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L.—The Lepidoptera collected during the recent expedition of H.M.S. 'Challenger'

Arthur G. Butler F.L.S. F.Z.S. ^a

^a Zoological Department, British Museum
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L.—*The Lepidoptera collected during the recent Expedition of H.M.S. 'Challenger.'* By ARTHUR G. BUTLER, F.L.S., F.Z.S., Assistant Keeper, Zoological Department, British Museum.

THE Lepidoptera obtained by the naturalists of the 'Challenger' represent 101 species, distributed as follows:—

	Philippine Islands.	Aru.	Admiralty Islands.	Fiji Islands.	Friendly Islands.
Salpinx usipetes	*			
— oculatus	*				
— iphianassa	*	*	
Nacamsa Meldolæ	*				
Calliploea Saundersii	*			
Saphara ursula	*		
Radena manillana	*				
Andasena Lucasii	*				
Nipara eleutho	*
— Eschscholtzii	*	
Hamadryas nais	*				
Tirumala angustata	*
Salatura Edmondii	*				
— affinis	*			
— aruana	*			
— chrysippus	*				
Anosia plexippus	*
Melanitis taitensis	*
Zethera musa	*				
Sevanda Duponchelii	*			
Mydosama æthiops	*			
— phidon	*			
Calysisme justinella	*				
Ragadia melindena	*				
Hypocysta osyris	*			
Ypthima Sempera	*				
Xois fulvida	*	
Tenaris catops	*			
— myops	*			
Messaras madestes	*			
Atella Bowdenia	*
Cethosia luzonica	*				
— damasippe	*			
Cynthia deione	*				
Neptis venilia	*			
— lactaria	*			

	Philippine Islands.	Aru.	Admiralty Islands.	Fiji Islands.	Friendly Islands.
Hypolimnas nerina	*			
— lasinassa	*			
— eriphile	*	
— pallescens	*	
— Murrayi	*	
— Thomsoni	*	*
— Moseleyi	*
— Naresi	*
Precis hellanis	*			
— ida	*				
Junonia villida	*	*
Acraea andromacha	*	
Sospita segecia	*				
Holochila intensa	*				
Pithecopa hylas	*				
Danis aleuas	*			
— coritus	*			
Castalius roxus	*				
Catochrysops strabo	*				
— ancyra	*			
— sp. ?	*
Nacaduba aluta	*				
— macrophthalma	*				
Jamides carissima	*
Lampides evanescens	*				
— cleodius	*				
— suidas	*				
Zizera oriens	*				
Nilasera ænone	*			
Terias invida	*				
— alitha	*				
— diversa	*				
— sulphurata	*			
— aprica	*
— vallivolans	*				
— hecabe	*			
— puella	*			
Appias domitia	*				
— mindanensis	*				
Ornithoptera aruana	*			
Papilio gordion	*				
— idæoides	*				
— ledebouria	*				
— Schmeltzi	*	
— alcidinus	*			
— emalthion	*				
Pamphila eurtas	*			
— angustula	*	
— sunias	*				

	Philippine Islands.	Aru.	Admiralty Islands.	Fiji Islands.	Friendly Islands.
Suastus sp.?	*				
Thanaos inornatus	..	*			
Plesioneura insulata	..	*			
— proserpina	..	*			
Argina cribraria	..	..	..	*
Damalis alciphron	..	..	*
Hypsa dama	..	*			
Cleis aruana	..	*			
Nyctemera fasciata	..	..	..	*
— alternata	*				
Pitasila inconstans	*				
Cocytodes modesta	..	..	..	*
Phyllodes cerasifera	*				
Azazia rubricans	..	*			
Hydrocampa sp.?	*				
Astura fluminalis	..	..	..	*
Number of species	41	35	2	15	12

