycephala grisola** (Blyth).

An evidently very old pair from the low country. The outer webs of the primaries very greyish. "Iris deep brown; bill black; feet slate-blue."

40. **Hemipus obscurus** (Horsf.).

In the low country and between 2000 and 3000 feet. "Iris dark brown; bill and feet black."

41. **Lalage timoriensis** (S. Müll.).

Quite a series of this species from the low country. It is one of those forms of the Timor group which, regardless of Wallace's line, trespass into the Javan group, to which Bali zoologically belongs. "♂ ad. Iris dark brown; bill and feet black."

42. **Graucalus javensis** (Horsf.).

Low country and at about 2000 feet. One specimen marked ♂ and one marked ♀ do not differ, except that the latter has some whitish fringes to the feathers of the rump and upper tail-coverts, and the lores dark slaty grey, while they are much darker, almost black, in the *male*. One example, sex uncertain, has the abdomen narrowly banded with grey, the lores ashy grey. "Iris rich brown, or light reddish brown; bill and feet black." The Bali specimens do not differ from those from Java.

43. **Pericrocotus exsul** Wall.

Low country and 2000 to 3000 feet. ♂. "Iris dark brown; feet and bill black." ♀. "Iris dark brown; feet and bill black."

44. **Pericrocotus peregrinus** (L.).

Low country, common.

45. **Muscicapula hyperythra** (Bl.).

2000 to 3000 feet. ♂. "Iris deep brown; beak black; feet pale pinkish."

46. **Muscicapula westermanni** Sharpe.

♂, 2000 to 3000 feet. "Iris very dark brown; bill and feet black."

47. **Siphia elegans** (Temm.).

Mount Arjuno, at 3000 feet. Under tail-coverts nearly but not quite white; lower abdomen white in the middle. The skin mentioned by me in *Ornis*, 1891, is perhaps an immature *male*.

48. **Rhinomyias pectoralis baliensis** subsp. nov.

♂ and ♀ ad. Very similar to *Rh. pectoralis typicus* from Borneo and Sumatra, but the whole upper surface distinctly less rufous, more with a greenish olive hue, the rump without any rufous wash, ear-coverts paler and more greyish. Wing 77—79 mm.; tail 64—65. "Iris dark brown; bill brownish black; feet pale purplish." Juv. With rusty spots like most young flycatchers.

Bali, low country and 2000 to 3000 feet.

49. **Hypothymis azurea** (Bodd.).

Low country and 2000 to 3000 feet. "Iris deep brown."

50. **Cryptolopha trivirgata** (Temm.).

An adult *male*, from 2000 to 3000 feet. "Iris dark brown; feet slaty, soles pale orange; bill black; mandible reddish below." This specimen is perfectly similar to *C. trivirgata* from Java, though the wing is rather long, measuring fully 61 mm.

51. **Culicicapa ceylonensis** (Sw.).

Three specimens. 2000 to 3000 feet.

52. **Rhipidura javanica** (Sparrm.).

Low country and 2000 to 3000 feet. "Iris dark brown; bill and feet black."

53. **Eucichla cyanura** (Bodd.).

Not rare in the low country. ♂ ad. "Iris deep brown; bill black; feet slaty grey." ♀ ditto. The ground-colour below of this *female* is not white, as described in *Cat. B. Brit. Mus.* XIV. p. 446, but yellowish buff, and the throat is more white. The young bird is of a duller brown above; the feathers of the crown are blackish, with rusty centres; the underparts dull brown. "Iris dark brown."

54. **Macropteryx longipennis** (Rafin.).

♂ ad., shot in the low country. "Iris dark umber-brown; feet blackish; bill black." Wing 174 mm.

55. **Caprimulgus affinis** Horsf.

Four *females* and one immature *male* from the low country. ♀ ad. "Iris deep brown; bill reddish brown, with blackish tip; feet dull reddish."

56. **Gecinus vittatus** (Vieill.).

Low country and 2000 to 3000 feet. "Iris dull red; maxilla black; mandible ochreous, tip blackish; feet dirty greenish."

57. **Chrysocolaptes strictus** (Horsf.).

♀ ad., low country. "Eye scarlet; maxilla brown, with distinct transverse dark lines; base, commissure, and mandible dirty yellowish green; feet green."

58. Tiga javanensis (Ljung).

An adult *female*. "Iris moderately dark red-brown." A young *male* in fullest moult, shot in the low country. "Iris dark brown; feet bluish; maxilla mostly black; mandible bluish white." This is one of the few species which were shot and preserved by Wallace on his memorable visit to Bali. The bill seems a little larger in these birds than in skins from Borneo before me.

59. Dendrocopus analis (Horsf.).

A series from the low country, quite like the Java birds. ♂ and ♀. "Iris dark red-brown; maxilla pale slaty grey; mandible slaty grey in the middle, whitish on the sides."

60. Thriponax javensis (Horsf.).

♂, low country. "Iris pale yellow; maxilla black; mandible blackish at tip, whitish horn-colour towards the base."

61. Merops philippinus L.

Low country.

62. Melittophagus leschenaulti (Vieill.).

Common in the low country.

63. Alcedo ispida bengalensis (Gm.).

One *female*, low country. "Iris deep brown; feet coral-red; maxilla black; mandible red; claws black." This specimen is rather bright bluish above, almost as blue as *A. ispidioides* Less. It seems almost fully to agree with *A. ispida* var. *taprobana* Kleinschmidt, *Ornith. Monatsber.* II. p. 126, and is very closely allied to *A. ispida floresiana* (Sharpe), *Cat. B. Brit. Mus.* XVII. p. 151. In fact these birds seem to bridge over to *A. ispidioides* Less.*

64. Alcedo meninting Horsf.

Three fine specimens from the low country. Two, marked ♂, have the cheeks blue, while the third, *also marked* ♂, has the cheeks chestnut-rufous. It is evidently younger, as its bill is much shorter; beak with the tip pale, *but the rest black*; the bands on the head are greenish blue, not deep blue as in the two others; the back of a much paler blue. This last specimen has on the label: "Beak black, tip whitish; feet pale orange; iris deep umber-brown." The other two *males*: "Beak black, extreme base dark red; feet and claws coral-red; iris deep brown."†

* From the material now in the Tring Museum it seems evident that *A. ispidioides* is not more than a subspecies, connected with *A. ispida bengalensis* by intermediate forms. Skins from Sambawa (Guillemard coll.) agree in every respect with the bright bird from Bali, which seems to me inseparable from the very remarkable *A. ispida* var. *taprobana*, which is not rare in Ceylon; nevertheless *A. ispida bengalensis*, the usual paler Indian form, is also not uncommonly found in Ceylon.—Walter Rothschild.

† It is this species, *A. meninting* Horsf., and not *A. beavani* (if the latter is more than a subspecies!), which extends to Celebes, whence we have a number of skins. The specimens enumerated by Sharpe in *Cat. B. Brit. Mus.* XVII. p. 161, at the end of the list of specimens of *A. bearani*, seem to be *A. meninting*, and were probably enumerated on p. 161, instead of on the foregoing page, by a mistake.—Walter Rothschild.

65. **Ceyx innominata** Salvad.

In the low country. ♂. "Iris dark brown; bill and feet coral-red." ♀. "Feet pale orange; maxilla dusky with orange tip." This *female* has the inner secondaries somewhat darker and the wing 1·5 or 2 mm. shorter than the *males* from Bali. I do not see signs of immaturity in any of them.

66. **Halcyon sanctus** Vig. & Horsf.

Bali, low country. "Iris dark brown."

67. **Halcyon chloris** (Bodd.).

Low country. Quite typical, though with rather much white on the occiput.

68. **Halcyon cyaniventris** (Vieill.).

A ♂, shot in the low country. "Beak vermilion; iris dull brown; feet scarlet."

69. **Xantholaema australis** (Horsf.).

In the hills between 2000 and 3000 feet. "Iris dark brown; feet greenish, soles ochreous; bill black."

70. **Xantholaema rosea** (Dumont).

In the low country, not rare. "Iris dark brown; bill black; feet orange."

71. **Cyanops armillaris** (Temm.).

♂ ♀, shot at 2000 or 3000 feet. "Iris pale yellow; feet greenish; bill black." These two birds have the forehead deeper orange than the three Java birds in the Tring Museum, but it is doubtful whether this is a constant character or not.

72. **Cyanops lineata** (Vieill.) **typica**.

Not rare in the low country. "Iris pale brown; skin round eyes bright ochreous; feet ochreous, soles whitish; bill pale reddish corneous."

73. **Anthracoceros convexus** (Temm.).

Low country. ♂. "Iris dull umber-brown; feet slate-blue; skin round eye rather greenish; beak yellowish horn-colour, forepart of casque rather darker shaded."

74. **Cacomantis merulinus** (Scop.) and **C. threnodes** Cab. & Heine.

Both these forms, the pale and small *C. merulinus*, with the grey of the head and throat distinctly separated, and the larger and darker *C. threnodes* of Cabanis & Heine, from Bali, low country as well as 2000 to 3000 feet. Whether they are the same species or not, or different stages, I cannot say; but I must say that the explanation given by Shelley on pp. 269, 270, of Vol. XIX. of the *Cat. B. Brit. Mus.*—*i.e.* that *C. merulinus* inhabits drier countries, while *C. threnodes* frequents localities with a greater amount of rainfall—is not satisfactory, as both are found in the same places. I should not wonder if they turned out to be species after all.

A *male C. merulinus* has the "iris scarlet; bill blackish above, pale reddish below: gape orange; feet ochre-orange, claws black." A large *C. threnodes*, also a *male*: "Iris red-brown inwardly, paling outwardly; eyelid bright ochreous; feet ochreous, claws blackish."

75. **Surniculus lugubris** (Horsf.).

♀. ad. 2000 to 3000 feet. "Iris dark brown; feet very dark slaty blue; bill black." Wing 128 mm.

76. **Cuculus intermedius** Vahl.

♂. Low country. "Iris ochreous yellow; eyelids lemon; maxilla black; mandible horn-colour with blackish tip; feet ochreous, soles rich ochre, claws darker." Wing 210. Rather long-winged, but undoubtedly *C. intermedius*.

77. **Centropus javanicus** (Dumont).

An immature *male*, rather pale *above*, but otherwise typical; shot in low country.

78. **Phoenicophaes (Rhinococcyx) curvirostris** (Shaw).

Not rare in the low country. ♀. "Beak bright yellowish green; lower mandible and base of commissure black; iris bright ochreous; space round eye rich scarlet; feet slaty blackish." Exactly like Javan specimens.

79. **Palaeornis alexandri** (L.).

Specimens from the low country. ♂. "Iris pale yellow; bill orange-red; feet greenish."

80. **Glaucidium castanopterum** (Horsf.).

♂, 2000 to 3000 feet. "Eye bright yellow; bill greenish, yellowish at tip; feet greenish yellow."

81. **Phodilus badius** (Horsf.).

One *female* from the low country. It is like one from Malacca in the Tring Museum, while one from Sikkim is very much larger. The bird is described from Java. Doherty describes the feet as dirty brownish white, the iris as deep brown.

82. **Treron (Osmotreron) griseicauda** Gray.

Low country and up to 3000 feet. ♂ ad. "Iris orange; skin round eye yellow; bill yellow, basally bluish green; feet beet-red." ♀ ad. "Eye orange, skin round it bluish green; beak terminally pale yellow, basally dark bluish."

83. **Carpophaga williami** sp. nov.

Carpophaga similis speciei *C. lacernulata* dictae, sed capite supra saturate grisescente-vinaceo, collo pectoreque summo concoloribus, gula vinacea. Al. ♀ 194, ♂ 207 mm.

Hab. Bali.

A *male* and a *female* of this fine new pigeon have been sent by Mr. William Doherty, who collected them between 2000 and 3000 feet in Bali. He describes the eye as "dark red-brown; feet magenta; beak black." The top and sides of the head are deep greyish vinous, paler on the forehead: sides of the head also slightly paler. Chin pale vinous with a slight greyish tinge. Fore-neck and breast greyish vinous, a little more greyish than the head; abdomen paler and a little more vinaceous. Thighs grey with only a faint vinaceous tinge. Under tail-coverts chestnut. Rest of upper parts dark brown with a slight greyish and metallic greenish gloss, slaty and somewhat purplish on the rump. Tail above like the back, tips dusky grey for about 43 mm., a little darker at the edges. Tail below much paler, tips almost whitish. Under wing-coverts dark slaty grey. ♂. Wing 207 mm.; tail 160; culmen from end of feathering to tip 19; tarsus 26, feathered for two-thirds; middle toe without claw 30 mm. The *female* is like the *male*, but a little smaller (wing 194 mm.); top of head and hind-neck deeper vinous. Named in honour of my friend William Doherty.

I first thought that the name *Ducula concolor*, Bonaparte in *Compt. Rend.* XLIII. p. 836 (1856), was referable to this species. I wrote to Professor Reichenow for particulars about the type of *D. concolor*, which the author said he had seen in the Berlin Museum, but I was informed that no specimen of a pigeon in the Berlin Museum under that name was to be found, nor was there a specimen answering the description. As Bonaparte's description is insufficient and not clear, and as he says it came from the same country as *C. lacernulata*, *i.e.* Java, his name cannot be referred to any species with certainty, and *D. concolor* must for the present remain with a query among the synonyms of either *C. lacernulata* (where it has been placed by Salvadori, *Cat. B. Brit. Mus.* XVI. p. 215) or *C. williami*.

84. **Ptilinopus albocinctus baliensis** subsp. nov.

Mr. Doherty sent three skins from Bali, shot in heights of 2000 to 3000 feet, in April. They differ from the type of *P. albocinctus* in the British Museum in having the wing a little shorter, the upper surface and especially the greater wing-coverts with a purplish coppery gloss, the back just behind the grey of the neck with a greenish bronzy gloss. All these characters are found in *P. albocinctus typicus*, of which I have a large series before me now, but only in immature individuals. I see no reason to assume that the three birds from Bali are immature, and therefore think that they belong to a slightly differentiated, and perhaps a little degenerated, form of *P. albocinctus*. Wing 150—153 mm. This species was hitherto only known from Flores, but inhabits, as the collections now under my hands prove, all the islands between Flores and Java. According to Doherty the iris of the Bali form is orange-red, the feet vermilion, the beak ochreous, basally bluish. It seems to be rare in Bali, where it evidently reaches its most westerly home, and where it should rather not occur, according to Wallace's theory.

85. **Ptilinopus melanocephalus** (Forst.)

One *female* juv., shot on the coast. "Iris ochreous; feet purplish crimson."

86. **Macropygia emiliana** Bp.

Low country, Bali. "Iris successively crimson, blackish, and yellowish white in concentric rings, the crimson one being the outermost one; beak brown, dark red at base; feet dark purplish red."

87. **Macropygia ruficeps** (Temm.).

One *male*, low country. "Iris white; beak reddish brown, dark at tip; feet dull beet-red, soles dark ochreous." This specimen belongs probably to my *M. ruficeps orientalis*, described on p. 573 from Sambawa. See my remarks there.

88. **Chalcophaps indica** (L.).

Bali, from the low country up to 3000 feet. "Iris deep rich brown; beak orange; feet dark red." One fine *male* shows partial albinism, having the bases of the longer upper wing-coverts snow-white.

89. **Geopelia striata** (L.).

Low country.

90. **Turtur tigrinus** (Temm.).

Common in the low country of Bali. I cannot perceive the slightest differences in birds from Malacca to Celebes. "Eye pink-white or salmon; feet dark red, claws blackish."

91. **Turnix taigoor pugnax** (Temm.).

♀, low country. "Iris dull whitish; beak ochreous at base, paler at tip; feet dull ochreous."

92. **Gallus varius** (Shaw & Nodd.).

At 2000 feet.

93. **Tringoides hypoleucus** (L.).

Low country.

94. **Rallina fasciata** (Raffl.).

Low country.

IV.—ON THE BIRDS OF LOMBOK.

The birds from Lombok, or Tanah Sasak as it is generally called by the Malays, were collected in one fortnight in June, on the hills above Labuan-Hadji on the east coast, mostly at elevations of from 1000 to 6000 feet, chiefly between 2000 and 4000, where there was large old forest, some few from the low country near the coast. The higher parts were found "very poor in birds, and seemed not to contain anything very interesting or peculiar."

This collection is a most interesting addition not only to Mr. Rothschild's Museum, but also to our knowledge of the avifauna of Lombok. Only two Lists of Birds from Lombok have ever been published—the one by Wallace in the *Proceedings of the Zool. Soc. of London*, 1863, and one that appeared quite recently in Vol. LIV. of the *Natuurk. Tijdschr. voor Nederl.-Indië* in Batavia, 1895, pp. 327—353, by Dr. Vorderman. Wallace's list contains sixty-two species, Vorderman's fifty-one, of which twenty had not been found on Lombok by Wallace, the total of the species of the two collections being eighty-two species known. I affix an asterisk to the species not found in Lombok before.

It is remarkable that a large new *Carpophaga* was found in Lombok as well as in Bali.

Doherty could not find any confirmation of the reports that the tiger had crossed over from Bali to Lombok. This report seems to be an unfounded newspaper note.

1. **Pratincola caprata** (L.).

Met with at 4000 and 5000 feet. Both sexes iris dark brown.

*2. **Geocichla horsfieldi** (Bp.).

Six specimens of this rare thrush, hitherto only known from Java, were shot in the hills between 3000 and 6000 feet. Some are immature, and they have the subterminal spots on the head and the lanceolate spots on the lesser wing-coverts more ochraceous, the breast darker. Wing 140—145 mm. "Iris dark chestnut; maxilla blackish; mandible grey, ochreous at base; feet pale dirty brownish."

3. **Geocichla andromedae** (Temm.).

Shot at 2000 and 3000 feet, one with still a few feathers of the first plumage on the wing, one quite young. ♂ fere ad. "Iris deep brown; beak black; feet blackish."

*4. **Geocichla dohertyi** sp. nov.

(Plate XI. f. 3.)

♂ ad. *Geocichla* pileo nigro, cervice, dorso supracaudalibusque castaneis. Alis nigris, apicibus tectricum mediarum majorumque nonnullarum, speculo magno Geocichlino sic dicto albis, remige quinto et sexto pogoniis externis albo limbatis. Cauda nigra, rectricibus externis apice albo in pogonio interno. Loris, regione malari, ophthalmica et parotica albis. Mento albido. Gutture nigro. Pectore et abdomine albis; lateribus ochraceis, plumis maculis magnis nigris ornatis. L. t. ca. 180 mm.; al. 105; caud. 73; tars. 26—27; culm. 21.

Hab. Insulis Lombok (typus) et Sambawa dictis.

This new species resembles most *G. erythronota* from Celebes, but its entirely black head and the ochraceous colour on the sides of the body distinguish it at a glance. The *adult male* has the top of the head from the base of the bill to the hind-neck pure black, the entire back deep chestnut, lighter and more ochraceous on the rump and upper tail-coverts. The remiges are black, with the usual Geocichline wing-pattern,* of pure white colour, beginning on the fifth primary and reaching all over the secondaries. Most of the median and some of the greater upper wing-coverts have large white tips. The under wing-coverts are black and white. The tail is black, the outermost tail-feather on each side with a white longitudinal spot on the tip of the inner web, varying in size. Lores, feathers round the eyes, chin, cheeks, and ear-coverts white, the feathers of the chin and cheeks with narrow blackish tips, and some black feathers forming a spot immediately above and below the middle of the eye. Feathers of the throat black with white bases. Middle of the breast and abdomen and under tail-coverts white. Sides of the body pale ochraceous, all the feathers whitish towards the base and with very large black tips. Thighs white, with some dusky spots behind. "Iris brown; feet whitish; beak black, with pale base to the mandible" (W. Doherty). Wing 105; tail 73—74 mm. ♀ like the *male*, but the wing only about 100, the tail only about 69—70 mm.

The young birds are of a darker chestnut above, with paler shaftlines to the feathers, the feathers of the top of the head black, with longitudinal chestnut spots before the tip, the white everywhere more or less washed with a pale ochraceous rust-colour, the underparts all over washed with ochraceous, the breast like the abdomen and with very little black, the feathers of the sides of the body with smaller black spots, or only with broad black fringes.

This species was found in Lombok at elevations of from about 2000 to 5000 feet, where there were a good many young birds, and some of the old ones moulting. It was also found in the hills of Sambawa.

I have adopted for this bird the generic term *Geocichla*, as has been done almost universally among ornithologists since Seebohm's Monograph of the *Turdidae* in the fifth volume of the *Catalogue of Birds*; but I must confess that I do not believe that in future time his arrangements of the three genera *Turdus*, *Merula*, and *Geocichla* can be upheld. There seems to be a complete connection of *Turdus* and *Merula*, and there is hardly a character given to distinguish *Geocichla*, except the coloration of the wings, and that is almost the same in "*Turdus*" *viscivorus* and similarly indicated in *T. mustelinus*. Unless, therefore, we can find some structural generic characters to separate the *Geocichlae*, or at least some of them, I am afraid there is no scientific reason to recognise the genus *Geocichla*.

5. Geocichla interpres (Temm.).

An adult *male* and a young bird were shot in Lombok, at about 2000 feet, in June 1896. Wallace had collected it long ago in Lombok. The head of the adult bird is dark chestnut, the back slaty grey. "Iris dark brown; feet pale yellowish; beak black" (W. Doherty). The young bird has the feathers on the top of the head slaty black, shafts pale, tips rufous chestnut, those of the back similar. The breast is not black as in the old bird, but rusty rufous with black tips to the

* See Seebohm, *Cat. B. Brit. Mus.* V. p. 147.

feathers ; and the abdomen, which is almost pure white in the fully adult *male*, is strongly suffused with ochraceous, and the black spots at the tips of the feathers are smaller. The white spots on the wings are suffused with ochraceous.

*6. **Brachypteryx leucophrys** (Temm.).

Common at 2000 and 3000 feet above the sea. "Iris deep brown ; maxilla blackish ; mandible blackish, tip paler ; feet slaty blue." Sexes alike, except that the *female* has the wing from 2 to 3 mm. shorter. Young spotted.

7. **Cisticola cisticola** (Temm.).

Young and old from 1000 to 6000 feet.

8. **Cisticola exilis** (Vig. & Horsf.).

♂ ad. 6000 feet. "Iris pale red-brown; bill blackish above, reddish below; feet pale reddish."

9. **Orthotomus sepium** Horsf.

At 2000 and 6000 feet.

10. **Parus atriceps** Horsf.

Two evidently young birds from elevations of 5000 feet have the mantle washed with yellowish green, but a fine series of adult birds since received from Mr. Everett shows that this is not a peculiarity of the Lombok birds, but merely a sign of nonage. See Gadow, *Cat. B. Brit. Mus.* VIII. p. 17. (*P. cinereus* of Wallace's list.)

11. **Dicaeum mackloti** Müll. & Schleg.

From the coast up to about 4000 feet above the sea. ♂. "Iris dark brown; feet and bill black." ♀. "Iris dark brown ; feet black ; bill blackish ; base of mandible pale." ♂ juv. "Iris dull brown ; feet slaty brown ; bill orange, blackish at tip." No difference between specimens from Lombok and Flores.

12. **Cinnyris pectoralis** (Horsf.).