The most valuable series is that collected in the Aru Islands, containing, among other species, a new *Papilio* allied to *P. Laglaizei* of Depuiset (Ann. Soc. Ent. France, 1878, p. 142, pl. v.), from New Guinea, but certainly quite distinct; it is an admirable copy of a day-flying moth, *Alcidis aruus* of Felder, particularly as regards the pattern and coloration of the upper surface; on the under surface, however, is a character which strongly supports the view, held by Messrs. Bates, Wallace, Trimen, and others, that resemblances of this kind are due to the assimilation of species in need of protection to the pattern of others which, owing to their odour, taste, or uneatable aspect, enjoy immunity from the attacks of insect-enemies. This character consists in a longitudinal orange streak, so placed upon the abdominal area of the hind wings as to simulate (when the butterfly is in repose) the orange ventral surface of the abdomen in the moth; the same character may also be seen in the figure of *P. Laglaizei*. If the *Papiliones* in repose retained the same flattened wing-surface as do the species of *Alcidis*, it is obvious that the orange streak would rather hinder than assist the resemblance between the two; it is, however, well known that the abdominal border in *Papilio* is in this position so folded that the streak would appear to be upon the body.

One must not, however, overlook one fact in connexion

with this question, and that is the fact of the apparent rarity of these copying Papilionidæ. If it be of great importance for one species to resemble another, inasmuch as that thereby the copying species shares, in common with its model, immunity from evil, one would naturally suppose that this advantage would be evidenced by abundance of specimens. It seems to me, however, that, on the other hand, if the numbers of the butterfly and moth were equal, many of the former would fall victims to the inexperience of young birds before the association of an evil taste or smell with such a type of coloration was discovered; this would quickly reduce the number of the butterfly, whilst the moth escaped. On the other hand, many of the butterflies which resemble Euploeinæ appear to be abundant; and I think we must look for the explanation of this in the abundance of examples in the species of that group, coupled with the abundance of species, all much alike, and therefore representing an army of unpalatable individuals greatly exceeding in numbers the so-called "mimicking" species.

The subfamily Euploeinæ is largely represented in the 'Challenger' collections, no less than seventeen species being referable to this group; of these, one of the most interesting to me is a species named by Mr. Moore *Tirumala angustata*, and which is represented by eighteen examples from Tongatabu; in this series there is only one variety, a melanistic example differing from the typical form in the want of the irregular spot towards the end of the cell of the front wings, but agreeing with it in every other respect. The point of interest about this species is its marvellous similarity to *T. hamata* of Australia, and nevertheless the absolute constancy of the principal character by which it can be distinguished, the dark brown band on the hind wings, separating the greenish-white markings of the basal area from the inner series of spots upon the external area, being invariably about half as wide in *T. angustata* as in *T. hamata*. I regard the constancy of the slight differences in these two locally separated but nearly allied forms as important evidence against those who assume that all differences of pattern which do not at once arrest attention are due to individual variation, and who consequently must not only be themselves disabled from studying the geographical distribution of species in its finer details, but must deter others from learning the exact truths which a study of it is designed to teach.

Another interesting form in which the characters are also constant, though equally slight, is *Saphara ursula*, a species of the same subfamily, to which I shall have to call attention later in this paper.

List of the Species.

RHOPALOCERA.

Nymphalidæ.*EUPLEINÆ.*

This subfamily is represented by seventeen species, one of which, however, may, I think, eventually prove to be a slightly melanistic form of *Salatura affinis*, inasmuch as both forms are in the same series from Aru (possibly not from the same island); at the same time I prefer to regard them as distinct, until proofs of their identity have been produced. Seven of the species are pronounced by Mr. Moore to be new; six of these are included in the revision of the subfamily prepared by Mr. Moore, the seventh, however, appears not to be described by him.

1. *Salpinx usipetes*.

Euplexa usipetes, Hewitson, Exot. Butt. ii. *Eupl.* pl. i. fig. 4 (1858).

Two males. "Dobbo (Wamma), Wanumbai, Wokan, Aru Island."

The localities above given were upon the box containing the Aru specimens, the exact locality not being recorded upon the envelopes; I shall therefore refer to them simply as from Aru.

2. *Salpinx oculatus*.

Salpinx oculatus, Moore, Rev. *Eupl.* P. Z. S. 1883.

♂. Pasananca valley, Mindanao, near Zamboanga, February 1875.

3. *Salpinx iphianassa*.

Euplexa iphianassa, Butler, P. Z. S. 1866, p. 287. n. 57, pl. cclxxxvi fig. 3.

♀. Kandavu, Fiji, August 1874.

4. *Nacamsa Meldolæ*.

Nacamsa Meldolæ, Moore, Rev. *Eupl.* P. Z. S. 1883.