♂ at 2000 feet. "Iris dark brown ; bill and feet black."

*13. **Zosterops citrinella** Bp.

Met with at elevations of 4000, 5000, and 6000 feet. These birds agree entirely with specimens from Java (*Z. neglecta* Scebb., see *antea*, p. 540) and from Timor in the British Museum. They differ from *Z. palpebrosa* in the buffy isabelline sides of the body and a less developed black spot in the front of the eye. Originally this species was known from Timor only, but it evidently extends all over the Lesser Sunda Islands and on to Java.

14. **Zosterops intermedia** Wall.

Met with at elevations from 1000 to 5000 feet. "Iris dull golden yellow : bill grey, much darker above ; feet slaty grey."

15. **Ptilotis virescens** Wall.

Shot at "Labuan-Hadji" and in the hills of 1000 to 2000 feet. "Iris dark brown; feet slaty grey; claws black; bill black." ♀ wing about 5 mm. shorter. See Gadow, *Cat. B. Brit. Mus.* IX. p. 248, Pl. VII.

16. **Stigmatops ocularis** (Gould) = **Ptilotis limbata** S. Müll.

At elevations of 4000 and 5000 feet.

The adult *male* has the throat whitish grey, the fore-neck pale grey with whitish spots, the breast pale grey with white fringes to the feathers. Abdomen and under tail-coverts whitish yellow; top of the head brownish grey; lores darker. Wing 76—78 mm. The *female* has the chin and throat pale yellow, the head above washed with greenish olive, the wing much shorter, only 66—69 mm. The figure in *Cat. B. Brit. Mus.* IX. Pl. VII. is that of a *female*, not of a *male*, as supposed by the author. The young bird resembles the *female*. ♀. "Iris grey, inwardly brown; bill black; feet slaty grey."

About the occurrence of this species in Bali (where, however, Doherty did not find it), see *antea*, p. 543, footnote.

† 17. **Philemon neglectus** (Büttik.).

In the low country and at 1000 feet above the sea. "Iris bleared whity brown; skin of head and neck black; bill black; feet dark slate-colour." The Lombok birds agree with those from Sambawa, Sumba, and Flores. See Büttik., *Notes Leyden Museum* XIII. p. 213. (*Tropidorhynchus timoriensis* Wallace, *P. Z. S.* 1863, p. 486, and Vorderman, *t.c.* p. 342.)

18. **Pycnonotus analis** (Horsf.).

At elevations of 2000 feet. The *female* of this species has the wing a little shorter than the *male*.

19. **Anthus rufulus medius** (Wall.).

One *male*, shot at 4000 feet.

It seems that all the skins of the group of *Anthus rufulus* from the Lesser Sunda Islands belong to a grey form, characterised by a rather greyish upper surface, a broad superciliary streak, rather white colour below, sharply streaked breast. Wing 83—84 mm.; tarsus 26. It must either be a species, or, more likely, a subspecies of *A. rufulus*. See Sharpe, *Cat. B. Brit. Mus.* XIII. p. 577.

† *20. **Chlorura intermedia** sp. nov.

This species, or perhaps rather subspecies, is most closely allied to *Chl. hyperythra* Rchb. of Java, but the upper tail-coverts are not dull orange, but green with a slight orange wash. It is just as closely allied to *Chl. borneensis* Sharpe from Kina Balu, but differs in a deeper tawny rufous breast, throat, and sides of head and neck, and a purer tawny rufous abdomen. *Chl. brunneicentris* Grant, of Luzon, is smaller, and has the abdomen not only in the middle, but all over pale rufous.

♂ ad. Above dark green; crown of head blue; forehead black: upper tail-coverts with a slight orange wash. Tail black; central rectrices and outer edges of the rest dull green. Primaries black, with narrow outer edges of a yellowish green. Secondaries with green outer margins, which increase towards the middle, the innermost secondaries being nearly quite green. All the remiges with pale rufous inner edges. Below deep tawny rufous, deepest on the breast. Sides of body widely green. Wing 59 mm. The young are duller and have no black and blue on forehead and crown.

I confess that I felt somewhat uneasy about the differences of *Chl. intermedia* from *Chl. hyperythra*, but the upper tail-coverts look certainly quite different from the *female* of the Java species in the British Museum, and I have before me now not less than nine specimens collected by Doherty, and exactly as many sent by Everett—all from Lombok, and in all ages and both sexes—and certainly none has the upper tail-coverts orange, but green with only a very slight orange wash. ♂ juv. "Iris dark brown; feet pale reddish; beak black; mandible with yellowish white tip." Doherty shot them in the hills up to 4000 feet.

21. **Munia punctulata nisoria** (Temm.).

Common from 1000 to 3000 feet. "Iris dark brown; feet blackish; maxilla black; mandible slate-colour." Vorderman enumerates *M. punctulata* and *M. nisoria* as occurring in Lombok. This is clearly a mistake.

22. **Munia leucogastroides** Horsf. & Moore.

Met with at elevations of from 2000 to 6000 feet. Vorderman, *l.c.* p. 347.

23. **Munia wallacei** Sharpe.

Two *males* from about 2000 feet. "Iris dark brown; bill slate-blue; feet duller slate-colour." Wing 56 mm. (*M. quinticolor* of Wallace's list, *l.c.*)

24. **Munia pallida** Wall.

♂, 2000 feet. "Iris dark brown; bill and feet slate-grey."

*25. **Sporaeginthus flavidiventris** (Wall.).

Found at elevations of 4000 and 5000 feet. "Bill scarlet; culmen broadly black; iris scarlet; feet pale testaceous."

26. **Taeniopygia insularis** (Wall.).

From the low country up to 2000 feet. "Iris scarlet; bill orange; feet pale orange." Only known from Timor and Flores. Vorderman, *l.c.* p. 347.

27. **Calornis minor** (Bp.).

Met with frequently in the low country and up to 4000 feet above the sea.

Lombok specimens are quite like those from Sambawa, Djampea, Saleyer, and Bonthain Peak in South Celebes, while the Bali bird is *C. chalybea* or a small form of it. (*Intea*, p. 546.)

28. **Dicrurus cineraceus wallacei** (Walden).

D. wallacei Walden, *Ann. and Mag. Nat. Hist.* ser. 4, v. 5 (1870). The ashy grey Drongo of Lombok has been separated by Walden from *D. cineraceus typicus* of Java, but it was not recognised as distinct afterwards. The remarkably darker tail above and below, however, distinguishes it without difficulty if compared. The difference in the colour of the tail below is almost as obvious as in *Megaloprepia puella* and *poliura*, which look *alike above* (see Salvad., *Cat. B. Brit. Mus.* XXI. pp. 169, 170). Some of the Lombok specimens have also very long wings, but this seems to be very variable in the species. I measure the wings of the specimens now in the Tring Museum as follows: Java, 139, 134, 137 mm.; W. Sumatra, 129 mm.; Bali, 131, 135, 132 mm.; S. Tenasserim, 130 mm.; Palawan, 129 mm.; while the Lombok form has the wing 128, 129, 131, 133, 133, 135, 135, 135, 138, 145 mm.

The distribution of *D. cineraceus typicus* is peculiar. I cannot distinguish the Palawan bird. With regard to the name, I agree with Oates (*Fauna Brit. Ind. Birds*, I. p. 311) that it is best to accept the name *D. cineraceus* (Horsf.), as Vieillot's name was based on Levaillant's "Drongris," *Ois. Afr.* Pl. 170, which, though probably the Java bird (but, as Oates seems to think, his *D. nigrescens*, which is not likely at all), is said to have come from Ceylon!

D. cineraceus (or *leucophaeus*) *typicus* extends to Tenasserim, while another form, *D. nigrescens* Oates, is found in Lower Pegu, Tenasserim, and the Malay Peninsula. A large series in the Tring Museum, collected in North Cachar by our friend E. C. Stuart Baker, are all Oates' *D. nigrescens*, as a careful comparison with Oates' types shows beyond doubt. In the Himalaya is found the darkest form, *D. longicaudatus*. This latter, *D. nigrescens*, *D. cineraceus*, and *D. wallacei* are perhaps all subspecies of one species.

29. **Chibia bimaënsis** (Bp.).

At elevations of from 1000 to 5000 feet. Wings generally distinctly longer than in (typical) specimens from Sambawa.

30. **Oriolus broderipi** Bp.

Shot at 1000 and 5000 feet. There is a great variation in colour, from yellow to orange-yellow, and also in the markings on the wings, the secondaries being largely tipped with yellow, while in one (probably an older bird) there are only narrow yellow fringes. In that same bird the primary-coverts are quite black, while as a rule they are broadly tipped with yellow. "Iris scarlet; bill purplish pink." Younger birds have the maxilla blackish.

31. **Lanius bentet** Horsf.

Shot at elevations of 2000 and 4000 feet. This is the *Lanius schah* of Wallace's list.

32. **Pachycephala grisola** (Bl.).

Met with frequently at heights of 1000 to 6000 feet. "Iris deep brown; feet slate-colour; bill black." Younger birds with rufous edges to the outer webs of the quills.

33. **Lalage timoriensis** (S. Müll.).

Lombok, at about 1000 and 2000 feet.

34. **Pericrocotus exsul** Wall.

Both sexes from 2000 to 4000 feet. ♀. "Eye dark brown; feet and beak black."

35. **Hypothymis azurea** (Bodd.).

Shot at 1000 and 4000 feet. *H. occipitalis* Vorderm., *t.c.* p. 336.

*36. **Cryptolopha trivirgata** (Strickl.).

A series from elevations of about 5000 feet. Wings 55—61 mm. "Iris dark brown; bill black; feet dusky slate-colour." Wings 2 to 5 mm. longer than in the few typical *C. tricirgata* from Java I was able to measure. A large series of Java specimens would be necessary to decide whether the size of Java birds is constant. I cannot see other differences except the length of the wings.

*37. **Muscicapula westermanni** Sharpe.

Evidently common at elevations of 4000 and 5000 feet. Both sexes and young birds sent.

*38. **uscicapula hyperythra** (Bl.).

From heights of 3000 to 5000 feet. ♂ ad. "Iris dark brown; feet dull rufous grey; bill black." ♀ ditto.

39. **Erythromyias dumetoria** (Wall.).

At about 1000 and at 2000 feet above the sea. ♂ ad. "Iris dark brown; bill black; feet purplish slate-colour." ♀ ad. "Iris very dark brown; bill and feet as in ♂." The *female* seems to be undescribed. It is rusty brown above, slightly darker on the head, and more rusty on the rump. Upper tail-coverts brownish cinnamon. Rectrices rufous brown, outer webs more cinnamon-rufous. Quills dark brown, outer webs edged with pale brown, larger upper wing-coverts with some brownish yellow spots, forming an indistinct bar across the upper wing. Lores and feathers round the eyes brownish buff. Feathers of chin and throat pale orange rufous, bases white; feathers of breast orange rufous with black bases. Abdomen and under tail-coverts white; sides of body brown. Under wing-coverts white; inner wing-lining ashy white. One skin, marked ♂, is exactly like the ♀; it may be a *young male*, if not also a *female*.

40. **Pitta concinna** Gould.

A nice series from elevations of 1000, 2000, and 4000 feet. "Iris of ♂ and ♀ ad. deep chestnut; bill black; feet pale reddish." The sexes, when adult, do not seem to differ. A young bird has the tip of the beak, gape, and base of mandible dark orange, the back more dusky, the breast dark brown, the vent and under tail-coverts of a very pale reddish colour.

41. **Caprimulgus macrurus** Horsf.

One adult *male*. Wing 191 mm.

42. **Iyngipicus grandis** Hargitt.

At 1000, 2000, and 6000 feet. "Iris dark brown; bill and feet blackish." Known from Lombok and Flores. (*Picus moluccensis*, Wallace, *l.c.*)

43. **Monachalcyon fulgidus** (Gould).

Only met with in the hills at about 2000 and 5000 feet above the sea. "Iris, eyelids, beak, and feet all uniform orange-red; claws brown." An immature bird is black above, the underparts washed with brownish buff.

This species is evidently congeneric with *M. monachus*, as there are no structural differences whatever.

44. **Halcyon australasiae** (Vieill.).

Up to about 2000 feet above the sea. "Iris deep brown; maxilla and tip of mandible black; rest of mandible white."

45. **Halcyon chloris** (Bodd.).

The Lombok form of this widespread and variable species is rather large, and the top of the head and upper back are very dusky, thus closely approaching *H. sordidus* Gould, which is probably not more than a subspecies of *H. chloris*. The wing of Lombok specimens is 115—119 mm. long.

*46. **Cuculus poliocephalus** Lath.

Old and young from heights of 4000 and 5000 feet. ♂ ad. "Iris bleared reddish brown; maxilla black; mandible greenish; gape at base ochre; eyelids bright ochre." ♀. "Iris outwardly dull creamy, inwardly brownish; maxilla black; mandible and gape greenish yellow."

*47. **Cacomantis threnodes** Cab.

Shot at 1000 feet. ♂. "Iris red-brown, inwardly paler; bill black; gape reddish; feet reddish ochreous, claws blackish." Rather large and pale.

48. **Centropus javanicus** (Dumont).

♀ at 3000 feet. "Iris inwardly dark brown, outwardly pale brown." The *Centropus affinis* of Wallace's list.

*49. **Trichoglossus mitchelli** Gray.

It is with great satisfaction that we are able to make known the home of this handsome Lory, which was hitherto unknown. Doherty collected a large series in the hills of Lombok, at elevations of 3000 to 4000 feet. In both sexes he found the iris orange, the beak orange, more yellow at tip and darker at base, the feet bluish. In the young bird the bill is uniform dull orange. The sexes are alike in colour and size. Immature birds have blackish edges to the red feathers of the

breast, a more dusky crown, and the nape more or less tinged with green. A variety shows broad yellow subterminal bars to the feathers of the upper breast. The wings measure 125—130 mm.

50. **Cacatua parvula** (Bp.).

Shot in the hills from 1000 to 5000 feet high. "Iris dark brown; bill and feet black." Two *females* with the wings 225 and 227 mm., three *males* with wings from 225—232 mm. Bills varying a little, but not much, in size.

*51. **Geoffroyus sumbavensis** Salvad.

In the hills from 2000 to 4000 feet above the sea. A series of Lombok specimens agrees in every respect with the types of *G. sumbavensis* and a series of skins collected by Doherty in Sambawa. The adult *female* has the head dull brownish brick-red, just between figs. 11 and 14 on Plate IV. of Ridgway's *Nomencl. Col.*, slightly paler on the sides of the head, merging into greenish yellow on the upper throat. Both sexes, when quite young, have the head green like the back; young *males*, before moulting into the lilac-blue colour on the crown, assume a brick-red crown similar to that of the old *female*.

Whether it will eventually be possible to keep *G. sumbavensis* distinct from *G. floresianus* seems somewhat doubtful. The large series before me now measure as follows, only evident *males* not in moult being measured: Sambawa, wing 159—168 mm., mostly 160—164; Lombok, 160—168, mostly 160—165; one *male* from Flores, collected by Wallace, 159 mm.; while Salvadori gives (*Cat. B. Brit. Mus.* XX. p. 407) 152 mm. as the length of the wing of *G. floresianus*. The difference of the length of the wings is therefore slight, and besides it I can see none, except a somewhat darker colour of the under wing-coverts and axillaries. A good series of Flores skins from different places is wanted.

The iris of Lombok skins is described as "pale yellowish; the maxilla as orange, tipped with dirty ochre-yellow; the mandible blackish; feet dirty brownish, claws blackish." *Females* and young birds have the maxilla brown, or blackish, like the mandible.

*52. **Osmotreron griseicauda** (Schleg.).

At 2000 feet above the sea.

53. **Ptilinopus melanocephalus** (Forst.).

At about 2000 feet.

*54. **Ptilinopus albocinctus** Wall.

Hitherto only known from Flores, while Timor is inhabited by the quite different, though closely allied, *P. cinctus*. Lombok specimens are quite like the type and only known specimen of *P. albocinctus* in the British Museum. The sexes are perfectly alike, though, on an average, the *female* seems to have the wing 5 to 10 mm. shorter than the *male*. Young birds have yellow edges to the feathers above and below. "Iris orange; beak pea-green, tip ochreous; feet beet-red with dark claws." Wing: *males* 160—170 mm., *females* 155—159.

† *55. **Carpophaga sasakensis** sp. nov.

Carpophaga speciei *C. lacernulata* dictae similis, sed subcaudalibus griseo-vinaceis, nec castaneis.

Hab. Lombok.

♂ ad. Cap ashy grey. Hind-neck greyish vinous, passing through ashy grey into the colour of the back, which, like all the rest of the upper parts, is of a brownish slate-colour with a very slight metallic-green tinge and a greyish hue, the rump being more greyish slate. Underparts pale greyish vinaceous, more grey on the chest. Sides of body and under wing-coverts slaty grey. Tail dark slate-colour, tips grey for 37 to 40 mm., slightly darker on the edges. "Iris deep dull brown; beak dark slate-colour, darker at tip; eyelids dark red; feet dark purplish red, soles ochreous, claws black." Total length about 140—150 mm.; wing 227—233; tail 175; tars. 30; middle toe without claw 35; culmen from end of feathering to tip 20 mm. Two *males*, both alike, were shot in Lombok, at about 3000 feet, in June, by Mr. Doherty.

56. **Chalcophaps indica** (L.).

Lombok at about 1000 feet.

*57. **Columba metallica** Temm.

One ♀, shot about 3000 feet above the sea, is not distinguishable from the two *males* from East Timor—the only island from where this species is known—in the British Museum, except that it has rather a short wing, that being only 218 mm. long. "Iris orange; beak dark red, outer half greenish ochre; eyelids and gape dark red; fore aspect of feet dark red; hind aspect, soles, and claws pale yellowish."

58. **Turtur bitorquatus** (Temm.).

2000 feet. "Iris orange; beak blackish; base of gape, eyelids, and feet dark red."

59. **Turtur tigrinus** (Temm.).

Lombok up to 3000 feet.

*60. **Macropygia leptogrammica** (Temm.).

Hills of Lombok, from 3000 to 6000 feet. "Iris outwardly purplish pink, followed by a black line and then (inwardly) by a gamboge yellow or greyish ring; feet dark red, claws dark grey; beak dark brown" (W. Doherty).

61. **Macropygia emiliana** Bp.

Lombok in elevations of 2000 and 5000 feet. "♀. Eye orange; beak dull brown; feet dark red with brown claws."

62. **Gallus gallus** (L.).

Shot 3000 feet above the sea.

63. **Gallus varius** (Shaw & Nodd.).

Shot 5000 feet above the sea.

64. **Ardea novaehollandiae** Lath.

At nearly 5000 feet elevation.

Doherty thus collected in Lombok almost exactly the same number of species as Wallace, who enumerates sixty-two.* Both naturalists collected chiefly small birds and very few large ones, but Doherty sent twenty-one species not got by Wallace, and consequently about as many of Wallace's species have not been sent by him. Of these three are here described as new, and of them two, *Carpophaga sasakensis* and *Chlorura intermedia*, have decided Javanese affinities, while the third is evidently nearest related to a Celebes species, but it is clearly rather of a Malayan than an Australian character. Of the others six are Javanese forms; four are generally distributed over the Malayan and Austro-Malayan islands, but are not Australian; three are known from Flores and Timor; one from Flores alone; two from Timor alone; one from Sambawa only, but is very closely allied to the forms from Flores and Timor; one, *Trichoglossus mitchelli*, is probably confined to Lombok, and it is of very distinct Australian (or Timorese) relations, no *Trichoglossus* reaching to Indian or purely Malayan regions. Dr. Vorderman, in *Natuurk. Tijdschr. v. Nederl.-Indië*, Vol. LIV., mentions fifty-one species as noticed by him in Lombok. Most of these were collected by him, but a few were only seen. A large kingfisher has been described by Vorderman as "*Pelargopsis sasak* nov. subspec." It is very doubtful whether this bird is distinct from *P. gurial floresiana*, the only difference I can gather from the description being the want of the green wash on the head, and this being absent in younger birds of *floresiana* (see p. 570). The sex of Vorderman's bird is not stated, nor that of the types of the *floresiana* in the British Museum. On the other hand, the length of the bill given by Vorderman (culmen 89 mm.) is rather against its being a young bird.

V.—LIST OF COLLECTIONS FROM SAMBAWA.

Mr. Doherty sent two collections from Sambawa (or Sumbawa), a small one from low country near *Bima*, on the north coast of Eastern Sambawa, and a larger one from the Peninsula of *Tambora*, in about the middle of the north coast, partly collected in the lowlands, partly on the slopes of the high volcano of Tambora, but mostly not higher than about 3000 feet. Unfortunately a long letter about the nature of Tambora, the collections made there and the adventures of the collectors on the mountain, "has been lost or mislaid by the messenger I sent it with from Swéla,—at any rate it never reached the hands of the controleur (Dutch official) at Labuan-Hadji, who was to post it to Europe," writes Doherty.

The birds from Bima were shot in February, those from Tambora in April and May.

* His *Cisticola ruficeps* and *C. lineocapilla* are both what is now called *C. exilis*.

The ornithology of Sambawa has hitherto only very imperfectly been known. The Leyden Museum possesses some birds from there, collected in the first half of this century by Forsten, near Bima, and a few of them were described long ago by Bonaparte (*Chibia bimaënsis*, *Trichoglossus forsteni*).

The naturalists of the yacht *Marquesa* landed on the north coast, wishing to ascend the mountain of Tambora, but they did not succeed, and collected only a few days on the island. Dr. Guillemard nevertheless gave a list of the species of birds obtained in the *Proceedings of the Zoological Society of London* for 1885, enumerating thirty-eight species.

Nearly all of these have also been met with by Doherty, who sent sixty-five species, adding no less than thirty-four species to the Sambawa list, of which one and one subspecies are here described as new.

The species which have not hitherto been registered from Sambawa, as far as I know, are marked with an asterisk.

The newly added species are mostly known from other islands of the so-called Timor group of islands; the others are rather Indo-Malayan elements, only one, *Falco lunulatus*, being of Australian origin.

1. **Pratincola caprata** (L.).

Low country at Bima and Tambora.

*2. **Geocichla interpres** (Temm.).

Tambora at 2000 feet. Not different from the Lombok specimens.

*3. **Geocichla dohertyi** Hartert.

(See *antea*, p. 555.) In the hills of Tambora at about 3000 feet.

*4. **Phylloscopus borealis** (Blas.).

Bima and Tambora, low country and at 3000 feet. *Males* with wings 70—72 mm., a *female* wing 63 mm.

It is quite possible that two forms, a larger and a smaller, migrate in winter to these islands, for in our other specimens the sexual difference in size is not so large.

*5. **Brachypteryx leucophrys** (Temm.).

Tambora, 3000 feet. "Iris dark brown; beak black, pale below; feet pale slaty grey." There is a good deal of variation in these little birds, some being much more rufous, others more olive, the middle of the throat and abdomen being sometimes quite white, sometimes very much washed with pale brown.

6. **Parus atriceps** Horsf.

Bima and Tambora, low country and up to an elevation of 3000 feet.
(*Parus cinereus* of Guillemard's list.)

*7. **Dicaeum igniferum** Wall.

Tambora, low country and at 3000 feet.

♂. "Iris dark brown; beak black; feet blackish." Wings of the *males* 50—52 mm., of the *females* 49 mm. These measurements are a little larger than those given in the *Cat. B. Brit. Mus.* X. p. 19, from Flores specimens.

*8. **Prionochilus obsoletus** (Müll. & Schleg.).

Bima and Tambora, in low country. "Bill dark brown, paler below; feet dark grey; iris light orange-brown."

*9. **Anthreptes malaccensis chlorogaster** (Sharpe).

Both sexes from Bima. The Sambawan race of this bird is very dark below, almost as much so as the Celebes form, and they are very large birds. Wings, ♂, 70 and 71 mm.; culmen 21—22 mm. The *female* is very green above.

10. **Cinnyris pectoralis** (Horsf.).

Low country and hills of Tambora at 3000 feet.

11. **Stigmatops ocularis** (Gould).

Tambora, from the sea-coast up to 3000 feet.

12. **Philemon neglectus** (Büttik.).

Tambora, low country. "Iris dark brown."
(*Philemon timoriensis* Guillemard, *P. Z. S.* 1885, p. 509.)

13. **Zosterops aureifrons** Wall.

A fine series from the lowlands of Bima and Tambora. I have compared them with the types of the species in the British Museum and found them identical. The types are from Flores, but Sharpe (*Cat. B. Brit. Mus.* IX. p. 160) mentions also Sambawa as the habitat of the species, while Guillemard does not enumerate the bird.

"Iris red-brown; bill blackish; base of mandible and near nostrils whitish; feet dull slaty grey."

14. **Zosterops intermedia** Wall.

Not rare in Tambora.

This is the bird named *Z. brunneicauda* by Dr. Guillemard in *P. Z. S.* 1885, p. 508. I, however, cannot find any constant characters to separate these birds from *Z. intermedia*, though most of my specimens have longer wings and bills, others, on the other hand, being in no way larger. *Z. brunneicauda* Salvad. is very closely allied, but the totally different locality whence it came (Ceram Laut, Choor, and Aru), as well as the quite black bill and more olive flanks, seem to be against its identity with the Sambawa birds. *Z. griseicentris* Scl., from Timor Laut, is also allied. *Z. sumbawensis*, described by Guillemard *l.c.*, is much more yellow and may be a different species. It was shot at Bima.

Lophozosterops gen. nov.

A series of a pretty little bird from the mountain of Tambora cannot, without violence, be united with any genus known to us. I am, therefore, obliged to create a new genus for its reception. In its wing-formula it agrees best with *Zosterops*, to which genus it seems most nearly allied. The nasal aperture is covered from above with a strong operculum, the beak rather strong and stout. Tail shaped as in *Zosterops*. Tarsus distinctly, though only about 4 mm., longer than middle toe with

claw, and covered with seven or eight strongly marked scutellae. Wing longer than tail. Plumage soft and full, as in *Zosterops*. Eye surrounded by a narrow ring of white feathers. Head with a full crest. Coloration above olive, below yellow; crested top of head of different colour, *i.e.* blackish brown with white streaks.

Type: *Lophozosterops dohertyi*.

*15. **Lophozosterops dohertyi** sp. nov.

♂ ad. Top of head blackish brown, each feather with a long, narrow, guttate white spot near the shaft towards the tip, these spots becoming brownish and obsolete on the hinder part of the crown. Lores black. Eyes surrounded with a narrow white ring of feathers. Behind the eyes an elongate yellowish spot. Ear-coverts olive. Rest of upper surface, including wing-coverts, greyish olive. Wing-quills blackish brown, outwardly margined narrowly with olive-green, inwardly broadly with yellowish white. Entire under surface sulphur-yellow, paler on throat. Under wing-coverts yellowish white. "Iris dark brown; beak black; feet yellowish slate-colour." Total length about 120 mm.; wing 62—65 mm.; tail about 50; tarsus 17—18; culmen 14 mm.

♀ like *male*, but wing apparently 2 or 3 mm. shorter.

Hab. Volcano of Tambora, 1000 to 3000 feet high.

*16. **Mirafra horsfieldi parva** (Swinh.).

♂ ad. Tambora, low country. Hardly distinguishable from some Australian *M. horsfieldi*, and also very close to *M. javanica*, so that it is not easy to say, in my opinion, to which of these forms it is closer allied. "Iris light brown; feet pale reddish; maxilla blackish; mandible dull ochreous." Wing 68; tail 48; tarsus 20; culmen 13.

Only known from Flores.

*17. **Anthus rufulus medius** (Wall.).

Lowlands of Bima and Tambora and hills at 3000 feet. All alike in colour. "Iris brown; feet dull ochreous; maxilla dark brown; mandible pale ochreous."

*18. **Munia molucca propinqua** Sharpe.

Two *males* from Bima have a distinct patch of white, unbarred, on the sides of the breast, by this as well as geographically belonging to the subspecies *propinqua*, to which the specimens from Kalao must probably also be considered to belong (*antea*, p. 168).

Some young birds were shot at Tambora.

19. **Artamus leucogaster** (Valenc.).

Low country of Tambora and Bima.

20. **Calornis minor** Bp.

Bima, low country.

21. **Eulabes veneratus** (Bp.).

Tambora, from the low country up to 3000 feet.

"Iris dark brown." Specimens from Flores are totally alike.

22. **Chibia bimaënsis** (Bp.).

Typical Sambawa specimens are smaller than most specimens from Lombok and Bali, but the dimensions seem to vary to a certain extent, and I do not, therefore, dare to separate the Bali and Lombok birds from those of Sambawa at present.

23. **Oriolus broderipi** Bp.

Tambora, low country and at 3000 feet, and Bima. See *antea*, p. 560.

Young birds have black shaft-lines below and are pale yellow; their middle rectrices are greenish. "Iris crimson; beak pinkish; maxilla blackish near tip; feet dark grey."

24. **Lanius bentet** Horsf.

Low country at Bima and Tambora.

25. **Pachycephala fulvotincta** Wall.

A *male* from Bima agrees entirely with the types of the species in the British Museum, which are from Flores.

26. **Lalage timoriensis** (S. Müll.).

Low country at Bima and Tambora, and at about 3000 feet above the sea.

*27. **Graucalus floris** (Sharpe).

♂, ♀, from the low country of Tambora.

♀. "Iris dark brown; beak and feet black." The fully adult *male* has a narrow line of black on the forehead; lores, cheeks, ear-coverts, chin, and throat black.

♂. Wing 162 mm. ♀. Wing 158 mm.

28. **Pericrocotus lansbergi** Büttik.

(Plate XI. f. 1, 2.)

This beautiful species has been collected in the Tambora Peninsula from the low country up to about 3000 feet above the sea. It is well described by Büttikofer in *Notes Leyden Museum*, 1886, p. 155, and a black figure of both sexes given. It may be added that the rectrices have their shafts black as far as the black colour reaches, while they are white from below within the red colour. The *females* before me are dark smoky grey above. The *males* have the wings 72—75 mm., the *females* 72—74.

♂ ad. "Iris dark brown; feet and bill black." The young *males* are like the *females*.

*29. **Muscicapula hyperythra** (Bl.).

Frequently met with in the hills of Tambora at about 3000 feet.

♂ ad. "Iris very deep brown; bill black; feet dark grey."

*30. **Muscicapula westermanni** Sharpe.

In the same localities as the former species.

♂. "Iris dark brown; bill and feet black; ♀ the same."

*31. **Erythromyias dumetoria** Wall.

Frequently met with in the mountains of Tambora at about 3000 feet. "♂. Iris dark brown; bill black; feet dull pale slate-colour."

*32. **Cryptolopha trivirgata** (Strickl.).

Common in the mountains of Tambora.

"Iris dark brown; feet dark slaty, soles ochreous; beak blackish; commissure and base of mandible pale." Wings 58—60 mm. The few Java specimens I was able to measure have the wings some millimetres shorter.

33. **Rhipidura sumbawensis** Büttik.

In the low country and at 3000 feet in Tambora. "Iris dark brown; bill black; feet dark brown." The long rictal bristles have very conspicuous white bases, while their tips are black. Wings of *males* 81—82 mm., of *females* 76—77 mm. (*Notes Leyden Mus.* 1893, p. 85.)

34. **Hypothymis azurea** (Bodd.).

Bima and Tambora, low country and 3000 feet.

*35. **Collocalia esculenta** (L.).

One ♂, shot on the volcano of Tambora, at 3000 feet, belongs to this species, though it is rather steel-blue above. Wing 94 mm.

This species has never been known to extend so far westwards. Timor possesses a quite different species, and it is probably *via* Djampea and Kalao, from Celebes, that this species reaches the Lesser Sunda Islands. Lombok has *C. linchi*.

36. **Caprimulgus affinis** Horsf.

♂ ad. in full moult. Tambora, low country.

37. **Iyngipicus grandis** Harg.

Bima and Tambora, low country and at 3000 feet. "Iris dark brown, or brownish grey; feet greenish; bill dark bluish slate-colour, paler at base below."

38. **Merops ornatus** Lath.

Met with commonly in the low country and in the hills of Tambora at about 3000 feet, and also at Bima. Dr. A. B. Meyer in *Sitzungsber. Isis*, Dresden, I. p. 19, called attention to a blue spot under the black band of the throat in some Sumba specimens. This remarkable blue spot is very largely developed in one specimen from Sambawa, while it is not visible in another adult bird.

*39. **Pelargopsis gurial floresiana** (Sharpe).

This very distinct form of *P. gurial* was shot in the low country of Tambora. The iris was "dark brown; eyelids and beak dark vermilion; tip of beak dark blackish; feet coral-red; claws blackish."

A young bird has the "beak partly blackish"; the crown darker brown and *without any green wash*; feet not so bright red; feathers of the breast margined with black.

40. **Alcedo ispida floresiana** (Sharpe).

One from Tambora, wonderfully bridging over the way from *A. ispida bengalensis* to *A. ispida ispidioides*. (This is the *Alcedo bengalensis* of Guillemard's list.)

*41. **Ceyx innominata** Salvad.

Six skins from the low country of Bima and Tambora. ♂ ad. "Iris dark umber-brown; beak and feet coral-red." A *female* has the beak and feet "orange," a young bird "pale sordid brown."

None of these birds is so strongly washed with lilac above as some of my Bali birds, but it seems to me that the stronger lilac wash comes with age.

I cannot see the differences between *C. euerythra* Sharpe (*Cat. B.* XVII. p. 179) and *C. innominata*. There seems to be no constancy in the colour of the upper parts, older birds being more lilac, nor any in the more or less black scapulars and wing-coverts. A specimen from Bunguran, kindly named for me by Sharpe himself as *C. euerythra*, has no black whatever on scapulars and wing-coverts. *C. dillwynni* is probably only subspecifically separable from *C. tridactyla* on the one hand and *C. innominata* (= *euerythra*) on the other hand. Some of the specimens called *C. euerythra* in the British Museum are inseparable from *C. dillwynni*, others inseparable from *C. innominata*.

42. **Halcyon chloris** (Bodd.).

In the low country at Bima and Tambora. Heads of the two sent lighter than in the Lombok specimens.

*43. **Halcyon sanctus** Vig. & Horsf.

Tambora, low country and upwards to about 3000 feet.

*44. **Monachalcyon fulgidus** (Gould).

Common in the low country and hills of Tambora, to about 3000 feet. Young birds and nestlings have the back and wing-coverts more or less black, the breast washed with ochreous brown.

45. **Eurystomus orientalis australis** (Sw.).

An adult *male*, shot in the low country of Tambora, agrees better with *E. australis* than with *E. orientalis*, but stands somewhat between the two forms. The birds of the Lesser Sunda Islands and Celebes seem to connect *E. orientalis* and *E. australis*. See on this vexed question, among other places, A. B. Meyer, *Mitth. zool. Mus. Dresden*, I. 1875, p. 18; *id.*, *Verh. zool. bot. Ges.* 1881, pp. 763, 764; Sharpe, *Cat. B. Brit. Mus.* XVII. p. 34 footnote, p. 38 (intermediate specimens!); Dresser, *Monogr. Coraciidae*. Sharpe, in the *Catalogue of Birds*, XVII. p. 37, does not mention the Lesser Sunda Islands at all as the habitat of *E. australis*, but from his synonymy and his enumerating the specimens from the

islands of Lombok, Timor, and Flores under *E. australis* on the next page, it is clear that he considers all the birds from there as belonging to the latter species. "Iris and eyelids dark reddish brown ; beak dark red, tip and culmen black."

*46. **Cuculus poliocephalus** Lath.

Tambora, 3000 feet.

*47. **Cacomantis threnodes** Cab.

Tambora, 3000 feet.

*48. **Chalcococcyx malayanus** (Raffl.).

Low country of Tambora. "Iris inwardly light brown, outwardly whitish ; bill black ; feet blackish."

*49. ? **Eudynamis honorata malayana** (Cab. & Heine).

One *male* from the low country of Tambora. See remarks on form from Satonda, p. 575, which apply to the Tambora bird as well.

50. **Centropus javanicus** (Dumont).

Bima.

51. **Trichoglossus forsteni** Bp.

Two beautiful *males* from Bima, the same locality where the type came from.

These two specimens agree fully with the one we had from Sambawa out of Dr. Guillemard's collection, and have not such a broad blue patch behind the pale greenish band on the hind-neck as all those from Djampea have. (*Antea*, p. 176.)

*52. **Pisorhina albiventris** (Sharpe).

Scops albiventris, *Cat. B. Brit. Mus.* II. p. 78, is a subspecific form of either *S. magicus* or *S. menadensis*, the latter species being its nearest ally.

The two skins before me from the low country of Tambora agree in every respect with the type in the British Museum, which was collected by Wallace in Flores.

"Iris yellow ; beak dirty brownish, tip and commissure darker ; feet dirty whitish."

*53. **Falco lunulatus** Lath.

Tambora at 3000 feet.

Somewhat pale below, but evidently this species. Wallace obtained it in Flores.

♀. "Eye dark brown ; eyelids bluish at their edges ; cere slaty blue ; beak bluish grey, blackening towards the tip ; feet greenish yellow, claws black."

*54. **Osmotreron vernans** (L.).

A series from the low country of Tambora. The wings of the *males* measure from 146 to nearly 150 mm. "Bill French grey, base greenish black; iris crimson, with an inner ring of blue ; feet dark magenta-red."

A quite young bird of this species has brownish buff tips to many of the feathers above and below.

*55. **Ptilinopus albocinctus** Wall.

Tambora at elevations of 3000 feet.

" Iris crimson ; beak yellowish green, tip ochreous : feet dark beet-red."

*56. **Ptilinopus melanocephalus** (Forst.).

Tambora, low country and up to 3000 feet.

*57. **Carpophaga aenea** (L.).

Tambora, low country as well as up to 3000 feet. " Iris dark crimson ; eyelids dark red ; feet dull purple-red ; base of beak dark red, tip dull slaty."

Two vividly coloured birds, below rather light, throat vinous grey, crown pale, the latter being conspicuously darker in skins from Cachar (E. C. S. Baker coll.) and Tenasserim (Col. Bingham coll.). With a large material for study it will probably be possible to divide *C. aenea* into several subspecies. (See Salvadori, *Cat. B. Brit. Mus.* XVI. p. 193.)

*58. **Macropygia ruficeps orientalis** subsp. nov.

There are several small specimens of *Macropygia*, one marked *male*, one marked *female*, from Tambora, Sambawa, shot at elevations of about 3000 feet, one immature *male* from the low country of Tambora, and one *male* from Bali, shot in low country. These birds agree with *M. ruficeps* (Temm.), except in their longer wings and their generally darker, deeper rufous under tail-coverts. The supposed *female* may possibly not be a *female*, but a somewhat young *male*, for it has no black on throat and breast, and differs from the *male* only in having the feathers of the hind-neck and upper back of an earthy brown, without any metallic gloss, and all the rest of the upper surface of a paler brown. The bird from Bali is distinctly smaller, but has the under tail-coverts very deep rufous. The Sambawa bird might, therefore, stand as a new subspecies, and the Bali form is perhaps intermediate between *Macropygia ruficeps orientalis* from Sambawa and *M. ruficeps typica* from Java and Sumatra. The wing of the Tambora birds measures 151 and 155 mm., that of the young bird 142 mm., but the latter is not full grown. The tails are 165 mm. long. The bird from Bali has the wing 145, the tail 150 mm. long.

In my opinion the specimens from Tenasserim and Burma constitute another subspecies, characterised by its long wing (149 mm.) and somewhat pale underside, while all our birds from North Borneo are decidedly paler than those from Sumatra and very small.

59. **Turtur bitorquatus** (Temm.).

Low country of the Tambora Peninsula. " Iris orange ; skin round eye and base of beak laterally dark red ; feet dark red, claws brownish ; bill black."

Sambawa specimens do not differ from those from Java.

60. **Turtur tigrinus** (Temm.).

Bima and low country of Tambora.

61. **Geopelia maugei** (Temm.).

Low country of Tambora. ♂. "Iris whitish; eyelids ochreous; beak bluish grey; feet purplish grey, claws paler."

*62. **Columba metallica** Temm.

Two *males* and one *female* from Tambora, at 3000 feet, the *males* with wings of 232 and 242 mm., the *female* with the wings 223 mm. "Iris orange-yellow; eyelids and basal two-thirds of beak dark red, terminal third ochreous horn-colour; feet beet-red, soles and claws whitish or whitish flesh-colour."

63. **Chalcophaps indica** (L.).

From the low country.

*64. **Gallus varius** Shaw & Nodd.

Tambora, low country and at 3000 feet.

"*Male* adult. Eyes ochreous orange; maxilla dark brown, with pale tip; mandible pale horn-colour; naked parts of head dark red; wattle on chin rich ochreous; feet sordid brown; comb violet, greenish at base. *Female:* eye pale orange; feet whitish; beak brown, pale at base."

*65. **Megapodius duperreyi** Less. & Garn.

In the hills of Tambora at about 3000 feet above the sea. *Male* adult. "Iris reddish brown; beak deep ochre; culmen dark; feet orange; scutellae of toes and tarsus in front dark brown; claws blackish."

VI.—ON BIRDS FROM SATONDA.

Doherty writes:—

"The island of *Satonda* or *Sitonda* lies three miles off the coast of Northern Sambawa. I think it must be some three miles across, and consists of a large lake of immense depth, and almost inaccessible on account of the high cliffs round it, enclosed as it is by a ring of steep hills, ranging up to 1500 feet. It is partly pasture, partly forest. The island is greatly feared by the Tambora people on account of its enormous *pythons*. One I saw was about twenty-five feet long. Ram Persad shot one rather bigger, I imagine, and I saw the excreta of one containing the bones of a full-grown deer; that snake must have been a monster. Deer abound on the island, and so do pigs. The birds that inhabit Satonda are partly different ones from those on the mainland, as so often happens on small detached islands. There are Nicobar pigeons, not met with in Sambawa. As you will see, there are quite a number of species that are not found in Sambawa. There are *Turnix powelli*, of which I send both sexes; there are some *Eudynamis* which are very puzzling; *Caprimulgus macrurus* and *Carpophaga rosacea* were shot, while *Caprimulgus affinis* and *Carpophaga aenea* were found instead on Sambawa."

No birds have been recorded from Satonda before.

1. **Cisticola cisticola** (Temm.).

Several specimens, in rather abraded and poor plumage.

2. **Cinnyris pectoralis** (Horsf.).

Two *males* and two *females*, like those from Sambawa.

3. **Lophozosterops dohertyi** Hartert.

One *male*. Like the type from Sambawa. (See p. 568.)

4. **Artamus leucogaster** (Valenc.).

Females.

5. **Monarcha inornatus** (Garn.).

♂, Satonda. "Iris dark brown ; beak slaty blue, asymmetrically marked with black ; feet slaty blue."

This is probably the westernmost place of the occurrence of this species.

6. **Erythromyias dumetoria** Wall.

One *female* from Satonda.

7. **? Eudynamis honorata malayana** (Cab. & Heine).

One *male* and three *females* from Satonda are very puzzling. They are larger than any *E. honorata typica* I have measured, and much more rufous at least than any Indian specimens. I do not dare to decide at present finally what they are. It is probable that they are a large race of *E. honorata*, with a more rufous *female*, and might stand as *E. honorata malayana* (Cab. & Heine). They also point towards *E. orientalis*, but seem smaller and the *female* a little different. Perhaps they should receive a subspecific name as standing between *E. honorata* and *E. orientalis*. The geographical distribution does not help us, as Shelley in *Cat. B. Brit. Mus.* XVII. p. 323—if his divisions are natural—gives Lombok as a locality for *E. orientalis*,* and also allows *E. honorata* to extend from India to Flores ! Doherty's *female* had : "Iris chestnut ; beak blackish ; gape and from below greyish horn-colour ; feet dark green." ♂ ad. "Eye crimson ; beak ochreous horn-colour ; feet dark grey." ♂ wing 205 mm. ; ♀ wing 210 mm.

I wish to await more material before finally judging of this species or subspecies.

8. **Centropus javanicus** (Dumont).

One young bird from Satonda.

9. **Eurystomus orientalis australis** Sw.

One *male* from Satonda.

10. **Spizaëtus kieneri** (Geoffroy St. Hil.).

♀ ad., Satonda. "Iris chestnut ; cere ochreous ; gape dull ochreous ; beak bluish black ; base of mandible pale ; feet ochreous, claws black." Wing 367 mm.

11. **Ptilinopus melanocephalus** (Forst.).

One from Satonda.

* Though under "*Hab.*" he says only "Moluccas" and does *not* mention Lombok !

12. **Carpophaga rosacea** (Temm.).

Satonda, near Tambora, Sambawa, May 1896. "Eye dark crimson; beak dark grey, dark red at base; feet purple-red."

This seems to be the most western locality hitherto known of *C. rosacea*.

13. **Caloenas nicobarica** (L.).

This species has hitherto not been found in the Timor group of islands, but Mr. Doherty obtained three young birds on the island of Satonda.

14. **Turnix powelli** Guillemard.

Three *males* and one *female* from Satonda. The *males* agree very well with the figure on Plate XXIX. and the description given on p. 511 of *P. Zool. Soc. Lond.* 1885. They look much like *T. rufilatus* Wall. of Celebes, but are distinguished by the absence of rufous below, the abdomen being white in the middle, barred on the sides, vent and under tail-coverts very pale buff, with or without distinct black bars. The middle line on the crown is narrow and ill-defined. The *female* differs from the *male*, having the throat black in the middle. I do not understand Dr. Guillemard saying that the "black stripe on the throat of the *male* bird is considerably more restricted" than in *T. rufilatus*. First of all he evidently mixes up the sexes, the *female* only having a black throat, not the *male*, while the sexes are nearly alike in *T. rufilatus*. The *female* of *T. rufilatus* differs from its *male* in being larger, with a longer wing, in the forehead being black, the throat more whitish; but the scapulars are in no way more mixed with rust-colour than in the *male*.

The black throat of the *female* of *T. powelli* removes this species more from *T. rufilatus*, and suggests a closer relationship to *T. taigoor* than *T. rufilatus* shows.

"♂. Iris pale yellow; beak pale greenish ochreous, tip and culmen much darker; feet brighter greenish ochreous, claws pale reddish. ♀. Iris yellowish white; beak *all over* greenish yellow, not partly blackish as in ♂."