♂. Pasananca valley, Mindanao, near Zamboanga, February 1875.

This species was represented in the collection by only one example; it is an admirable copy of *Andasena Lucasii*, which came with it.

5. *Calliplœa Saundersii*.

Euplœa Saundersii, Felder, Reise der Nov. Lep. ii. p. 322. n. 439 (1867).

♂. Aru.

6. *Saphara ursula*, sp. n.

Allied to *S. Treitschkei* of New Ireland, *biformis* of Duke-of-York Island, and *ænea* of the Solomon Islands; but differing constantly from all three (in both sexes) in having two unequal subapical white spots on the upper surface of the primaries, and no spot on the first median interspace, the two upper spots of the triangular group in *S. Treitschkei* being alone present; the interno-median elongated spot is considerably smaller and shorter than in any of the species; the first three of the discal series of spots on the secondaries of the female are generally much enlarged, and two of them are frequently present on the male secondaries. In the dark blue-black colouring of the male the species most nearly approaches *S. biformis*; but the pattern of the under surface (with the exception of the subapical spots on the primaries) agrees with *S. Treitschkei*. Expanse of wings 84-95 millim.

Ten specimens. "Dentrecasteaux Island, Admiralty Group"*.

It is evident that each island, or at least each group of islands, has a separate species, constantly differing, although in apparently insignificant characters, from its nearest allies. To those who have not specially studied the Euplœinæ the presence or absence of two white spots on the primaries would appear to be a variation scarcely worthy of remark, much less of specific value; nevertheless it is perfectly clear that the form having these spots is characteristic of the island where it occurs, and therefore to record one of the Admiralty Islands as a locality for *S. Treitschkei* would not be in accordance with exact scientific fact. We might say that a local form of the latter species was found in the Admiralty group, a second in the Solomon group, and a third at Duke-of-York Island; but the rapid increase of our collections of Lepidoptera proves more and more clearly that the genera consist of nothing but gradational series of local forms in this Order; and therefore, if we call the species local forms, we may call the genera species. To such a course no living Lepidopterist would consent.

7. *Andasena Lucasii*.

Andasena Lucasii, Moore, Rev. Eupl. P. Z. S. 1883.

Four males. Pasananca valley, Mindanao, near Zamboanga, February 1875.

* See H. N. Moseley's 'Naturalist on the Challenger,' p. 454.

8. *Nipara eleutho*.

Danaïs eleutho, Quoy, Freyc. Voy. pl. lxxxiii. fig. 2 (1815).

Tongatabu, 20th July 1874.

9. *Nipara Eschscholtzii*.

Euplœa Eschscholtzii, Felder, Reise der Nov. Lep. ii. p. 345. n. 480 (1867).

Kandavu, Fiji.

10. *Hamadryas nais*.

Nymphalis nais, Guérin, Voy. Coq. pl. xv. fig. 3 (1829).

Aru.

11. *Radena manillana*.

Radena manillana, Moore, Rev. Eupl. P. Z. S. 1883.

Camiguen, Philippines, 26th January 1875; Pasananca valley, Mindanao, February 1875.

12. *Tirumala angustata*.

Tirumala angustata, Moore, Rev. Eupl. P. Z. S. 1883.

♂ ♀. Eighteen examples. Tongatabu, July 1874.

13. *Salatura Edmondii*.

Danaïs Edmondii, Bougainville, Voy. Thetis, pl. xlv. figs. 3, 3 bis (1837).

♂ ♀. Six specimens. Pasananca valley, Mindanao, February 1875.

14. *Salatura affinis*.

Papilio affinis, Fabricius, Syst. Ent. p. 511. n. 291 (1775).

♂ ♀. Five specimens. Aru.

15. *Salatura aruana*.

Salatura aruana, Moore, Rev. Eupl. P. Z. S. 1883.

♂ ♀. Three specimens. Aru.

16. *Salatura chrysippus*.

Papilio chrysippus, Linnæus, Mus. Lud. Ulr. p. 263 (1764).

Pasananca valley, Mindanao, February 1875.

17. *Anosia plexippus*.

Papilio plexippus, Linnæus, Mus. Lud. Ulr. p. 262 (1764).

Tongatabu, July 1874.

SATYRINÆ.