VII.—LIST OF THE BIRDS COLLECTED IN SUMBA.

Few and small are the publications about the island of Sumba. In 1881 Dr. A. B. Meyer published a list of forty species of Sumba birds in the *Verhandl. der k. k. zoolog. botan. Gesellschaft in Wien*, pp. 759—767. Of these only two, viz. *Ninox rudolfi* and *Graucalus sumbensis*, were described as new species, *Tanygnathus megalorhynchus* var. *sumbensis* as a new subspecies. In 1892 Dr. J. Büttikofer enumerated, in *Notes Leyden Mus.* XIV. pp. 196—204, thirty-two species, of which only eight were the same as those named by Dr. Meyer, and one a new species, viz. *Dicaeum wilhelminae*. In the same year the latter author described (*Notes Leyden Mus.* XIV. p. 267) the *Geoffroyus* which at first he had called *G. jakesii* as *G. tjindanae* sp. nov. Quite recently Büttikofer described a duck from Sumba under the name of *Anas salvadorii* (*Notes Leyden Mus.* XVIII. p. 59). The number of species thus known from Sumba was sixty-five, of which six, viz. *Ninox rudolfi*, *Graucalus sumbensis*, *Dicaeum wilhelminae*, *Tanygnathus megalorhynchus sumbensis*, *Geoffroyus tjindanae*, and *Anas salvadorii*, had received their own names.

It is with great pleasure that we now publish Doherty's list, which contains many species not yet recorded from Sumba, among them the most beautiful *Ptilinopus dohertyi* Rothsch. and other more or less interesting previously unknown forms, as well as the *Eclectus cornelia*, the home of which was unknown before.

With the help of the following list, and another which I hope to be able to give of a further collection from Sumba that is probably on the way to Europe, we may hope that, instead of the unlucky star of which Dr. Meyer complained in 1892, a bright day will soon dawn over our knowledge of the avifauna of the most interesting island of Sumba, thanks to the energy of our collecting friends abroad.

Sumba or Humba, on the maps also frequently called Tjendana, Tjindana and Chendana, Sandelhout and Sandalwood, not being within the long chain of islands that extends from Java eastwards to Flores, and on to Ombay, Wetter, etc., but being an outlier south of Flores and west of Timor, is of particular zoogeographical interest, and I think therefore that it is worth while to extract some notes from the valuable and highly interesting account given by Doherty in the *Journal of the Asiatic Society of Bengal*, LX. 1891, in a paper entitled "The Butterflies of Sumba and Sambawa, with some Account of the Island of Sumba":—

"Sumba is one of the largest of the Lesser Sunda Islands, having an area probably exceeding six thousand square miles, for the unexplored southern coast-line, drawn on the maps as concave, is really convex, giving great breadth to the island. . . . Deep sea separates Sumba from Flores, the high peaks of which are distinctly visible from Naugawesi Bay, but a bank covered by 50—80 fathoms of water connects it with Eastern Sambawa,* while on the side of Savu and Roti there is apparently deep sea again. . . . The aspect of the north coast of Sumba is most forbidding. Long naked headlands, Sasa, Ngarulubu, Mandolu, famous for their horses, extend far into the sea, marked with the lines of raised beaches. All this side of the island, for as much as forty miles inland and up to a height of two thousand feet, is covered with a sheet of coral overlying sandstone. Near Kawangu the sandstone is uncovered, forming hills curiously carved and water-worn. The coral must be of considerable age, and is often extraordinarily hard, reminding one of the ancient metamorphic limestones of Greece, in Boeotia and Arcadia. Its surface is infinitely rough and broken, capable of destroying the strongest boots in a few days. Fortunately, wherever the ground is level, the coral is hidden by a coating of indurated clay like laterite, and the native paths keep to this as much as possible. A scanty growth of grass, especially the horrible spear-grass, which renders travelling almost unendurable, covers the coral. Wherever the surface consists of irregular piles of jagged fragments, bristling with needle-like points, and full of deep rifts and well-like cavities, a dry thorny jungle grows, since horses cannot find foothold there, nor fire reach it. The grass is burnt every May or June, and for some months later the country is as black as a coal, but travelling is easier and is therefore usually done at this season. In some places the soil is exceedingly rich, and the population dense, especially in Melolo and Laura, but the country is everywhere dreary, and is far from green even just after the rain. The coast itself is generally uninhabited for several miles inland, owing to the depredations of the Endinese pirates. The

* See correcting note on p. 579.

heat is terrible, but the coast seems singularly healthy, and the climate is more like that of Northern Australia than of the Indian Archipelago.

"Till I came to Sumba, no European had ever visited the interior. Learning from the natives that a well-wooded and watered tract existed inland, I pushed across forty miles of a desolate coral wilderness and reached a wholly different country. . . . The interior of the island is a great plateau, somewhat hollowed out in the middle by the river Kambera, which rises in the forests round Lewa west of Mandas, flows eastward, and near Mandas is a considerable river in deep jungle, difficult to ford, haunted by crocodiles, and much larger in volume than at its mouth, seventy or eighty miles below. Indeed most rivers of Northern Sumba tend to disappear on approaching the coast. The table-land is flat in general outline, but deeply cut by an infinity of exceedingly steep ravines, each with a clear swift stream. Flat or steep it is everywhere the richest possible meadow-land. The forests lie in great masses, and, except at Tabundung and one or two other exceptional places, they are wholly trackless, and serve as the boundaries of hostile tribes. West of Mandas the country appears to descend steeply into the Indian Ocean. This slope was described to me as covered with high forest, with a heavy rainfall and a coast so stormy as to be inaccessible during the greater part of the year. The height of the table-land of the Kambera is usually about 1500 to 2000 feet. The hill at Pada Dalung must be about 2500 feet above the sea. The climate of this region is delicious. South-east and north-west the country rises, and by its upward trend conceals whatever high mountains may be in that direction. The great isolated massif of Tabundung, covered with high forest, lies south of Pada Dalung, and must be about 4000 feet high. East of this is the unknown *tana maringu* (cold country) of Masu, which lies back of Melolo, and is sacred ground. . . . West of Pada Dalung the country rises again, and beyond Lewa Paku and the sources of the Kambera lies another 'cold country,' probably of considerable height and extent. West of Perwatana and Anakala, on the border of this region, which is called by the general name of Wayéwa, lies a great forest, and then comes Kodi, beyond which the land sinks precipitously into the sea near Gaura or Garu.

"A volcano has been said to exist near Tarimbang on the south-western coast, but some people of that state told me this was quite untrue. However, the mountain of Tabundung, which I did not succeed in reaching, may possibly be of volcanic origin. This district, though rather out of the way, seems to be the best accessible collecting-ground on the island.

"The upland forests of Sumba are less luxuriant than in Java or Sumatra, and are singularly free from thorns and underbrush, but many of the trees reach the height of a hundred feet, and some of the figs are of enormous girth. The only bamboos on the island occur in the dry valleys near the coast. Palms, except the *loutar* or palmyra, and a few arecas, are exceedingly scarce. The Endinese, who import cocoanuts, always destroy the germ of each nut, which perhaps accounts for the absence of this useful tree.

"Of the animals of Sumba I can say but little. The natives think there are three kinds of monkeys, but I saw only the *Macacus cynomolgus*, which is very common and tame. A deer like the *Cervus muntjac* is said to be common, as well as another with large branching horns, which they call by the Malay name of *rusa*. Wild pigs abound and a wild cat. Among birds *cockatoos* are so numerous that I have seen the trees white with them!

"Among domestic animals there are pigs, goats, fowls, a few buffaloes, cats, dogs, and pigeons. Horses are the most valuable product of the island, and 'Sandalwood ponies' are perhaps the best in the world, and well known as far as Rangoon and Hong Kong. They live unguarded in troops of twenty or thirty, each having its own range of pasture, the limits of which are carefully respected. Being very curious, they used to follow me for miles over all obstacles, but never dared to cross the ravine, which bounded their beat. . . . The mares are rarely ridden, and as in Sambawa are kept for breeding and for food. Only stallions are exported. The trade is wholly in the hands of the Arabs and Bugis. The Sumbanese are the best rough-country riders I have ever seen (and I have lived among the Turkman, Bedawin, and Iliats), galloping bareback down the steepest slopes. . . .

"The staple food in Sumba is millet and maize, generally planted alternately, and rice, which is hard to obtain except on the coast. . . .

"The people of Sumba do not probably number less than 100,000, and perhaps much more if Laura and Melolo are really as populous as they are said to be. . . ."

From Doherty's letters I extract the following notes :—

"We did all we could in Sumba at this season (end of February and March), very badly in lepidoptera, but not so bad, I think, in birds. I think I never saw insects quite so scarce as when I left Sumba, and that in perfect butterfly-weather, heavy storms alternating with terrific heat—heat which my men found very trying, and which nearly killed me, fresh as I am from home. The terrific coral was another great trial; it tore our boots to pieces at once, and cost my men great sufferings in their long tramps. They disliked the place immensely, and that was one reason for not staying there longer. The flooded streams prevented my getting either to Tabundung or Pada Dalung, which would have probably been pleasanter places, but perhaps also no better collecting-grounds, as I could see it raining there nearly all the time.

"We worked the neighbourhood of Nangawesi Bay at first, and then the deep valleys of Watupanu and Palukasewi in the Taimanu state. The forest in the ravines is heavy, but the country very rough. There is now a regular Dutch official at Waingapu, Mijnheer de Korte, who has some influence with the nearer native chiefs. The country at Waingapu seems to become less disturbed and more civilised. They have even started the wet cultivation of rice at one place. Otherwise my old account of the island still applies, and I was wrong only in a few things. I now doubt the islanders having any Mongolian blood. The supposed bank between Sambawa and Sumba seems to be the mistake of an old chart (giving 50 and 60, in place of $\overline{50}$ and $\overline{60}$, meaning *no bottom* at 50 and 60 fathoms!). It now seems to me that there is a remarkable Celebensian element in the fauna of Sambawa and Sumba.

"We got every bird we could hear of on the island. One of the most remarkable of the birds is a single *male* of a superb new *Ptilopus*, of the *Leucotreron* group.*

"In parrots we did well, with de Korte's assistance—at least I cannot hear of any other species on the island. The natives know of the *Loriculus* in Flores, but strongly deny its existence in Sumba. The natives say there are two kinds of cockatoos in the island, but I saw the supposed two kinds, and they seemed exactly the same, only some being smaller, some larger. I procured only specimens of the

* *P. dohertyi* Rothsch.—E. H.

larger form. The *male* has a red eye, the *female* brown. *Trichoglossus haematodes* is probably scarcely different from the Timor form.* There is also a *Tanygnathus*, probably new,† and both sexes of a probably new *Eclectus*.‡ The latter two species we did not shoot, but got them from Mr. de Korte, who received them from natives who brought them alive from the interior of the island. My *female* of the *Eclectus* came from Lewa, my *male* from the country back of Melolo, where the bird is said to be common. The *Eclectus* is sometimes seen near Waingapu, and we saw a *female* flying, but did not get it. As to the *Tanygnathus*, it seems to be very rare. The one I send was brought from some remote part of the Taimanu state, and is said to be a true mountain bird. However, most of the natives here (at Waingapu) did not know it.

"Mijnheer de Korte's daughter Marie gave me a *Pitta* (sex not ascertained, eye said to have been rich brown), which she had stuffed herself very well. It was brought by a native from the mountains back of Melolo. I think it hardly differs much from *Pitta irena* of Timor.§

"Of *Ploceidae* you will find a number of interesting species. I did not send the crow, because it is evidently, I should say, the common *Corvus macrorhyncha*,‖ and was too big for my box. For the same reason I did not send the common *Megapodius*. I send two kinds of hawks. Several shore-frequenting birds and an eagle were not sent. I send two kinds of owl, but no *Caprimulgus* or *Batrachostomus* was seen or heard of. . . . There is a little lark, *Mirafra parva*, and a very lark-like wagtail, *Anthus rufulus*, I think.¶ Its flight and habits are exactly like a skylark's, and it is found in vast numbers over the coral meadows. I suppose it outnumbers all the other birds in the island put together. *Calornis minor* was common, but no *Eulabes* seems to be found in Sumba, but *E. veneratus* is brought over from Ende in Flores as a cage-bird. . . . No *Ceyx*, no *Woodpecker*, was seen. No jungle fowls—a pity.

"As regards the season, I was unlucky in coming in a very rainy year. When I was there before it was quite dry at Waingapu, and the butterflies were already rather *passés*, so to speak, on March 20th; this year there is no trace of the commencement of the brood on March 10th. Such is luck! . . . It seems that I formerly greatly underrated the rainfall of the Sumba coast. My idea now is that the rains are short, but rather heavy, and the desolate look of the country is entirely due to the coral crust."

The species not formerly stated to occur in Sumba are marked with an asterisk.

1. **Pratincola caprata** (L.).

Adult *males* and *females* and young birds. The young birds have the feathers above and below dark brown, with darker edges and whitish spots before the tips.

2. **Acrocephalus australis** Gray.

Two *females* of a middle-sized reed-warbler are somewhat doubtfully referred to this species. They are certainly smaller than typical *A. australis*. The third primary is longest, the second equal to the sixth. Wings 65 and 66 mm.; culmen

* It is not distinguishable.—E. H.

† *T. megalorhynchus sumbanensis* Meyer.—E. H.

‡ *E. cornelia* Bp.—E. H.

§ It is different and was named by me *P. maria*.—E. H.

‖ As crows are difficult to distinguish this must remain an open question.—E. H.

¶ *A. rufulus medius* (Wall.).—E. H.

20 and 21·5; tarsus 22. "Iris grey-brown; feet slaty grey; maxilla blackish; mandible mostly pale horn, flesh-colour at base."

*3. **Phylloscopus borealis** (Blas.).

A large series shot in winter quarters.

4. **Cisticola cisticola** (Temm.).

Three specimens.

*5. **Parus atriceps** Horsf.

Evidently common on the island. ♂. "Iris deep brown; feet slaty blue; beak black, pale at commissure."

6. **Dicaeum wilhelminae** Büttik.

1892. *D. w.*, Büttikofer in *Notes Leyden Mus.* XIV. p. 199. ♂ ad. "Iris deep brown; feet black; maxilla black; mandible black, pale brown at base." Two undoubted *males* of this species.

*7. **? Dicaeum mackloti** Müll. & Schleg.

There is a *female* from Sumba, like the *female* of *D. mackloti*, but of a paler red on the upper tail-coverts. This paler red I find in *young* birds of *D. mackloti* only, while the bird before me is evidently an adult *female*; bill black, except on base of mandible. The red upper tail-coverts make it very improbable that it is the unknown *female* of *D. wilhelminae*.

*8. **Prionochilus obsoletus** (Müll. & Schleg.).

One *male* from Sumba. "Eye pale ochraceous; beak dark grey above, pale bluish grey below."

9. **Anthreptes malaccensis celebensis** (Shell.).

There is a series of specimens of this species from Sumba which I cannot separate from Celebes skins, though they should rather be *A. m. chlorogaster*.

10. **Cinnyris büttikoferi** sp. nov.

♂ ad. Above greenish olive-grey; upper wing-coverts, sides of head and neck, like the back. Throat dark glossy purplish, metallic bluish green on the sides of the throat and on the upper breast; breast with an orange spot in the middle, just below the bluish metallic colour; rest of underparts yellow. Pectoral tufts bright yellow. Under wing-coverts white. Tail black, with brownish tips, very narrow on the central, very large on the lateral rectrices. Wing 54—56 mm.; culmen 24; tail 35; tarsus 14.

♀ ad. Like the *male*, but the under surface yellow, throat pale yellow, sides of breast greenish olive.

This new species, of which Doherty sent several *males* and *females*, differs from *C. pectoralis* in having a much longer bill, in being much less yellowish above, the *male* having no metallic blue forehead, a paler abdomen, and a beautiful orange spot

on the breast. It most resembles *C. aurora*, but the *male* of that species has a broad deep orange band quite across the breast and pure white tips to the outer rectrices. From *C. frenata* and its allies it differs in having an orange spot on the breast, no indication of a pale stripe under the eye and ear-coverts and no line above the eye, and no pure white tips to the outer rectrices.

Dr. Büttikofer, in his article on the Sumba birds in *Notes Leyden Mus.* XIV. p. 201, has already described the *females* of this form, the differences of which from *C. pectoralis* struck him very much; but having no *males*, he cautiously refrained from describing them under a new name. I therefore take a pleasure in naming this bird after him.

11. **Stigmatops ocularis** (Gould).

A number of both sexes. I do not find any differences between specimens from Sumba, Sambawa, Lombok, and other islands.

12. **Philemon neglectus** (Büttik.).

Two specimens which agree with skins from Lombok and Sambawa.

13. **Zosterops aureifrons** Wall.

A fine series, exactly like the types and those from Sambawa. "Iris dull ferruginous; bill black; base of mandible and surrounding of nostrils pale corneous; feet dull slate-colour."

*14. ? **Zosterops citrinella** Bp.

One *female* with the sides of the body very pale. Further material must be awaited, for at present it seems impossible to make out whether this is an individual variety or belongs to a distinct species.

15. **Anthus rufulus medius** Wall.

The commonest bird on the island. Exactly like specimens from Lombok and Sambawa (*antea*, p. 558). "Iris dark umber-brown; maxilla deep brown; mandible, except tip, pale yellowish."

Wings 83 mm.

16. **Sporaeginthus flavidiventris** (Wall.).

Two *females* and one young *male*.

*17. **Taeniopygia insularis** (Wall.).

A fine series of specimens of both sexes, agreeing with typical examples from Timor and Flores.

18. **Munia punctulata nisoria** (Temm.).

Both sexes in some number.

*19. **Munia molucca propinqua** (Sharpe).

A small series of very typical *propinqua*. ♂. "Iris deep brown; maxilla black; mandible silvery bluish grey."

20. ? **Munia quinticolor** (Vieill.).

There are some specimens which seem to differ from *M. quinticolor* in a darker beak and slightly darker rump and upper wing-coverts, but I wish to await further material from Flores and Sumba before deciding of their being distinct or not. Büttikofer had only young individuals, and apparently referred them not without hesitation to *M. quinticolor*.

21. **Calornis minor** (Bp.).

A series, quite typical. Mentioned from Sumba already by both Meyer and Büttikofer.

22. **Artamus leucogaster** (Valenc.).

Evidently common on Sumba.

23. **Chibia bimaënsis** Bp.

Both sexes also from Sumba.

24. **Oriolus broderipi** Bp.

Some beautiful specimens, one of them quite orange.
Wing 156—159 mm. "Iris scarlet ; beak purplish pink ; legs slaty blue."

*25. **Lanius superciliosus** Lath.

A small series of moulting individuals, evidently in winter-quarters.

*26. **Pachycephala fulviventris** Hartert.

P. f., Hartert in *Bull. B. O. C.* V. p. 47, 1896 (Latin diagnosis).

♂ ad. Top and sides of head as well as a broad band across the lower throat glossy black. Ring round hind-neck yellow. Back and rump yellowish olive-green. Upper tail-coverts black. Primaries black, outwardly narrowly margined with grey. Secondaries black with broader outer pale olive-green margins. Inner webs of quills margined with whitish grey, those of the primaries only towards the base. Primary coverts brownish black, with narrow greenish edges ; other wing-coverts with broader edges of the colour of the back. Rectrices black with greyish olive tips. Throat white, enclosed by the black colour described above ; chin-spot also black. Rest of the under surface orange-ochraceous, lighter along the sides of the body and on the under tail-coverts. Under wing-coverts and axillaries pale buff. Total length about 150 mm. ; wing 86—88 mm. ; tail 65—66·5 ; culmen 19 ; tarsus 20. "Iris deep brown; feet slaty; beak black."

♀ ad. Top of head grey ; rest of upper surface olive greenish, washed with brown on the upper back, more yellowish greenish on rump and upper tail-coverts. Quills dark brown with brownish olive outer margins. Tail olive-green. Ear-coverts pale brown. Throat almost pure white ; rest of under surface pale yellowish; under tail-coverts lemon-yellow. Wings 83—85 mm. "Iris deep brown ; feet slaty grey ; beak black."

Young birds have the crown like the back, the throat yellowish white, the quills outwardly margined with pale rufous.

There is a good series of this distinct species, the differences of which from its nearest ally, the *P. fulvotincta*, are given in the original diagnosis in the *B. O. C.*

27. **Graucalus sumbensis** A. B. Meyer.

Two specimens, both said to be *females*, of this very good species. They differ from a *male*, the type, described by Meyer in *Verh. zool. bot. Ges. Wien*, 1881, p. 765, in having the throat pale grey like the breast, not blackish, in having no black frontal line, the head grey like the back, the breast pale grey, shading off into the white abdomen, under tail-coverts white. Wings 178 and 182 mm. This species is distinct from all other known species.

*28. **Edoliosoma dohertyi** sp. nov.

Edoliosoma speciei *E. emancipata* dictae similis, sed capitis lateribus gulaque tota nigerrimis haud difficile distinguenda.

♂ ad. Above light bluish slate-grey, just a shade darker on the head and neck, and a shade lighter on the rump and upper tail-coverts. Primaries and primary-coverts black, greyish white towards the base of the inner webs. Inner primaries with small greyish white tips. Secondaries black, with outer webs broadly margined with light lavender-grey, inner webs greyish white. Upper wing-coverts light grey, darker towards the outer edge of the wing. Forehead, all the feathers from the base of the bill to the upper margin of the eye, ear-coverts, sides of head, and entire throat black, this black quickly shading off into the dark grey breast. Abdomen, flanks, and under tail-coverts dark grey. Rectrices, except the two innermost, black with grey tips, which diminish in size towards the middle. Central pair of rectrices dark grey, with broad black subterminal patches and a tiny grey tip. Under wing-coverts dark grey. Total length about 240 mm.; wing 125—126; tail 110; culmen 25; tarsus 23.

No *female* procured.

This interesting new species is, so to say, one step further in the development than the *E. emancipata* described *antea*, p. 170. While the *male* of the latter species differs from the *male* of *E. timoriense* in having black lores and ear-coverts, in this respect closely resembling the *male* of *E. amboinense*, this species has still more black, the whole throat being of this colour. Unfortunately the relations of the *female* are unknown, as two *males* only were shot.

29. **Lalage timoriensis** (S. Müller).

A large series from Sumba, exactly like those from other islands.

30. **Alseonax latirostris** (Gray).

A large series of this common wanderer from the north, with beaks rather long, viz. 16 mm. They may belong to a large-beaked race.

31. **Culicicapa ceylonensis** (Sw.).

Some rather poor skins show no differences from typical *C. ceylonensis*.

32. **Rhipidura celebensis sumbensis** subsp. nov.

Three skins, all marked "♂," from Sumba differ from *Rh. celebensis* Büttik. from Makassar (?), Djampea, and Kalao (cf. Büttik., *Notes Leyden Mus.* XV. 1893, p. 79; *antea*, p. 173), in decidedly longer wings and generally larger size. I cannot with confidence state any constant difference in colour, but the three skins from Sumba are not very good. While the wings of the type in the Leyden Museum measure 66 mm., and those of my four skins from Djampea and Kalao 66, 67, and 68 mm., those from Sumba have wings of 72 and 73 mm. Their tails measure 90—98 mm., against about 85.

33. **Terpsiphone sumbaensis** A. B. Meyer.

T. s., Meyer in *J. f. O.* 1894, pp. 90, 93.

T. floris (partim), Büttikofer in Weber's *Reise Band III. Ornith. Samml.* pp. 293—298 (1893).

Büttikofer separated from *T. affinis* a series of specimens from Sambawa, Flores, Sumba, and Ombay under the name *T. floris*, type from Flores. A. B. Meyer separated again *T. sumbaënsis* from Sumba. Doherty sent a fair series of the latter. They are large birds, and have nothing to do with *T. affinis*. In very old *males* the shafts of the rectrices are white towards the tips and they show no black margins at all, while younger *males* have the shafts of the rectrices quite black and black edges to all the rectrices. Young *males* have also much more black on the remiges. Wings of adult *males* 100—103 mm., of *females* about 95. Having seen no specimens from Flores, I cannot judge myself of the differences between *T. floris* and *T. sumbaënsis*, which seem to be conspicuous, though slight.

34. **Myiagra rufigula** Wall.

A series of both sexes. In some the beak is about one millimetre broader at base than in our specimens from Djampea and Kalao, but there is no other difference between them. "The iris is dark brown; feet black: maxilla black: mandible slaty blue with black tip."

*35. **Hirundo rustica gutturalis** (Scop.).

Two *females*. "Iris dark brown; beak black; gape yellowish; feet black."

36. **Pitta maria** Hartert.

1896. *P. m.*, Hartert in *Bull. B. O. C.* V. p. 47.

This *Pitta* has been compared by me, *l.c.*, with *P. irena*, but perhaps looks more like *P. cyanorsi*. It agrees with that latter species in its narrow brownish stripes on the sides of the crown, which pass into a very pale blue behind, also in having a smaller white speculum in the wing, and the deep brown underside. It differs, however, from *P. cyanorsi* in having the whole chin and throat black, this colour running downwards in a point. The red middle line on the abdomen is not mixed with black. From *P. irena* it differs in its deeper brown underside, its small white speculum in the wing (only a small concealed white spot on the fifth quill!), the much greater extension of the black throat, and the red on the middle of the abdomen not being mixed with black. Culmen 23 mm.; wing 109; tarsus 35·6.

One skin, not sexed, from the interior of Sumba.

Named in honour of Mejuffrow Marie de Korte, daughter of the Dutch official in Sumba.

Büttikofer records *Pitta concinna* Gould from Sumba, but I do not believe that it could occur there, for the Sumba bird differs from that species in a much deeper brown underside, no black on the abdomen, a much narrower and paler superciliary stripe, a longer wing, and still smaller and concealed white wing-speculum.

37. **Merops ornatus** Lath.

(Cf. A. B. Meyer in *Isis*, 1884, p. 19, and in *Notes Leyden Mus.* XIV. p. 267.)

In one *male* there is a distinct blue spot under the black throat-patch, in the other one not.

"Iris scarlet; beak black; feet blackish."

38. **Alcedo ispida floresiana** (Sharpe).

Two *males*, Sumba. "Maxilla black: mandible with basal half red; feet coral-red, claws dark brown."

39. **Halcyon chloris** (Bodd.).

One *male*, rather blue above with a rather bluish crown. Wing 16 mm.

40. **Halcyon australasiae** (Vieill.).

One *male*, not quite adult, the breast having narrow black fringes to the feathers, the upper wing-coverts rusty edges.

41. **Eurystomus orientalis australis** (Sw.).

Several specimens from Sumba, like those from Sambawa. See p. 571.

42. **Cacomantis threnodes** Cab.

Two *males* from Sumba are very puzzling. They are large, the throat mixed brownish and greyish, below not as pale as typical *C. meralinus* and not so dark as typical *C. threnodes*. They are quite like a Lombok bird mentioned before, and closely approach *C. variolosus*, but are not so grey below, and also *C. virescens*, but seem larger and paler below, somewhat more greyish above. I refer them to *C. threnodes*, though not without hesitation. It is difficult to believe in the distribution of the species as they are divided in the *Catalogue of Birds*.

43. **Centropus javanicus** (Dumont).

One *male*.

44. **Trichoglossus haematodes** (L.).

A fine series from the island of Sumba, from where Meyer had already recorded it. They agree exactly with specimens from Timor. There is a great deal of variation in the colour of the breast and under wing-coverts; these parts being strongly washed with deep orange in some specimens, chiefly old *males*, sulphur-yellow without orange wash in others. "Iris crimson; cere and eyelids black; beak orange-red; feet dull grey."

45. Cacatua citrinocristata (Fras.).

Of this species, which is not with certainty known from any other island except Sumba, Doherty sent four wild shot specimens. One of them has the feathers of the underside strongly washed with deep yellow near the tips, so as to give it a spotted appearance. Wing 245—254 mm.

"Iris deep brown in two *females*, bright crimson in one *male*; eyelids partly bluish; beak, feet, and cere black."

46. Geoffroyus tjindanae A. B. Meyer.

With a fine series of both sexes of this *Geoffroyus* before me I find it indeed very difficult to separate it from *G. sumbarensis*. In his description Dr. Meyer, guided by Salvadori's descriptions, compared it chiefly with *G. personatus*, as its yellowish green upper surface separated it at once from *G. floresianus* and *G. sumbarensis*, which belonged to the group with darker and purer green upper surface. This is altogether a mistake, for I find that the Sumba birds are rather darker green than the majority of Sambawa specimens, some of which are very distinctly yellowish green. The size is of little value, but *G. tjindanae* is larger than most of the *G. sumbarensis*. The latter form is said by Salvadori to be "like *G. floresianus*, only a little larger." This is very little indeed, and I am inclined to doubt the distinctness of *G. sumbarensis* from *G. floresianus*, at least as a species, though the under wing-coverts of the latter are perhaps of a somewhat different, darker colour. *G. tjindanae* seems only to differ from *G. sumbarensis* in a very slightly longer wing and a darker lilac bluish head, though that latter character is variable to a certain extent. Probably *G. tjindanae*, *G. sumbarensis*, and *G. floresianus* and possibly others of the genus—are only subspecifically separable, if that; but at present we do not yet know enough to place them finally, and they are better mentioned under special names.

The wings of our *male* skins measure as follows:—

Males from Sambawa (*G. sumbarensis*): 159, 160, 162, 163—168 mm.

Males from Lombok (*G. sumbarensis*): 160—168, mostly 160—165 mm.

Males from Sumba (*G. tjindanae*): 167, 168—174 mm.

One *male* from Flores: 159 mm. (Salvadori gives 152 only).

Of the adult ♂ *G. tjindanae* Doherty gives the following notes: "Iris very pale whitish yellow; eyelids and cere dirty brownish; maxilla orange-red, tip pale yellow; mandible mostly blackish; feet dull grey." Of the adult ♀: "Iris whitish yellow." Of the young bird: "Iris canary-yellow; beak deep purplish brown; cere earthy greenish; feet dull greenish, with a whitish powder."

*47. Eclectus cornelia Bp.

As mentioned before, Doherty has been so lucky as to discover the home of this *Eclectus*. Only its *female* has been hitherto known. The *female* agrees fully with the descriptions of *E. cornelia*. "The iris is pale yellow; beak horny black, with a small whitish spot on the tooth on each side; feet dull grey above and below." The *male* is above dark green, most of the feathers with lighter borders; head and neck lighter green. Primaries below and inner webs above black; outer webs deep blue, mostly with narrow greenish edges. Underside dark green; flanks

also dark green; sides of breast and upper abdomen, as well as under wing-coverts (except just on the edge of the wing), red. Rectrices from above dark green, blue towards the tip, tip yellowish. Tail black below, with dirty yellow tips. "Iris orange-ochre; maxilla orange-red, with yellow tip; mandible black."

48. **Tanygnathus megalorhynchus sumbensis** Meyer.

In 1882, in *Verh. zool. bot. Ges. Wien*, XXXI. p. 762, Dr. A. B. Meyer described from Sumba a form of *Tanygnathus megalorhynchus* which he named var. *sumbensis*. Salvadori, *Cat. B.* XX. p. 428 (1891), "greatly doubted whether the asserted locality, Sumba, given on the authority of Dr. Riedel, was correct." It was therefore of great interest to me that among Doherty's birds I found a skin of this form, collected in Sumba in February 1896. Unfortunately this skin is in a very bad condition, but Dr. Meyer most kindly lent me two of the typical specimens of his var. *sumbensis*, so that I could, with those two and the one received from Doherty, make a careful comparison of the Sumba form with skins from the Moluccas, New Guinea, Waigiou, Sangir, and Talaut. Salvadori, *l.c.*, states that he has "not been able to find any difference" between *T. megalorhynchus* and Meyer's var. *sumbensis*. However, I find that there are obvious differences between the two forms, and that Meyer's observations were quite correct. Meyer says: The underside is less yellow, but more greenish. This is decidedly so. Especially the breast is remarkably green in the Sumba specimens. This character varies a little, but the green breasts of the Sumba birds are very conspicuous. The under wing-coverts are less yellow: so they are. The rump is very deep blue: this is the case too, but there are specimens of *T. megalorhynchus typicus* which approach and even quite resemble the Sumba birds herein. Another character which strikes me in the Sumba specimens is the somewhat bluish tint on the back, produced by the broad blue edges to the feathers. They are very often indicated in *T. megalorhynchus typicus*, but hardly ever so distinct and broad as in the three Sumba birds now before me.

It is therefore evident that our bird must stand as *T. megalorhynchus sumbensis* Meyer. Doherty describes the iris as yellowish, with a brownish outwardly and a greenish inwardly border, the feet dull grey, beak all vermilion.

Quite recently, *antea*, p. 176, I made known the most westerly locality recorded for *T. megalorhynchus*. I may now add that, though no doubt they must be grouped with *T. megalorhynchus* and not with the Sumba subspecies, some of the specimens from Djampea stand a little between the typical Moluccan form and *sumbensis*, showing much of a greenish tinge on the breast and less bright under wing-coverts.

49. **Ninox rudolfi** A. B. Meyer.

See *Ibis*, 1882, p. 232, Pl. VI.

Two *females* of this beautiful owl.

Wing 225–230 mm. "Iris deep brown; cere partly bluish, partly yellowish; beak dull bluish white, commissure and tip blackish; feet dull ochreous."

50. **Strix flammea** L.

One skin, sex uncertain, above greyish; tail pale buff, with blackish bars, below

white; underside white with not very many small blackish spots. Wing 256 mm. Although of a very pale colour, this bird does not seem separable from *S. formosa typica*.

51. **Astur torquatus** (Temm.).

♂ ad. Wing 216 mm. Broad rufous collar, intermixed with some brownish grey feathers on the hind-neck. "Iris pale orange-ochre; feet ochreous; cere greenish yellow; maxilla black, laterally slaty blue at base; mandible slate-blue with brownish tip."

52. **Cerchneis moluccensis occidentalis** Mey. & Wigl.

Two *females*, both very typical *occidentalis*. "Iris dark brown; beak slaty blue, tip blackish; ceres and eyelids yellow; feet ochreous, claws black."

53. **Osmotreron teysmanni** Schleg.

Schlegel described an adult specimen, evidently a *male*, of this bird in *Notes Leyden Mus.* I. p. 103. A detailed description is given in *Cat. B. Brit. Mus.* XXI. p. 55. Doherty sent one *female* only. The pale yellow face characterises it very well. The mantle is dark green; rump and upper tail-coverts yellow-green; the shoulders greyish towards the edge. Otherwise the specimen agrees with the description of the type, which was evidently a *male*. Wing 159 mm. "Iris pale slaty grey; beak pale yellowish, base olive-green; feet pinkish purple, soles yellowish."

*54. **Ptilinopus dohertyi** Rothsch.

(Plate XII.)

This most beautiful pigeon has been well described by Mr. Rothschild in *Bull. B. O. C.* V. p. 46, and is figured on Plate XII. Only one adult *male* was procured in the state of *Tuimanu*. The inner primaries of this species are on the tip as broad as in the middle, the outer web is cut off quite straightly, while the inner web is deeply sinuated. The first primary is not abruptly attenuated on the apical portion. It seems, therefore, not to fit in any of the sections of the genus *Ptilinopus*, made by Salvadori on p. 70 of his catalogue.

55. **Ptilinopus melanocephalus** (Forst.).

Quite a series from Sumba. Tip of beak and eyelids gamboge-yellow. "Iris pale yellow; feet magenta."

56. **Carpophaga aenea** (L.).

Two *females* from Sumba, resembling those from Sambawa.

57. **Turtur tigrinus** (Temm.).

Two specimens from Sumba do not differ from typical *T. tigrinus*.

*58. **Geopelia maugei** (Temm.).

A good series from Sumba. ♂. "Eyes pale canary-yellow; feet purple-brown in front, slaty bluish behind; skin round eye orange-yellow; beak slaty blue."

Specimens from Sumba are like those from Sambawa. In some of them the black bars below reach farther down, nearly the whole abdomen being covered with them, but others are exactly like Sambawa skins.

*59. **Chalcophaps indica** (L.).

Common in the plains.

*60. **Tringoides hypoleucus** (L.).

One *female*.

*61. **Aegialites dubia** (Scop.).

One *female*.

*62. **Dendrocygna arcuata** (Horsf.).

♂. "Beak all black; feet dull slaty grey; eyes deep brown."

63. **Nettion gibberifrons** S. Müll.

♂. "Iris rich maroon-brown; beak pure slate-blue; maxilla with two terminal black spots, a lateral black streak at the angle; mandible with terminal third flesh-colour; feet dull grey."

LIST OF A COLLECTION OF BIRDS MADE IN LOMBOK BY MR. ALFRED EVERETT.

By ERNST HARTERT.

(*With Notes on Lombok by A. Everett.*)

A FEW months after the arrival of Mr. Doherty's Lombok collection, the Tring Museum received also a magnificent collection of birds from Northern Lombok, collected from May to the beginning of July. They are, as might be expected from an "old hand" in bird-collecting, better looking skins than those received from Mr. Doherty, whose first collection it was, although Mr. Everett had quite new men without experience, who had everything to learn—his old men, who had been with him to Celebes, Djampea, Kalao, etc., having struck for higher wages than he was prepared to pay.

In the following pages a full list of Everett's collection is given. His "Notes on Lombok" are printed in full, and his notes on the birds added to the single species. All Everett's notes are enclosed in quotation marks. The species not known from Lombok before have an asterisk. Where the species has been spoken of in the foregoing article on Lombok the page is quoted.

Notes on Lombok.

"There exists no regular survey of Lombok, but one has recently been commenced by the Dutch Government, which, since the late expulsion of the Balinese Rajah, has undertaken the direct administration of the island. Its main geographical features are, however, sketched in with approximate accuracy, though on a very small scale, in Part I. of the Admiralty chart of the western portion of the Indian Archipelago.

"Lombok,* or Tanah Sasak as it is commonly called by the natives—Lombok applying only to the place of that name on the eastern shore—is roughly square in form, with a mean length and breadth of about forty miles. It is traversed from west to east by two mountain ranges, of which the northern is wholly volcanic, culminating in Rinjani Peak, one of the highest points in the Archipelago, whereas the southern range is said to be of recent calcareous formation, and is of very moderate elevation, probably not attaining 3000 feet at its highest portion. The two ranges are separated by an extensive undulating plain interspersed with some low volcanic hills. The whole of this plain, together with the mountain slopes up to about 2000 feet, is, or has been, under high cultivation, chiefly for rice on the irrigation system, so that there is little, if any, of the original vegetation left; and thus the primitive forests of the two ranges are entirely disconnected with each other, and have been so probably for a very long time, except for an abundance of fruit plantations and patches of second growth scrub.

"The altitude of Rinjani Peak has been given variously at 12,460 feet (Admiralty chart, 1888) and 11,810 feet (E. A. Directory, 1893). The summit appears to be roughly some 1500 feet higher than that of any of the other of

* Partly compiled from the Eastern Archipelago Directory (ed. 1893).

the ring of mountains which together with it enclose the main crater of the volcano; and this higher part, which is bare of vegetation, is very steep. A thin vaporous smoke is always sluggishly drifting from a crater on the top, but I could not learn that there had been any regular eruption within the memory of the natives, only that the amount of smoke emitted varied considerably from time to time. The main crater is extinct, and it is now filled with a lake of tepid deep green water, which is known as the Segara Anak. It was viewed by my assistant, Mr. J. M. Dumas, from the Sengkarien summit, which is next in height to Rinjani Peak, and forms part of the southern lip of the crater, and he also visited its shore from the northern side, where it was possible to gain access to it by the stream, the Sungei Putih, which carries off its overflow to the sea in the north-eastern corner of the island. He roughly estimated the expanse of water to extend some two miles in a north-west and south-east direction, with a breadth of about one mile and a quarter. The Sungei Putih almost immediately after its egress from the lake becomes of a milk-white colour, and there are hot springs at the spot. Some of the water brought down had a strong smell of sulphuretted hydrogen with a marked astringent taste. The interior of the crater is more or less clothed with grass and with scattered Casuarina trees, while the only kind of vegetation noticed in the lake itself consisted of a grass with long, broad, flat leaves. No sign of fish was observed, but three species of mollusca (*Melania*, *Paludina*, *Corbula*) were plentiful. The only land-birds seen at the lake were *Ptilotis virescens* and *Glyciphila ocularis*, but a large duck was present in abundance. Owing to the fact that my aneroid could not be trusted beyond 4500 feet, it was unfortunately impossible to ascertain the altitude of the lake. A small cone of black stones and sand about 400 feet in height rises from the margin of the lake. Vapour was being emitted continually from the top, and from time to time the stones and sand were seen to be in motion down the steep sides.

"The southern range of mountains I was unable to visit in consequence of some trouble having arisen between the Government and the Sasaks in that quarter.

"The climate of Lombok is much drier than that of Java. On the coast and lowlands it probably does not differ greatly from that of Bali and Sambawa. Records kept over a short series of years at Beliling (height of observing station 656 feet) in the former island give a mean annual rainfall of only 44·8 inches, and at Bima in the latter island (at sea-level) of 47 inches. Above 1000 feet the fall must be much heavier, as I experienced several heavy falls in May and June at 1500 feet, though the south-east monsoon was blowing steadily and the dry season well set in, and at 4000 feet it rained or drizzled every day on the southern slope of the volcano. The northern slope, however, appears to be much drier and warmer, and the highland plants come farther down on that side. At 1500 feet the lowest night temperature observed was 64° Fahr. At 2400 feet the extremes of day and night temperature were 68° and 56° respectively, and at 4200 feet 61° and 52°. These altitudes were taken with an aneroid, and are sufficiently accurate for judging of the vertical range of the birds. The other altitudes which appear on the labels of my specimens in this collection must be regarded as still more approximate.

"There does not appear to be any distinctively highland avifauna in Lombok, and although a few species which occurred on the mountain were not met below,

I feel nearly sure that there is no bird that is found above 4000 feet which would not also be found at 2000 feet, where the old forest ends, if looked for long enough. If this be really the case, it may be surmised that it is due to the fact that the island is probably one of the most recently built up of those forming the Timorese group, and to its never having been in actual connection with the islands to the east and west of it—a conclusion which is confirmed by the character of the mammalian fauna, so far as it is known. Of *Quadrumana* there are two species, *Macacus cynomolgus* and *Semnopithecus maurus* of Java—the latter certainly introduced by the Balinese Rajahs and now abundant in the hills from Ampenan to Rinjani. Of *Carnivora* there appear to be three kinds, called respectively by the Sasaks *Ujat*, *Rasih*, and *Mumah*, the first two being by their description a *Paradoxurus* and a *Viverra*, and the third either *Felis bengalensis* or a feral domestic cat. Among the *Chiroptera* there are found *Pteropus* (2 sp.), *Megaderma*, *Rhinolophus*, *Kerivoula*, and other genera. The *Rodentia* are represented by two rats and a mouse (and perhaps other *Muridae*), and a porcupine, *Hystrix javanica* without doubt. Of *Ungulata* the island has a deer and *Cervulus muntjac*—the latter introduced by the Balinese Rajahs and now common. Zollinger, I think, mentions the Pelandok (*Tragulus*) also as existing in Lombok, but I could hear nothing of it. Wild pig, of course, abound, but I do not know of what species. In this scanty list, omitting the bats, the greater portion may have owed their existence in the island to their introduction by human agency direct or indirect. The presence of the porcupine, however, scarcely admits of this explanation. It is, found also in Flores, Djampea, and South Celebes, so that it seems to have some exceptional means of dispersal. Possibly its armature of quills serves to buoy it, and thus enables it to be drifted by the strong currents which characterise these narrow straits and sea to distances which would be fatal to other, and even swimming, mammals not similarly aided in keeping afloat."—A. Everett.

"*August 2nd*, 1896."

1. *Pratincola caprata* (L.).—Both sexes from Ampenan (p. 555).
2. *Geocichla horsfieldi* (Bp.).—One *male* in full moult from a place called Soukarean, 5000 feet high (p. 555).
3. *Geocichla andromedae* (Temm.).—A number of young birds only, mostly from about 1500 feet. "Iris chocolate-brown; bill dusky or slaty black: legs greyish brown" (p. 555).
4. *Geocichla dohertyi* Hartert (p. 555).—A fine series, old and young ones, from 1500 to 4000 feet.
5. *Geocichla interpres* (Temm.).—A very fine series of old and young birds. Adult: "Iris chocolate; bill very dark brown; legs pinky white, claws pale horn-brown." The young resembles the young of *G. dohertyi*; but the slaty grey, not deep black, tail, and the brownish, not chestnut-rufous, rump, distinguish it even in the youngest age (p. 556).
6. *Brachypteryx leucophrys* (Temm.).—3000 to 4000 feet and below (p. 557).
7. *Cisticola cisticola* (Temm.).—(p. 557).
8. *Orthotomus sepium* Horsf.—At 1200 and 1500 feet (p. 557).

*9. *Acrocephalus longirostris* Gould.—Two skins of an *Acrocephalus* agree in every respect with the type of *A. longirostris* Gould from Australia. They are certainly not *A. australis*, which has been recorded from Lombok, but was not found there either by Everett or Doherty. "Very abundant among the

reeds which fringe the backwaters just inside the sandy coast at Ampenan, and also in the bamboo clumps and thick herbage on the banks of the river."

10. *Parus atriceps* Horsf.—1500 to 4500 feet (p. 557).
11. *Dicaeum mackloti* Müll. & Schleg.—A fine series from the low country up to 2400 feet. A nest was found on May 27th at Tete Batu, 1500 feet high. It is of the shape of a large egg, about 90 mm. long and from 55 to 60 mm. wide. It hangs down from a palm-leaf, to which it is fastened by some grasses on the top. Outside it consists of fine dry grasses and twiglets, inside of beautifully pure white vegetable silk. It contained two pure white eggs, measuring 16·2 : 12 mm. (p. 557).
12. *Cinnyris pectoralis* (Horsf.).—(p. 557).
13. *Zosterops citrinella* Bp.—From 3000 to 4500 feet (p. 557).
14. *Zosterops intermedia* Wall.—From 1500 to 2300 feet (p. 557).
15. *Ptilotis virescens* Wall.—Rare at 1500, common at 4000 and 4500 feet. "Iris brown, ophthalmic skin dull blue ; bill dusky black ; legs plumbeous, claws blackish grey" (p. 558).
16. *Stigmatops ocularis* (Gould).—A small series from 4000 to 6000 feet above the sea (p. 558).
17. *Philemon neglectus* (Büttik.).—From 4000 feet and below. ♂. "Iris olive-brown ; bill dark brown, maxilla nearly black ; bare skin of head sooty; legs dark plumbeous grey, claws dark brown" (p. 558).
18. *Pycnonotus analis* (Horsf.).—At 1200 and 1500 feet (p. 558).
19. *Anthus rufulus medius* (Wall.).—1200 feet and below (p. 558).
20. *Mirafra horsfieldi parva* (Swinh.).—One *male*, like the one from Sambawa mentioned before, p. 568, but the wing 74 mm. New to Lombok.
21. *Chlorura intermedia* Hartert (p. 558).—A fine series from 1500 to 3000 feet. Adult : "Bill jet-black ; iris brown ; legs flesh-red, claws brown."
22. *Munia punctulata nisoria* (Temm.).—1000 to 2500 feet (p. 559).
23. *Munia leucogastroides* Horsf. & Moore.—1000 to 2500 feet (p. 559).
24. *Munia wallacei* Sharpe.—Low country (p. 559).
25. *Munia pallida* Wall.—Low country (p. 559).
26. *Munia oryzivora* (L.).—Ampenan.
27. *Taeniopygia insularis* (Wall.).—Lower country (p. 559).
28. *Coturnix minor* (Bp.).—Low country to 2300 feet (p. 559).
29. *Graucalica tertia* Hartert (p. 547).—A small series of both sexes from lower country. Exactly like the type from Bali. The slate-grey back of freshly moulted birds fades into a pale brown in time. ♀ and ♂ ad. "Iris brown : bare skin on sides of face bright chrome-yellow; beak chrome-yellow; legs paler yellow, claws horny yellowish." Wings: ♂, 127—133 mm.; ♀, 119—122 mm.
30. *Artamus leucogaster* (Valenc.).—Low country.
31. *Dicrurus cinereaceus wallacei* (Walden).—From elevations of 1500 to 4000 feet (p. 560).
32. *Chibia himalayensis* (Bp.).—From 1500 feet above the sea. "Iris crimson-lake." Wings 140—143 mm. Younger individuals are partly white below (p. 560).
33. *Oriolus broderipi* Bp.—From the shore up to 2300 feet. ♂ ad. "Iris crimson-lake ; bill dull rose-water ; legs light bluish plumbeous, claws blackish grey" (p. 560).
34. *Lanius hentet* Horsf.—(p. 560).

35. *Pachycephala grisola* (Bl.).—1500 to 4000 feet. ♂ ad. "Iris warm brown; bill black; legs bluish lead-grey, claws pale brown." Younger birds have the primaries outwardly edged with rusty rufous; quite young ones have a pale brown head and a dark striped breast (p. 560).
36. *Pericrocotus exsul* Wall.—Up to 3000 feet (p. 561).
37. *Lalage timoriensis* (S. Müll.).—Common (p. 561).
38. *Hypothymis azurea* (Bodd.).—1500 and 2300 feet (p. 561).
39. *Cryptolopha tricirgata* (Strickl.).—1500 to 5000 feet. ♂ ad. "Iris olive-brown; bill sepia-brown, tip and base of mandible ochreous yellow; legs bluish grey, claws dark grey." Wing: ♂, 59–62 mm.; ♀, 55—56 mm. (p. 561).
40. *Muscicapula westermanni* Sharpe.—4000 and 6000 feet (p. 561).
41. *Muscicapula hyperythra* (Bl.).—2000 to 6000 feet (p. 561).
42. *Erythromyias dumetoria* (Wall.).—A magnificent series from 1500 feet above the sea. ♂. "Iris chocolate; bill black; feet purplish grey, claws horn-grey." ♀. "Iris dark brown; bill brownish black; legs and claws pale lilac-grey" (p. 561).
43. *Hirundo javanica* Sparrm.—Ampenan.
*44. *Hirundo striolata* Temm. & Schleg.—Ampenan.
45. *Pitta concinna* Gould.—A beautiful series from the low country and as high up as 3000 feet (p. 561).
46. *Collocalia linchi* Horsf. & Moore.—Two skins, no doubt this species. They were found nesting in rock-shelters 1500 feet above the sea. The nests are by no means edible, consisting of pale greenish yellow moss. Some nests contained two eggs each, hard-set, measuring 17·5 : 11·5 and 18 : 12 mm.
47. *Caprimulgus macrurus* Horsf.—Ampenan and at 1500 feet (p. 562).
48. *Caprimulgus affinis* Horsf.—A fine series. "These nightjars are common at Ampenan, frequenting the scrub and grass bordering the sandy shore, and often flying over the town on moonlight nights, uttering their peculiar cry—a shrill 'chŭweĕk,' totally unlike that of any of the other Eastern species of the genus with which I am acquainted. They were not heard at any of the inland stations."
49. *Iyngipicus grandis* Harg.—Low country and 1500 feet (p. 562).
50. *Eurystomus orientalis australis* (Sw.).—One skin.
51. *Monachalcyon fulgidus* (Gould).—A very fine series from 1500 to 4500 feet. "Iris, bill, and feet vermilion-red; claws brown" (p. 562).
52. *Halcyon australasiae* (Vieill.).—Low country and 1500 feet (p. 562).
53. *Halcyon chloris* (Bodd.).—From 1200 to 1500 feet (p. 562).
54. *Halcyon sanctus* (Vig. & Horsf.).—One *female*.
55. *Ceyx innominata* Salvad.—One *male* and two *females*.
56. *Merops philippinus* L.—One old *male*.
57. *Merops ornatus* Lath.—Two *males*, one with a little blue below the black spot on the throat, the other not.
58. *Cuculus poliocephalus* Lath.—From the plains up to 2500 feet (p. 562).
59. *Cacomantis threnodes* Cab.—From 1500 to 2000 feet (p. 562).
60. *Centropus javanicus* (Dumont).—Three young birds (p. 562).
61. *Trichoglossus mitchelli* Gray.—A fine series of this rare parrot, the home of which has been unknown until this year, from the mountains from 2500 to 6000 feet.

There is a good deal of variation in this bird. The middle of the abdomen, which is deep purple in fully adult birds of both sexes, is dark green in younger individuals. Such younger birds also have yellow edges on the red breast-feathers. Other younger birds have very distinct bluish and greenish edges to the red breast-feathers. One such bird has the "bill dark livid brown, tinged with dull reddish on base of mandible," while fully adult birds have the whole bill orange-red, with an orange-yellow tip. Some adult birds too show some amount of yellow on the breast (p. 562).

"Common between 2000 and 5000 feet, and one was seen not at less than 7000 feet. Probably it occurs also in the lowlands where there is any jungle left."

62. "*Trichoglossus haematodes* (?). An orange-yellow-breasted *Trichoglossus* is brought occasionally into Ampenan by the Sasaks from the hills, but I failed to obtain a specimen. One which I saw in captivity had the irides bright red; bill orange-red with the tip yellow; feet dark grey. This individual seemed to be adult and not to differ in coloration from *T. haematodes* of Timor—but possibly the red-breasted birds have a yellow stage?"

(Mr. Rothschild thinks it must have been a variety of *T. mitchelli*, such as the one mentioned last under that species, which Mr. Everett has seen, for he does not think it likely that both *T. mitchelli* and *T. haematodes* occur in the same island.)

63. *Cacatua parvula* (Bp.).—One pair. "The naked skin surrounding the eye is white. According to the natives the irides are dark chocolate-brown in the *male* and pure cherry-red in the *female*, and the dissection of one of the latter confirmed this statement" (p. 563).

*64. "*Eclectus* sp. incert.—A species of *Eclectus* is also sometimes brought into the town of Ampenan by the hill natives, who declare that it is not uncommon in places, and that it flies wild in the jungle. I saw only one brought in, a green *male*, which the owner said he had kept for five months. It was much damaged, the wings and the under tail-coverts especially so, and the tail a good deal abraded. The general colour was bright grass-green; primaries dark blue on outer edges; edge of wing pale blue; the under coverts of the wing-margin green, the rest with the axillaries and a moderate side-patch red; under tail-coverts very pale green; apical band of tail a good deal worn, but evidently not broad as in *E. riedeli*, the yellow colour slightly washed with traces of pale orange-red. Irides muddy Indian yellow; bill scarlet, the basal half washed thinly with black, the apical third yellow; lower mandible dull black; feet and claws black. I think this bird was not quite mature. Whether this parrot is one of the more eastern species which has escaped from captivity or is an endemic species I could not satisfy myself, but if the latter it—or a representative form of *Eclectus*—may be confidently looked for in the islands between Lombok and the Tenimber Islands."

65. *Geoffroyus sumbaensis* Salvad.—Met with frequently in the hills from 2500 to 4000 feet. "Iris pale yellow; maxilla red with whitish tip; mandible dark brown; feet grey." Young birds have the feet olive-green. Old *males* have the wings 157—167 mm. long (p. 563).

*66. *Pisorhina albicentris* Sharpe.—A series from the plains up to about 2000 feet

above the sea. They are quite like the type from Flores. "Iris golden yellow; bill brown; feet dull ochreous." "Common. Like the nightjars, they are heard chiefly when there is bright moonlight. The cry is a clear but not very loud 'pwok,' like that of *S. lempiji*, but somewhat different in tone. The owls were heard as high up the mountains as 4500 feet, and no other owl was heard or seen by my men."

67. *Cerchneis moluccensis occidentalis* Mey. & Wigl.—Three skins.

*68. (?) "*Falco melanogenys*.—I observed this bird several times at the village of Tetch Batu, but did not secure a specimen. On one occasion I was able to examine it pretty closely with a field-glass, and I have no doubt that it was the Australian bird. It was certainly not *F. ernesti*; and apart from its very dark cheeks, it could hardly be the northern peregrine on migration near the end of June."

*69. *Falco lunulatus* Lath.—One specimen only of this hobby was obtained at Baian at about 700 feet on the northern slope of Rinjani. This is, I think, the most western locality where this species has ever been found.

*70. "*Haliaëtus leucogaster*.—One or two were observed at Ampenan."

71. "*Haliastur intermedius*.—Seen occasionally both at Ampenan and up to about 2000 feet on the mountains. The diurnal birds of prey are conspicuous by their paucity of individuals in Lombok according to my observation, *Cerchneis moluccensis* being perhaps the species most abundantly represented."

*72. *Sphenocercus korthalsi* (Temm.).—One adult *male* of this rare pigeon, which is only known from Java and Sumatra, has been sent from Rindjoni, Bendera, 4000 feet high.

73. *Osmotreron vernans* (L.).—One *male* (Vorderman, p. 350).

74. *Ptilinopus melanocephalus* (Forst.).—2500 feet (p. 563).

75. *Ptilinopus albocinctus* Wall.—A fine series from the low country up to about 4000 feet. "Iris bright red; beak greenish at base, yellow at tip; feet bright red" (p. 563).

76. *Carpophaga sasakensis* Hartert (p. 564).—A fine series from 2500 to 4000 feet on the northern flanks of Rinjani. ♂ and ♀. "Iris dark brown, orbital ring crimson; bill dull black; feet carmine, claws brown." The *males* are lighter than the *females*. Wing of *males*, 229—237 mm.; of *females*, 216—225 mm.

*77. *Carpophaga aenea* (L.).—"The two *male* specimens which I send of this bird were obtained on the northern flank of Rinjani Mountain at 2000 feet. In both the bills were dull black with the apical portions pale grey; iris and ring round the eye red; feet purplish carmine. In neither was there any red about the bill. I did not see these birds in the flesh, but very shortly after the skins had been prepared and before the bill and feet were dry. These birds seem to me so different from the Bornean and Palawan *C. aenea* that I think perhaps they are some other species altogether."

I have inserted Mr. Everett's notes in full, as field-notes are always of interest; but I am unable to see how to separate the birds from *C. aenea*. The wings are somewhat long, measuring 243 and 245 mm.

78. *Columba metallica* Temm.—From 1500 to 4000 feet. "Iris orange; bill lake-red, tip horn-yellow; feet dull carmine." Wings 220—243 mm. (p. 564).

79. *Macropygia emiliana* Bp.—1500 to 2000 feet (p. 564).

80. *Turtur bitorquatus* (Temm.).—(p. 564.)

81. *Tartur tigrinus* (Temm.).—(p. 564.)
82. *Chalcophaps indica* (L.).—(p. 564.)
83. *Geopelia striata* (L.).—Two *females*.
*84. "*Excalfactoria chinensis* (L.).—Button-quail apparently of this species were seen in the high grass of the abandoned rice-fields."
85. *Gallus gallus* (L.).—♂ ♀, lowlands and 4000 feet high (p. 564).
86. "*Gallus varius* (Shaw & Nodd.).—I did not procure any specimens of this jungle fowl, but it is not infrequently brought into Ampenan by the Sasaks for sale, and one of my men saw one crossing the road in the middle of the island" (p. 565).
87. *Megapodius duperreyi* Less. & Garn.—Adult and chick. "Although true Megapodes frequent the hills in Mindanao and in Bouru, I suspect that the occurrence of a bird of this genus at an elevation so high as 3000 feet is an unprecedented record. No mounds were met with, although the age of the young bird seems against the probability of its having travelled up from the coast. The coloration of the soft parts was similar to that of the Djampea birds; but in the specimen obtained near Ampenan the legs were entirely pure deep orange, the upper surface of the toes being dark brown."
*88. "*Butorides javanica* (Horsf.).—One seen at the mouth of the Ampenan River."
89. *Ardeola speciosa* (Horsf.).—One skin.
*90. *Ardetta cinnamomea* (Gm.).—One skin.
91. *Ardea novaehollandiae* Lath.—Two skins (p. 565).
*92. *Phalacrocorax sulcirostris* (Brandt.).—One *male* from Ampenan. "Iris green."
*93. *Phalacrocorax melanoleucus* (V.).—One *female* from Ampenan. "Iris green."
*94. *Anas superciliosa* (Gm.).—One *male* from Segora Anak Lake in the crater of the Rinjani.

Further:—

95. *Corcus macrorhynchus* subsp. ?.—Two specimens from Lombok seem to differ from *C. macrorhynchus* from other countries. A large material must be studied before judging finally of the probably numerous local forms of these crows.
*96. *Baza reinwardti* (Temm.).—One *male* from an elevation of 1500 feet. "Iris golden yellow; bill black, basal half lead-grey; feet white, claws blackish."
*97. *Milvus migrans affinis* (Gould).—One skin.
*98. *Circaëtus gallicus* (Gm.).—One *male* from 1500 feet, shot in the latter half of May!!! "Iris golden yellow; bill black, basal half and cere light bluish lead; legs whitish, claws black."
*99. *Macropygia ruficeps orientalis* Hart. (p. 573).—One *male*, 2500 feet. Like *males* from Sambawa. Wing 148 mm.
*100. *Rallina fasciata* (Raffl.).—One *female*, 1500 feet. "Iris blood-red; bill blackish, mandible plumbeous; orbital ring and legs coral-red; claws light brown."
*101. *Dissura episcopus* (Bodd.). One *male*.
102. *Turnix powelli* Guillemard.—Two *females*—iris white, bill and feet greenish yellow—and one *male* from low country near Ampenan. They quite agree with the specimens from Satonda, *antea*, p. 576.
103. *Aegialites peronii* (Temm.).

Besides the species found in Lombok by Doherty and Everett, the following are mentioned in Wallace's and Vorderman's lists: *Sula piscatrix* (Vorderm.), *Fregata aquila* (V.), *Gallinula chloropus* (Wallace), *Charadrius fulvus* (V.), *Dicaeum flammeum* (V., but not stated whether skins were procured! Probably an error!), *Alcedo beryllina* (W. and V.), *Polargopsis gurial floresiana* (as Wallace got *floresiana* in Lombok as well, there is not the slightest probability that Vorderman's *sasak* is a different "subspecies" [*sic*]), *Eudynamis orientalis* (W.), *Strix flammea* (W.), *Astur approximans* (W.), *A. wallacei* (W.).

CONCLUSIONS.

The collections made by Messrs. Doherty and Everett in Bali, Lombok, Sambawa, Satonda, and Sumba, registered in the foregoing pages, throw much new light on the geographical distribution of the birds in the Eastern Archipelago. Without presuming that they settle any questions finally, I believe we can draw the following conclusions from the material now known:—

1. Although zoologists have lately, in several instances, denied the great importance of "Wallace's line," and although Doherty's and Everett's collections show that many more Javanese forms have crossed the Lombok Straits over to Lombok, and many more Timorese forms have crossed the Straits over to Bali, than we formerly knew, the differences between the ornis of Bali and Lombok are remarkably conspicuous, and indeed much more so than those between the ornis of Lombok and Sambawa, or Sambawa, Flores, and Sumba.

2. The fauna of the higher peaks is very poor, which seems to point to the fact that these islands are geologically younger than the larger islands with their rich mountain fauna.

3. The forms from the higher regions are apparently more Malayan than Australian. This seems to indicate that the Indo-Malayan are not the later immigrants, as in that case they would have driven the original Australian fauna back towards the hills. Probably the Indian forms inhabited these islands before the Australian ones, or immigrated at about the same time.

4. Bali's avifauna is *not entirely* the same as that of Java, although very few forms are differentiated.

5. Sumba's fauna is closely allied to that of Sambawa and Flores, but contains a fair number of peculiar forms.

I hope to be able to come back to these interesting questions more fully on a future occasion.

DESCRIPTIONS OF SOME NEW SPECIES OF *LEPIDOPTERA*, WITH REMARKS ON SOME PREVIOUSLY DESCRIBED FORMS.

By THE HON. WALTER ROTHSCHILD.

(Plates XIII., XIV., and XV.)

1. **Anaeomorpha splendida** Rothsch., Nov. Zool. 1894. p. 687.
(Pl. XIII. f. 1.)

In neuration this remarkable insect agrees with *Prepona* Boisd.; the first subcostal branches are free, as in *Prepona*, not united to the costal nervure, as in *Anaea* Hb.

2. **Macroglossa kiushiuensis** Rothsch., *l.c.* 1894. p. 66.
(Pl. XIII. f. 2.)

This is probably only a subspecies of *M. saga* Butl. from Yokohama.

3. **Theretra staudingeri** Rothsch., *l.c.* 1894. p. 76.
(Pl. XIII. f. 10.)

Mr. H. Druce, *Biol. Centr. Amer., Het.* II., 1896, p. 305, unites this and my *Th. stuarti* to *Th. docilis* Butl. I have personally not enough material to decide the question for myself.

4. **Panacra lifuensis** Rothsch., *l.c.* 1894. p. 79.
(Pl. XIV. f. 12.)

5. **Panacra griseola** Rothsch., *l.c.* 1894. p. 80.
(Pl. XIV. f. 13).

Although I have received a large series of both forms (*lifuensis* and *griseola*) from Lifu, Loyalty Islands, containing a good many specimens which agree exactly with neither type figured, I cannot unite the two forms, as I have no complete chain of intermediates.

6. **Xyleutes affinis** sp. nov.

This species is closely allied to *X. magnifica* Rothsch., but the large series of both in magnificent condition which are in the Tring Museum prove the differences to be very constant.

♂. Has the hindwing much darker brown-red, the antennae black instead of red, has a marginal row of brown spots on forewing at the ends of the nervures, and the submarginal row of blotches is more distinct.

♀. Ground-colour of forewing more yellowish grey, owing to the presence of a greater number of reddish scales, a row of marginal red-brown square spots at the

end of the nervures, and a submarginal row of large brown splashes, while in in *X. magnifica* the forewings are entirely uniform grey without markings. Hindwings also have minute spots at the end of the nervures, except at anal angle.

This species seems to vary more in size than *X. magnifica*, our largest ♂ having the forewing 64 mm. long and the smallest 44 mm.; in *X. magnifica* the largest ♂ has a length of 68 mm. and the smallest 61 mm. The largest ♀ of *X. affinis* has a length of 95 mm. and the smallest 62 mm., while our largest ♀ of *X. magnifica* has the forewing 102 mm. and the smallest 78 mm.

Hab. Brisbane District, Queensland.

7. **Xyleutes sordida** sp. nov.

Closely allied to *X. boisduvali* Rothsch., Nov. Zool. 1896. p. 232.

♀. *Upperside:* thorax dark smoky grey, instead of pale grey with black and white centre; fore-legs darker grey; metathorax and anal segment much darker; forewing also darker and more sooty grey. Spot on forewing at apex of cell almost obliterated, while in *X. boisduvali* it is distinct and large. Hindwings more sooty brown.

Underside: more uniform and darker.

Forewing: length, No. 1, 56 mm.; No. 2, 64 mm.
„ breadth, „ 22 „ ; „ 24 „

Hab. Brisbane District, Queensland; 2 ♀♀.

8. **Xyleutes lichenea** sp. nov.

Nearest to *X. pulchra* Rothsch., *l.c.* 1896. p. 232.

♀. *Upperside:* forewing brownish grey; between the median veins a network of black lines. From the base diagonally across the cell from costa to beyond median nervure runs a triangular dark patch made up of a number of irregular and transverse lines, most distinct near base and apex of cell. This patch is continued from near lower angle of cell obliquely upwards to the apex of the forewing; the submarginal portion of this dark patch is composed of confluent black blotches. On the apical half of the costa are a number of black dots.

Hindwing dull greyish brown; on the outer half are a number of indistinct transverse lines somewhat darker than the wing, one more distinct forming almost a submarginal lunulate band. End of veins of both fore- and hindwing end in square brown dots.

Fore-legs dark grey. Head and thorax brownish black. Hinder part of mesothorax greyer, with on each side a small black patch. Abdomen brownish black, with anal segment and a narrow median line grey.

Underside: grey washed with rufous; marginal area of both wings marked with a number of brown lines and spots.

Forewing: length, No. 1, 55 mm.; No. 2, 44 mm.
„ breadth, „ 21 „ ; „ 17 „

Hab. Brisbane District, Queensland: 2 ♀♀.

Of *X. pulchra* Rothsch. I have received two more ♀♀ much larger than the type; the three measure as follows:—

Forewing: length, No. 1, 57 mm.; No. 2, 51 mm.; No. 3, 39 mm.
„ breadth, „ 20 „ ; „ 19 „ ; „ 14 „

9. **Bunaea rendalli** sp. nov.

This new species, though somewhat similar to the ♂ of *B. alinda* Dru. in colour, differs from other *Bunaeas* in the shape of the wings, which are rounded as in the genus *Nudaurelia* Rothsch., Nov. Zool. 1895. p. 41.

♂. *Upperside:* forewing ochraceous rufous with a purplish tinge, except apical region, which is buffy orange, and the costa and outer-marginal line, which are clear orange. Hindwing ochraceous orange, with a broad purple ochraceous ill-defined area down the abdominal margin consisting of thick woolly scales; outer-marginal line orange; submarginal band pearl-grey, bordered inside with purplish red; 3 mm. inwards from the submarginal band there runs across the disc of the wing a transverse convex narrow band of blackish grey. In the centre of hindwing is an ocellus 5 mm. in diameter, which has an outer black ring, a pearl-grey centre with a tiny yellow dot in the middle of the grey.

Antennae brown; head yellow; thorax ochraceous rufous; abdomen banded buff and black.

Underside: orange ochraceous, purplish on body and basal half of wings.

Length of forewing 54 mm.

Breadth „ 29 „

Hab. Zomba, Upper Shiré River, 3000 feet, October to December 1895 (Dr. Percy Rendall *leg.*).

10. **Asota kinabaluensis** sp. nov.

(Pl. XV. f. 42.)

♂ ♀. Is closely allied to *A. contorta* Auriv., *Ent. Tidskr.* 1894. p. 179. f. 4, from Java, with which it agrees in the structure of the antennae and palpi (see p. 205 of this volume). It differs from that species in the much more extended white markings of the upperside of the forewing as shown in figure, the absence of a yellow basal area, the much broader and above not interrupted black border to the hindwing, the black costal border of the hindwing below; further in the exterior discal black spots of the hindwing being larger and standing closer to cell.

Hab. Kina Balu, N. Borneo; ♂ ♀ in coll. Dr. Staudinger.

Hypsidia gen. nov.

Belongs to the *Pyralidae* and is nearest to *Vitessa* Moore.

Palpi with the second joint upturned and fringed with hair in front, the third porrect, long and naked; maxillary palpi minute and filiform; frons rounded and thickly scaled; antennae laminate; hind tibiae with the outer spurs two-thirds length of inner. Forewing with the costa slightly arched; the inner margin very strongly lobed at middle and forming a continuous curve with outer margin; veins 1*a* and 1*b* forked; 3 from before angle of cell; 4, 5 well separated at origin; 7, 8, 9, 10 stalked, or 7 arising free, then connected with 8, 9, 10. Hindwing with vein 3 from before angle of cell; 4, 5 separate at origin; 6, 7 from upper angle; 8 free. Forewing of *male* with a large fovea below base of cell; a fold above inner margin containing a tuft of long hair on underside.

Type: *Hypsidia erythropsalis* sp. nov.

11. **Hypsidia erythropsalis** sp. nov.

♂. *Upperside:* forewing slate-grey; at the base a triangular crimson patch bordered with white; beyond this between costa and vein 1*b* is a large irregular blotch of white, the upper half occupied by a crimson patch. At the end of the cell is a crimson patch surrounded by a white ring. At the apex of the wing is a large patch of ochre-yellow, slightly marked with crimson on its inner edge. Between veins 3 and 4 is a large marginal patch of white, bordered outside with yellow and inside with crimson. On the disc between veins 1*b* and 2 and between veins 5 and 6 6 and 7, are three tear-shaped crimson splashes. From the base to one-third the length of the wing there extends between vein 1*b* and hindmargin an orange splash washed with crimson. Hindwing, basal half buffy white, purer white towards costa; disc crimson; outer margin ochre-yellow, merging into the crimson of disc.

Head and thorax ochre-yellow; patagia laterally slate-grey. Abdomen crimson, whitish towards base; anal segment slate-grey.

Underside: forewing, centre crimson; costa dark grey, washed at base with orange; apical and marginal patch same as above, only more whitish; rest of marginal area dark grey; beyond middle and beyond apex of cell are two white spots; inner-marginal area buffy white. Hindwing dirty buffy white; at apex of cell a crimson dot; on the disc between veins 2 and 5 a large black patch; above this are some faint indications of red spots.

Thorax and legs ochre-yellow; abdomen white, with a line of red dots on each side; tarsi blackish.

Female differs principally in having the markings of forewings more distinctly separated, the crimson of hindwings much more extended, and the mesothorax more distinctly washed with crimson.

Length of forewing: ♂, 25 mm.; ♀, 30 mm.
Breadth „ ♂, 10 „ ; ♀, 13½ „

Hab. Cedar Bay, 30 miles south of Cooktown, Queensland (A. S. Meek *leg.*).

INDEX.

END OF VOL. III.

Printed by Hazell, Watson, & Viney, Ld., London and Aylesbury.

EXPLANATION OF PLATES XIII., XIV., AND XV.

PLATE XIII.

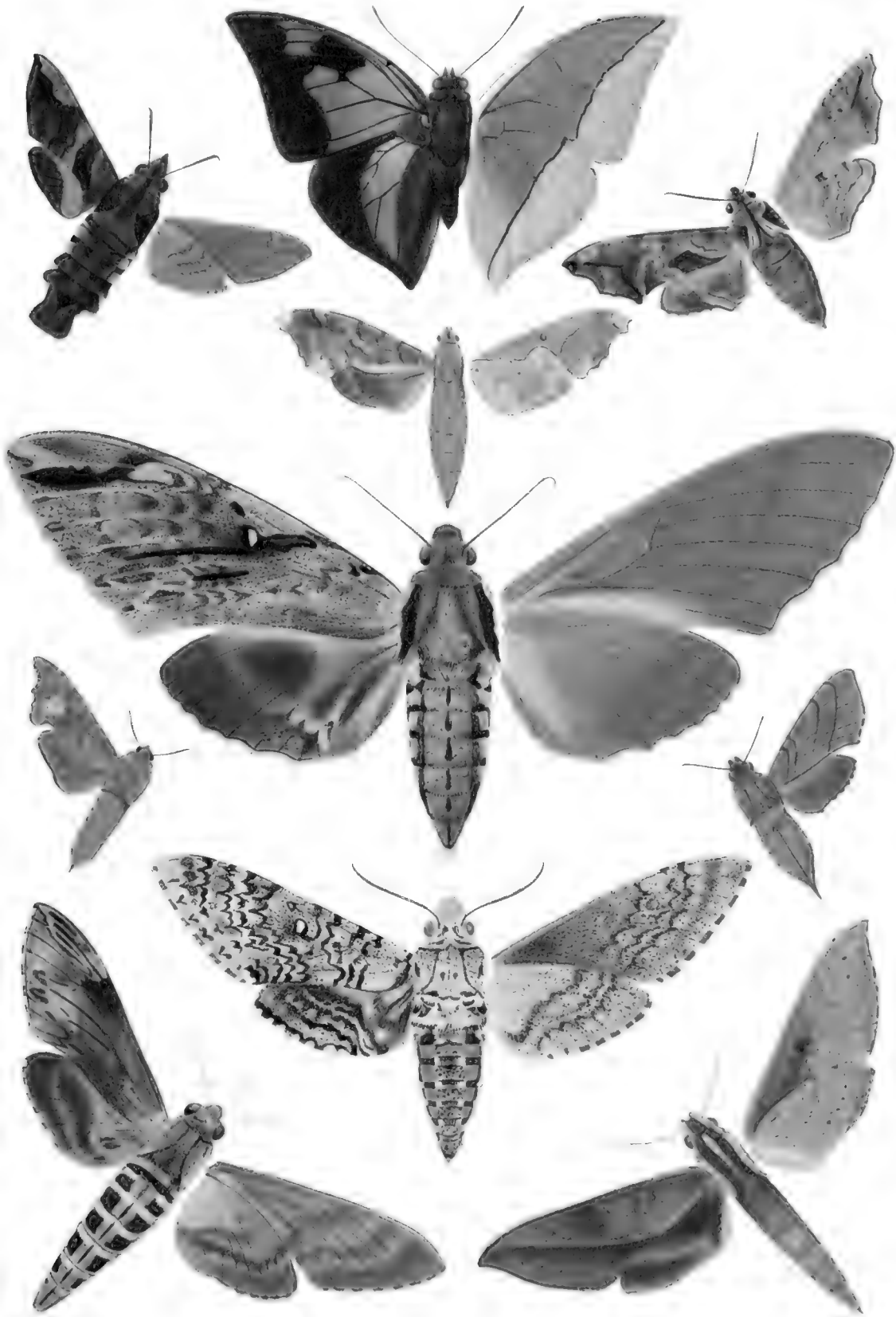
Fig. 1. *Anaeomorpha splendida* Rothsch., Nov. Zool. 1894. p. 687.
„ 2. *Macroglossa kinshiuensis* Rothsch., *l.c.* 1894. p. 66.
„ 3. *Pachygonia stuarti* Rothsch., *l.c.* 1896. p. 665.
„ 4. *Cypa mirabilis* Rothsch., *l.c.* 1894. p. 542.
„ 5. „ *perversa* Rothsch., *l.c.* 1895. p. 28.
„ 6. *Meganoton cocytioides* Rothsch., *l.c.* 1894. p. 89.
„ 7. *Callioma drucei* Rothsch., *l.c.* 1894. p. 73.
„ 8. *Phlegethontius stuarti* Rothsch., *l.c.* 1896. p. 22.
„ 9. *Sphinx fasciatus* Rothsch., *l.c.* 1894. p. 94.
„ 10. *Theretra staudingeri* Rothsch., *l.c.* 1894. p. 76

PLATE XIV.

„ 11. *Theretra obliterata* Rothsch., *l.c.* 1894. p. 75.
„ 12. *Panacra lifuensis* Rothsch., *l.c.* 1894. p. 79.
„ 13. „ *griseola* Rothsch., *l.c.* 1894. p. 80.
„ 14. *Angonyx boisduvali* Rothsch., *l.c.* 1894. p. 82.
„ 15. *Isbarta pandemia* Rothsch., *l.c.* 1896. p. 56.
„ 16. *Histia nivosa* Rothsch., *l.c.* 1896. p. 56.
„ 17. *Rothia lasti* Rothsch., *l.c.* 1896. p. 45.
„ 18. „ *simplex* Rothsch., *l.c.* 1896. p. 44.
„ 19. *Mimeusemia perakana* Rothsch., *l.c.* 1896. p. 50.
„ 20. *Arrothia bicolor* Rothsch., *l.c.* 1896. p. 46.
„ 21. *Metagarista* (?) *rendalli* Rothsch., *l.c.* 1896. p. 97.
„ 22. *Crinocula kinabaluensis* Rothsch., *l.c.* 1896. p. 36.
„ 23. *Godasa rufodiscalis* Rothsch., *l.c.* 1896. p. 47.
„ 24. *Crinala mimetica* Rothsch., *l.c.* 1896. p. 36.
„ 25. *Ophthalmis basalis* Rothsch., *l.c.* 1896. p. 50.

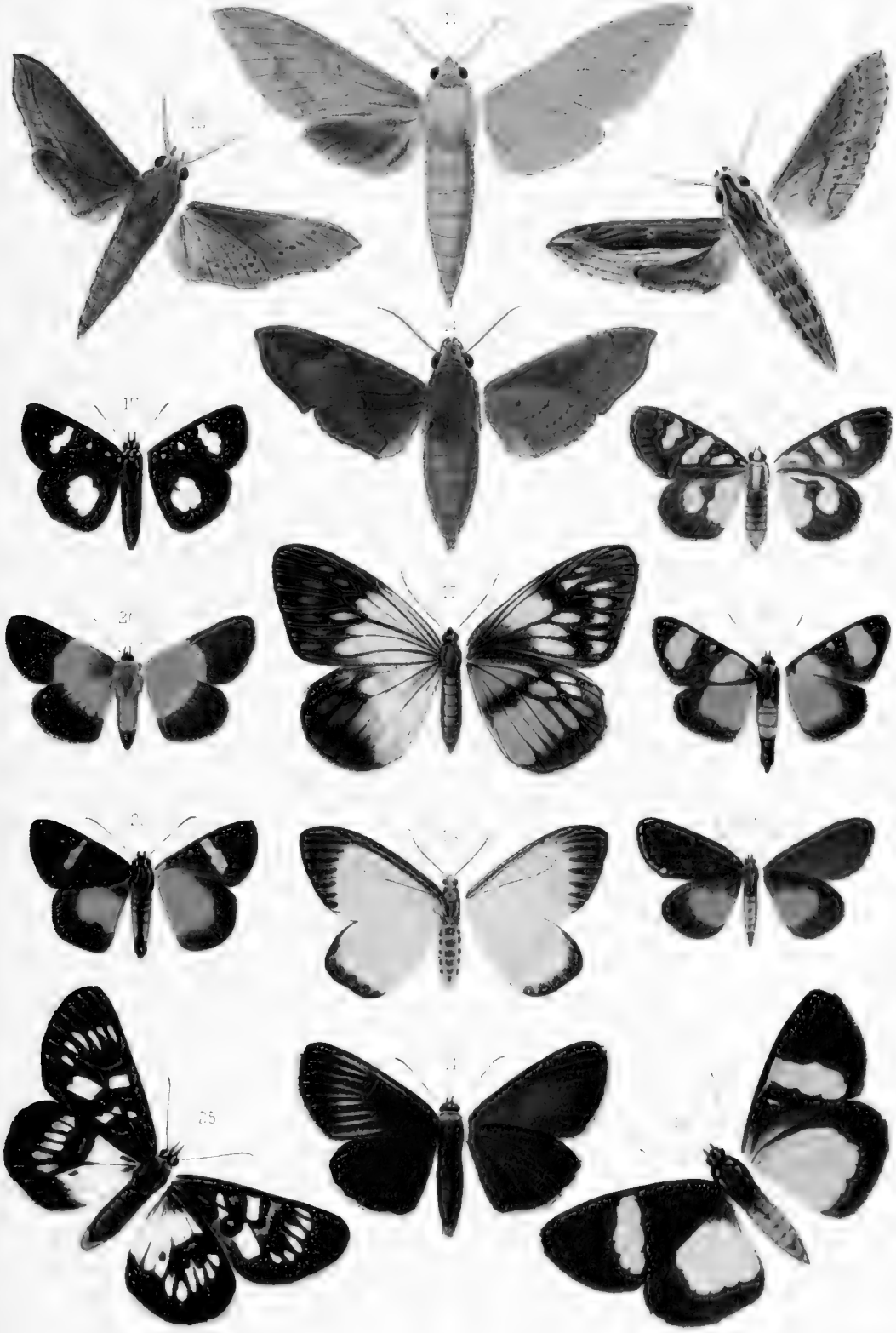
PLATE XV.

„ 26. *Episteme conspicua* Rothsch., *l.c.* 1896. p. 29.
„ 27. *Aegocera dispar* Rothsch., *l.c.* 1896. p. 43. ♂.
„ 28. „ „ „ „ „ „ ♀.
„ 29. *Phalaenoides maculosus* Rothsch., *l.c.* 1896. p. 94.
„ 30. „ *inconspicua* Rothsch., *l.c.* 1896. p. 49.
„ 31. „ *goldiei* Druce, *Ann. Mag. N. H.* (6). XIV. p. 21 (1894)
„ 32. *Agarista timorensis* Rothsch., *l.c.* 1896. p. 48.
„ 32*a*. *Rothia nigrescens* Rothsch., *l.c.* 1896. p. 45.
„ 33. *Pygnodontis orata* Rothsch., *l.c.* 1896. p. 98.
„ 34. „ *pulverosa* Rothsch., *l.c.* 1896. p. 98.
„ 35. *Laquea argentata* Druce, *l.c.* (6). XIV. p. 23 (1896) from Jamaica.
„ 36. Caterpillar, young, of same, dorsal view.
„ 37. „ „ „ „ lateral view.
„ 38. „ of same nearly full grown, dorsal view.
„ 39. „ „ „ full grown, dorsal view.
„ 40. „ „ „ „ „ lateral view.
„ 41. *Papilio canopus sumbanus* Rothsch., *l.c.* 1896. p. 231.
„ 42. *Asota kinabaluensis* Rothsch., *l.c.* 1896. p. 602.

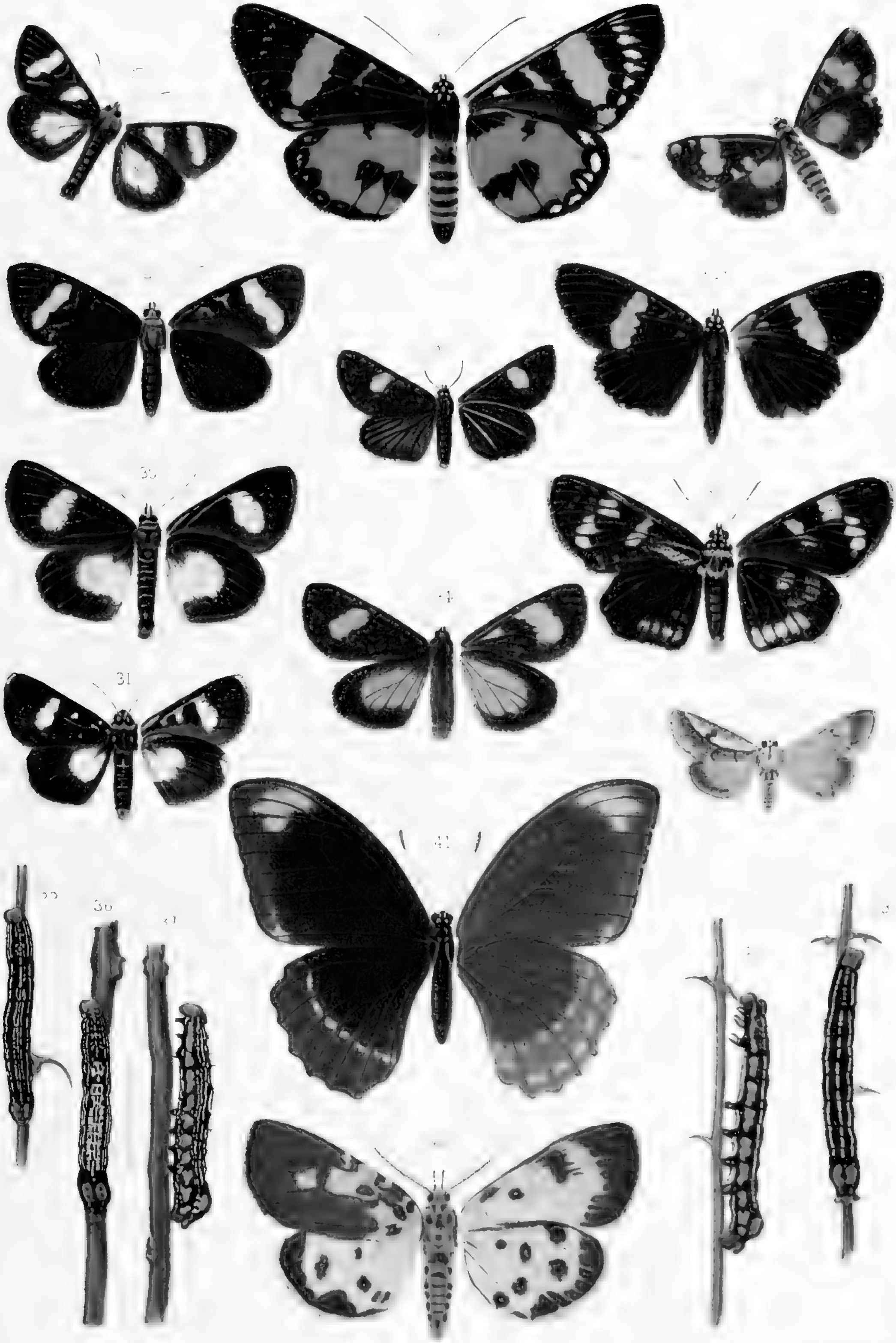


W. Purkiss jun.

Litho. W. Greve, Berlin.



W. Purkiss pinx.



W. Purkiss pinx


1
16
2
17
3
4
18
19
20
8
21
12
28
29
30
44
45
31
46
32
33
34
47
35
36
48.
37
38
49
39
40
41
50
42
43

EXPLANATION OF PLATES XVI.—XIX.

PLATE XVI.

Fig. 1. Valve with harpe of *P. aegeus ormenus* from Dorey.
„ 2. Harpe of „ „ „ „ „
„ 3. „ „ „ „ „ „ „
„ 4. „ „ „ „ „ „ „
„ 5. „ „ „ „ „ „ „
„ 6. „ „ „ „ „ „ Sattelberg, near Finschhafen.
„ 7. „ „ *P. aegeus aegeus* from Cairns.
„ 8. „ „ „ „ „ „ „
„ 9. „ „ „ „ „ „ Cedar Bay, 30 miles south of Cooktown.
„ 10. „ „ „ „ „ „ Queensland.
„ 11. „ „ „ „ „ „ N. S. Wales.
„ 12. „ „ *P. inopinatus* from the Tenimber Islands.
„ 13. Valve with harpe of *P. tydeus* from Halmaheira.
„ 14. Harpe of „ „ „ „
„ 15. „ „ „ „ „ Batjan.
„ 16. „ „ „ „ „ Halmaheira.
„ 17. Valve with harpe of *P. polytes polytes* from Kumaon.
„ 18. Harpe of „ „ „ „ „
„ 19. „ „ „ „ „ „ Bankipore.
„ 20. „ „ „ „ „ „ Bassein, Burma.
„ 21. „ „ „ „ „ „ „ „
„ 22. „ „ „ „ „ „ Loo Choo Islands.
„ 23. „ „ „ „ „ „ „ „ „
„ 24. „ „ „ „ „ „ Bunguran, Natuna Islands.
„ 25. „ „ „ „ „ „ „ „
„ 26. „ „ „ „ „ „ „ „ „
„ 27. „ „ *P. polytes nikobarus* from the Andaman Islands.
„ 28. „ „ *P. polytes theseus* from the Kina Balu, N. Borneo.
„ 29. „ „ „ „ „ „ Java.
„ 30. „ „ „ „ „ „ Dili, Timor.
„ 31. Valve with harpe of *P. polytes alphenor* from Mindoro.
„ 32. Harpe of „ „ „ „ „
„ 33. „ „ „ „ „ „ Mangiola, Sulla Islands.
„ 34. „ „ *P. polytes alcindor* from Tombugu, E. Celebes.
„ 35. „ „ *P. polytes perversus* „ Talaut.
„ 36. „ „ *P. polytes nicanor* „ Halmaheira.

PLATE XVI.—*continued.*

Fig. 37. Harpe of *P. ambrax ambrax* from German N. Guinea.
„ 38. Valve and harpe of *P. ambrax ambrax* from German N. Guinea.
„ 39. Harpe of *P. machaon flavus* from Cambridge, England.
„ 40. „ „ „ „ „ „ „ „
„ 41. „ „ „ „ „ „ „ „
„ 42. „ „ *P. machaon sphyrus* „ Syria.
„ 43. „ „ „ „ „ „ Palestine.
„ 44. Uncus of *P. machaon flavus* „ Cambridge.
„ 45. „ „ *P. machaon machaon* from Switzerland.
„ 46. Harpe of *P. bathycles bathycles* „ Java.
„ 47. „ „ *P. bathycles bathycloides* from S. E. Borneo.
„ 48. „ „ *P. bathycles chiron* from Shillong, Assam.
„ 49. „ „ „ „ „ „ Sikkim.
„ 50. „ „ „ „ „ „ Shan States.


3
74
5
76
65
80
81
83
82
84
85.
86
87
88.
89
90
91.
92
93
97
98
99
101
100
103
102

PLATE XVII.

Fig. 51. Valve with harpe of *P. euchenor euchenor* from Stephansort, German N. Guinea.
„ 52. Ventral ridge of harpe of „ „ „ „ „ „ „ „
„ 53. „ „ „ „ „ „ „ „ „ „ „ „
„ 54. „ „ „ „ „ „ „ „ „ Simbang. „ „ „
„ 55. „ „ „ „ „ *P. euchenor obsolescens* from Aru.
„ 56. „ „ „ „ „ „ „ „ „
„ 57. „ „ „ „ „ „ „ „ „ Kei.
„ 58. „ „ „ „ „ *P. euchenor goluri* „ Woodlark Island.
„ 59. Apical ridge of harpe of *P. euchenor euchenor*, ad figs. 51 and 52.
„ 60. „ „ „ „ „ „ „ „ ad fig. 53.
„ 61. „ „ „ „ „ „ „ „ ad fig. 54.
„ 62. „ „ „ „ „ *P. euchenor obsolescens*, ad fig. 56.
„ 63. „ „ „ „ „ „ „ „ ad fig. 55.
„ 64. „ „ „ „ „ „ „ „ ad fig. 57.
„ 65. Valve with harpe of *P. depilis depilis* from Neu Pommern = New Britain.
„ 66. Ventral ridge of harpe of „ „ „ „ „ „ „ „
„ 67. „ „ „ „ „ „ „ „ „ „ „ „ „
„ 68. „ „ „ „ „ *P. depilis novohibernicus* { from Neu Mecklenburg = New Ireland.
„ 69. „ „ „ „ „ „ „ „ { from Neu Mecklenburg = New Ireland.
„ 70. Apical ridge of harpe of *P. depilis depilis*, ad fig. 66.
„ 71. „ „ „ „ „ *P. depilis novohibernicus*, ad fig. 69.
„ 72. Valve with harpe of *P. aristeus anticrates* from Assam.
„ 73. Ventral ridge of „ „ „ „ „
„ 74. „ „ „ *P. aristeus hermocrates* from the Shan States.
„ 75. Dorsal lobe of valve of *P. aristeus anticrates*, ad fig. 72.
„ 76. „ „ „ „ „ *P. aristeus hermocrates*, ad fig. 74.
„ 77. „ „ „ „ „ „ „ „ from the Shan States.
„ 78. „ „ „ „ „ „ „ „ „ Kudat, N. Borneo.
„ 79. „ „ „ „ „ „ „ „ „ Palawan.
„ 80. „ „ „ „ „ „ „ „ „ „
„ 81. „ „ „ „ „ *P. aristeus aristeus* from Halmaheira.
„ 82. Valve with harpe of „ „ „ ad fig. 81.
„ 83. Ventral ridge of „ „ „ ad figs. 81 and 82.
„ 84. „ „ „ *P. rhesus* from S. Celebes.
„ 85. Dorsal lobe of valve of *P. rhesus*, ad fig. 84.
„ 86. Uncus of *P. aristolochiae aristolochiae* from Sikkim.

Fig. 87. Uncus of *P. aristolochiae aristolochiae* from Sikkim.
„ 88. „ „ „ „ „ „ „
„ 89. „ „ *P. aristolochiae austrosundanus* from Sambawa.
„ 90. „ „ „ „ „ „ „
„ 91. „ „ „ „ „ „ „
„ 92. „ „ *P. aristolochiae antiphus* from Bunguran, Natuna Islands.
„ 93. „ „ „ „ „ „ „ „
„ 94. „ „ „ „ „ „ „ „ „
„ 95. „ „ „ „ „ „ „ „ „
„ 96. Valve with harpe of *P. sarpedon sarpedon* from Massuri.
„ 97. Dorsal ridge from dorsal side of *P. sarpedon sarpedon*, ad fig. 96.
„ 98. „ „ „ ventral „ „ „ „ „ ad figs. 96 and 97.
„ 99. „ „ „ „ „ „ „ „ „ from Sikkim.
„ 100. „ „ „ „ „ „ „ „ „ „ „
„ 101. Valvewith harpe of „ „ „ „ „ „ „ the Shan States
„ 102. Dorsal ridge from „ „ „ „ „ „ ad fig. 101.
„ 103. „ „ „ apical „ „ „ „ „ ad figs. 101 and 102.

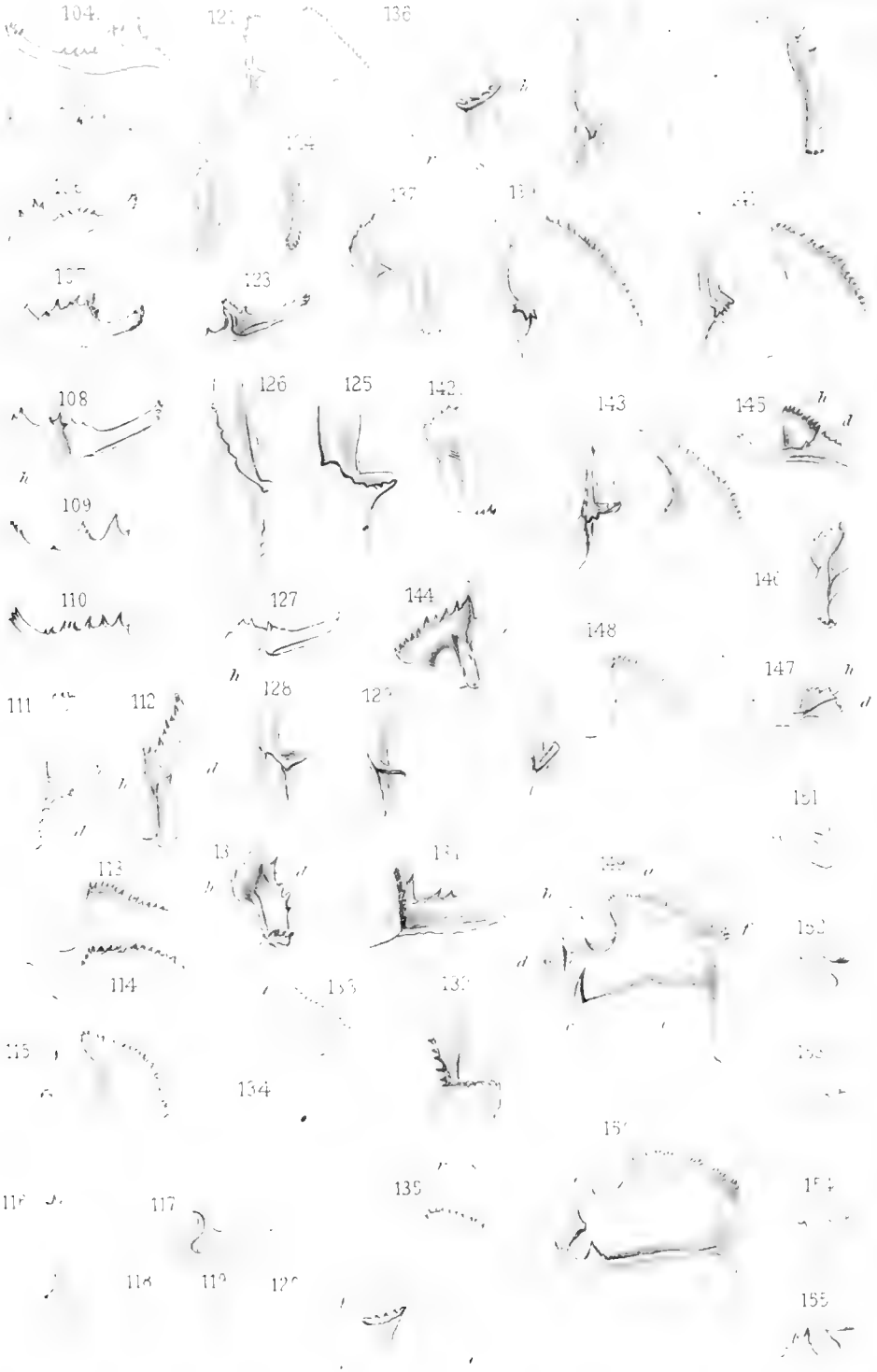

104
108
109
110
111
112
113
114
115
116
117
118
119
120
123
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
142
143
144
145
146
147
148
151
152
153
154
155

PLATE XVIII.

Fig. 104. Dorsal ridge of harpe from dorsal side of *P. sarpedon sarpedon* from the Shan States.

„ 105. . . . „ „ *P. sarpedon sarpedon* from the Shan States.

„ 106. „ „ . ventral „ *P. sarpedon sarpedon* from the Shan States.

„ 107. „ „ „ „ „ *P. sarpedon sarpedon* from Thaiping, Malay Peninsula.

„ 108. „ „ „ . „ *P. sarpedon sarpedon* from Sikkim.

„ 109. „ „ „ dorsal „ *P. sarpedon sarpedon* from Mt. Mulu, Sarawak.

„ 110. „ „ „ „ „ *P. sarpedon sarpedon* from Mt. Mulu, Sarawak.

„ 111. „ „ „ „ „ *P. sarpedon sarpedon* from Mindoro.

„ 112. „ „ „ apical side of *P. sarpedon sarpedon*, ad fig. 111.

„ 113. Outline of apex of valve of *P. sarpedon sarpedon* from Shan States, ad fig. 105.

„ 114. „ „ „ „ „ „ „ „ ad fig. 106.

„ 115. Valve with harpe of *P. sarpedon teredon* from Trichopolis.

„ 116. Dorsal ridge from above of *P. sarpedon teredon*, ad fig. 115.

„ 117. „ „ „ ventral side of *P. sarpedon teredon*, ad figs. 115 and 116.

„ 118. Transverse ridge from apical side of valve of *P. sarpedon teredon* from S. India.

„ 119. „ „ „ „ „ „ „ ad figs. 116 and 117.

„ 120. „ „ „ „ „ „ „ from Ceylon.

„ 121. Valve with harpe of *P. sarpedon jugans* from Sumba.

„ 122. Dorsal ridge from apical side of *P. sarpedon jugans*, ad fig. 121.

„ 123. „ „ „ ventral „ „ „ ad figs. 121 and 122.

„ 124. „ „ „ apical „ „ „ from Sumba.

„ 125. Transverse ridge from above of „ „ ad fig. 123.

„ 126. „ „ „ „ „ „ ad fig. 124.

„ 127. Dorsal ridge of harpe from ventral side of *P. sarpedon adonarensis* from Adonara.

„ 128. Transverse ridge from above of *P. sarpedon timorensis* from Wetter.

„ 129. „ „ „ „ „ „ „ „ Timor.

„ 130. Dorsal ridge from apical side of *P. sarpedon choredon* from Cairns, Queensland.

„ 131. Dorsal ridge from ventral side, middle portion, of *P. sarpedon choredon*, ad fig. 130.

Fig. 132. Dorsal ridge from above, middle portion, of *P. sarpedon choredon*, ad figs. 130 and 131.

„ 133. Outline of apex of valve of *P. sarpedon teredon* from South India.

„ 134. „ „ „ „ „ „ „ „

„ 135. Valve with harpe of *P. sarpedon choredon* from Cairns.

„ 136. Middle portion of dorsal ridge from above of *P. sarpedon choredon* from Redscar Bay, British New Guinea.

„ 137. Dorsal ridge from apical side of *P. sarpedon choredon*, ad fig. 136.

„ 138. Valve with harpe of *P. sarpedon imparilis* from Neu Pommern = New Britain.

„ 139. „ „ „ „ *dodingensis* from Halmaheira.

„ 140. Dorsal ridge from apical side of *P. sarpedon dodingensis*, ad fig. 139.

„ 141. Valve with harpe of *P. sarpedon anthedon* from Ceram.

„ 142. Dorsal ridge from apical side of *P. sarpedon anthedon*, ad fig. 141.

„ 143. Valve with harpe of *P. sarpedon milon* from S. Celebes.

„ 144. Dorsal ridge from apical side of *P. sarpedon milon*, ad fig. 143.

„ 145. „ „ „ dorsal „ „ „ ad figs. 143 and 144.

„ 146. „ „ „ apical „ „ *monticolus* from Mt. Bonthain, S. Celebes.

„ 147. „ „ „ dorsal „ „ „ ad fig. 146.

„ 148. Valve with harpe of *P. sarpedon isander* from Guadalcanar.

„ 149. „ „ „ *P. cloanthus cloanthus* „ Sikkim.

„ 150. „ „ „ „ „ *sumatranus* from Dili, Sumatra.

„ 151. Dorsal ridge and subdorsal tooth of *P. cloanthus cloanthus*, ad fig. 149.

„ 152. „ „ „ „ „ „ „ „ from the Shan States.

„ 153. „ „ „ „ „ „ „ *clymenus* from China.

„ 154. „ „ „ „ „ „ „ *sumatranus*, ad fig. 150.

„ 155. „ „ „ „ „ „ „ „ from Dili.

PLATE XIX.

Fig. 156. Terminal segments of abdomen of ♀ of *P. machaon flavus* from Cambridge, with vaginal armature: *v* = vaginal orifice; *a* = ventral process; *b* = lateral fold.

„ 157. The same from ventral side.

„ 158. Ventral process of fig. 156, from ventral side.

„ 159. The same, lateral view.

„ 160. End of abdomen of ♀ of *P. polytes polytes*, lateral view.

„ 161. Vaginal armature of the same flattened out: *a* = ventral process; *b* and *c* = lateral processes; *t* = postvaginal tubercle.

„ 162. The same of *P. ambrax ambrax* from Dutch New Guinea.

„ 163. End of abdomen of ♀ of *P. aegeus ormenus* from Dutch New Guinea, lateral view: *f* = lateral fold; *a* = ventral, *b* = lateral process; *t* = postvaginal tubercle.

„ 164. Vaginal armature of the same from ventral side.

„ 165. The same flattened out, semidiagrammatically.

„ 166. Ventral and lateral processes of *P. aegeus ormenus* from Dutch New Guinea.

„ 167. „ „ „ „ „ *aegeus* „ Queensland.

„ 168. Lateral process of *P. aegeus aegeus* from Queensland.

„ 169. Ventral and lateral processes of *P. aegeus aegeus* from Queensland.

„ 170. „ „ „ „ „ *P. rumanzovius* „ Luzon.

„ 171. „ „ „ „ „ *P. memnon agenor* from Sikkim.

„ 172. Lateral process of *P. memnon agenor* from Sikkim.

„ 173. Ventral and lateral processes of *P. memnon agenor* from Sikkim.

„ 174. Lateral, divided, processes of „ „ *memnon* „ Borneo.

„ 175. Ventral and lateral „ „ „ „ ad fig. 174.

„ 176. Anal segment and postvaginal tubercle of *P. aegeus ormenus*.

„ 177. „ „ „ „ „ „ „ *P. memnon agenor*.

„ 178. „ „ „ „ „ „ „ *P. rumanzovius*.

„ 179. End of abdomen of ♀ of *P. alcinous alcinous* from Japan, lateral view.

„ 180. Vaginal region of *P. alcinous confusus* from China, lateral view.

„ 181. End of abdomen of *P. podalirius podalirius* from Germany.

„ 182. „ „ „ *P. sarpedon sarpedon* from Japan.

„ 183. Ventral process of „ „ „ ad. fig. 182.

„ 184. „ „ „ „ „ *choredon* from Queensland.

„ 185. Vaginal region of *P. aristeus parmatus* from Queensland, lateral view.

„ 186. Ventral process of same: *v* = vagina.

„ 187. Vaginal region of *P. macfarlanei* from New Guinea, lateral view: *a* = ventral process; *f* = lateral fold.

„ 188. The same from apical side.

„ 189. „ „ of *P. agamemnon agamemnon* from N. India.

NOVITATES ZOOLOGICAE.

A Journal of Zoology.

EDITED BY

THE HON. WALTER ROTHSCHILD,
ERNST HARTERT, AND DR. K. JORDAN.

VOL. III., 1896.

No. 1.

ISSUED MARCH 14TH, AT THE ZOOLOGICAL MUSEUM, TRING.

(PAGES 1—84, PLATES I.—III.)

PRINTED BY HAZELL, WATSON, & VINEY, LD., LONDON AND AYLESBURY.

1896.

VOL. III.

NOVITATES ZOOLOGICAE.

EDITED BY

WALTER ROTHSCHILD, ERNST HARTERT, and KARL JORDAN.

CONTENTS OF NO. I.

DESIDERATA OF BIRDS OF PARADISE AND BOWER BIRDS OF THE TRING MUSEUM.

Ianthothorax benzbachi Büttik.

Paryphephorus duivenbodii (Meyer).

Drepanornis geisleri Meyer.

Epimachus ellioti Gould.

Paradisea mariae Reichen.

„ *novae-guineae* Alb. & Salvad.

„ *intermedia* De Vis.

Lamprothorax wilhelminae Meyer.

Phonygama gouldi (Gray).

Manucodia jobiensis Salvad.

„ *rubiensis* Meyer.

Xanthomelus ardens Alb. & Salvad.

Cnemophilus macgregorii De Vis.

Loria loriae Salvad.

Aeluroedus melanotis (Gray).

Chlamydodera nuchalis (Y. & S.).

„ *orientalis* Gould.

„ *occipitalis* Gould.

„ *guttata* Gould.

Annual Subscription to "Novitates Zoologicae," £1 1s.

Price of Yearly Volume, when completed, £1 10s. to Non-Subscribers. (Commission for Booksellers on completed volumes only.)

Communications, etc., may be addressed to
THE EDITORS OF "NOVITATES ZOOLOGICAE,"
ZOOLOGICAL MUSEUM,
TRING.

PRINTED BY HAZELL, WATSON, AND VINEY, LD., LONDON AND AYLESBURY.

NOVITATES ZOOLOGICAE.

A Journal of Zoology.

EDITED BY

THE HON. WALTER ROTHSCHILD,

ERNST HARTERT, AND DR. K. JORDAN.

VOL. III., 1896.

No. 2.

ISSUED JUNE 25TH, AT THE ZOOLOGICAL MUSEUM, TRING.

(PAGES 85—232, PLATES IV., V.)

PRINTED BY HAZELL, WATSON, & VINEY, LD., LONDON AND AYLESBURY.

1896.

VOL. III.

NOVITATES ZOOLOGICAE.

EDITED BY

WALTER ROTHSCHILD, ERNST HARTERT, and KARL JORDAN.

CONTENTS OF NO. II.

DESIDERATA OF BIRDS OF PARADISE AND BOWER BIRDS OF THE TRING MUSEUM.

Ianthothorax benzbachi Büttik.

Paryphephorus duivenbodei (Meyer).

Drepanornis geisleri Meyer.

Epimachus ellioti Gould.

Paradisea mariae Reichen.

„ *novae-guineae* Alb. & Salvad.

„ *intermedia* De Vis.

Lamprothorax wilhelminae Meyer.

Phonygama goulcli (Gray).

Manucodia jobiensis Salvad.

„ *rubiensis* Meyer.

Xanthomelus ardens Alb. & Salvad.

Cnemophilus macgregorii De Vis.

Aeluroedus melanotis (Gray).

Chlamydodera nuchalis (Y. & S.).

„ *orientalis* Gould.

„ *occipitalis* Gould.

guttata Gould.

Annual Subscription to "Novitates Zoologicae," £1 1s.

Price of Yearly Volume, when completed, £1 10s. to Non-Subscribers. (Commission for Booksellers on completed volumes only.)

Communications, etc., may be addressed to

THE EDITORS OF "NOVITATES ZOOLOGICAE,"

ZOOLOGICAL MUSEUM,

TRING.

PRINTED BY HAZELL, WATSON, AND VINEY, LD., LONDON AND AYLESBURY.

NOVITATES ZOOLOGICAE.

A Journal of Zoology.

EDITED BY

THE HON. WALTER ROTHSCHILD,
ERNST HARTERT, AND DR. K. JORDAN.

VOL. III., 1896.

No. 3.

ISSUED SEPTEMBER 18TH, AT THE ZOOLOGICAL MUSEUM, TRING

(PAGES 233—328, PLATES VI., VII., VIII., IX., X.)

PRINTED BY HAZELL, WATSON, & VINEY, LD., LONDON AND AYLESBURY.

1896.

VOL. III.

NOVITATES ZOOLOGICAE.

EDITED BY
WALTER ROTHSCHILD, ERNST HARTERT, and KARL JORDAN.

CONTENTS OF NO. III.

DESIDERATA OF BIRDS OF PARADISE AND BOWER BIRDS OF THE TRING MUSEUM.

Ianthothorax benzbachi Büttik.

Paryphephorus duivenbodei (Meyer).

Drepanornis geisleri Meyer.

Epimachus ellioti Gould.

Paradisea mariae Reichen.

„ *novae-guineae* Alb. & Salvad.

„ *intermedia* De Vis.

Lamprothorax wilhelminae Meyer.

Phonygama gouldi (Gray).

Manucodia jobiensis Salvad.

„ *rubiensis* Meyer.

Xanthomelus ardens Alb. & Salvad.

Cnemophilus macgregorii De Vis.

Aeluroedus melanotis (Gray).

Chlamydodera nuchalis (Y. & S.).

„ *orientalis* Gould.

„ *occipitalis* Gould.

„ *guttata* Gould.

Annual Subscription to "Novitates Zoologicae," £1 1s.

Price of Yearly Volume, when completed, £1 10s. to Non-Subscribers. (Commission for Booksellers on completed volumes only.)

Communications, etc., may be addressed to

THE EDITORS OF "NOVITATES ZOOLOGICAE,"

ZOOLOGICAL MUSEUM,

TRING.

PRINTED BY HAZELL, WATSON, AND VINEY, LD., LONDON AND AYLESBURY.

NOVITATES ZOOLOGICAE.

A Journal of Zoology.

EDITED BY

THE HON. WALTER ROTHSCHILD,
ERNST HARTERT, AND DR. K. JORDAN.

VOL. III., 1896.

No. 4.

ISSUED DECEMBER 29TH, AT THE ZOOLOGICAL MUSEUM, TRING.

(PAGES 329—631, PLATES XI., XII., XIV. XXII.)

PRINTED BY HAZELL, WATSON, & VINEY, LD., LONDON AND AYLESBURY

1896.

VOL. III.

NOVITATES ZOOLOGICAE.

EDITED BY

WALTER ROTHSCHILD, ERNST HARTERT, and KARL JORDAN.

CONTENTS OF NO. IV.

(TITLE-PAGE AND CONTENTS OF VOL. III.)

DESIDERATA OF BIRDS OF PARADISE AND BOWER BIRDS OF THE TRING MUSEUM.

Ianthothorax benzbachi Büttik.

Paryphephorus duivenbodei (Meyer).

Drepanornis geisleri Meyer.

Epimachus ellioti Gould.

Paradisea mariae Reichen.

,, *novae-guineae* Alb. & Salvad.

,, *intermedia* De Vis.

Lamprothorax wilhelminae Meyer.

Phonygama gouldi (Gray).

Manucodia jobiensis Salvad.

,, *rubiensis* Meyer.

Xanthomelus ardens Alb. & Salvad.

Chlamydodera nuchalis (Y. & S.).

,, *orientalis* Gould.

,, *occipitalis* Gould.

,, *guttata* Gould.

Annual Subscription to "Novitates Zoologicae," £1 1s.

Price of Yearly Volume, when completed, £1 10s. to Non-Subscribers. (Commission for Booksellers on completed volumes only.)

Communications, etc., may be addressed to

THE EDITORS OF "NOVITATES ZOOLOGICAE,"

ZOOLOGICAL MUSEUM,

TRING.

PRINTED BY HAZELL, WATSON, AND VINEY, LD., LONDON AND AYLESBURY.