18. *Melanitis taitensis*.

Cyllo lela, var. *taitensis*, Felder, Verh. zool.-botan. Gesellsch. xii. p. 493. n. 186 (1862).

Tongatabu, July 1874.

19. *Zethera musa*.

Zethera musa, Felder, Wien. ent. Monatschr. v. p. 301. n. 16 (1861); Reise der Nov. Lep. iii. pl. liv. figs. 6, 7 (1867).

♂ ♀. Pasananca valley, Mindanao, February 1875.

Z. aganippe of Felder, figured on the same plate (fig. 3), appears to me to be the female of *Z. musa*. The sexes in this genus are very dissimilar.

20. *Sevanda Duponchelii*.

Satyrops Duponchelii, Guérin, Voy Coquille, pl. xvii. fig. 3 (1829).

Aru.

Although Guérin quotes this himself as a synonym of Boisduval's *Mycalesis dorycus*, and gives the locality Dorey in the letterpress, his figure does not agree with that species, but with the Aru form, which differs in the obsolete character of the orange patch on the primaries, in the absence of the blackish border to the secondaries above, and in having the primaries below ochreous instead of smoky brown; the secondaries of the Aru form also only show four ocelli on the under surface, the second of *S. dorycus* not being present. In Moore's paper on the Lepidoptera referred to *Mycalesis* (Tr. Ent. Soc. 1880, pp. 155-177), I see that Aru is given as one of the localities for *S. Duponchelii*; this habitat was doubtless obtained from Hewitson's paper in the 'Journal of the Linnean Society,' viii. p. 145 (1865), where the following additional localities are also given:—"Waigiou, New Guinea, Mysol." Felder also gives New Guinea as the locality for his *Mycalesis getulia*, quoted by Moore as a synonym.

An examination of Hewitson's series seems clearly to show that *S. Duponchelii*, *S. dorycus*, and *S. getulia* are distinct although closely allied species (or local races, if that name be considered preferable), which could readily be distinguished if one possessed a fair series from each locality, but (as in many other instances) which look like slight varieties when single specimens from each locality are alone retained. Hewitson only possessed a single female from Dorey; and we possess three males from that locality. These are all uniform in the dark border to the secondaries above, the pale under

surface of the primaries, and the more numerous ocelli on the secondaries (*S. dorycus*); Hewitson also had a male from Mysol and a female from New Guinea, more nearly approaching *S. Duponchelii*, the secondaries having two strongly marked black marginal lines, somewhat obscured with brown in the male, and the under surface of the primaries dark, though not so dark as in the Aru form, the secondaries without the second ocellus (*S. getulia*). A male from Waigiou and a pair from Aru in Mr. Hewitson's collection appear to belong to a third form, the typical *S. Duponchelii*, although the males differ slightly from each other in the form of the submarginal lines on the secondaries; both, however, are destitute of the orange patch below the second ocellus on the primaries, which in the female is reduced to a slender curved streak partly encircling the ocellus; and all agree in other respects with the Aru specimen before me. I should therefore propose that these forms should be kept separate, thus:—

1. *Sevanda Duponchelii*, Guér. Aru, Waigiou.
2. *Sevanda getulia*, Feld. New Guinea, Mysol.
3. *Sevanda dorycus*, Boisduval. Dorey.

21. *Mydosama æthiops*.

Mycalesis æthiops, Butler, Cat. Sat. B. M. p. 141, pl. iii. fig. 11 (1868).
Aru.

22. *Mydosama phidon*.

Mycalesis phidon, Hewitson, Exot. Butt. iii. p. 84, *Myc.* pl. iii. fig. 16 (1862).
Aru.

23. *Calysisme justinella*.

Mycalesis justinella, Butler, Cat. Sat. B. M. p. 135, pl. iii. fig. 12 (1868).
Pasananca valley, Mindanao, February 1875.

24. *Ragadia melindena*.

Ragadia melindena, Felder, Wien. ent. Monatschr. vii. p. 125. n. 99 (1863).
Pasananca valley, Mindanao, February 1875.

25. *Hypocysta osyris*.

Satyrus osyris, Boisduval, Voy. Astrolabe, Lép. p. 154, n. 17 (1832).
Aru.

26. *Ypthima sempera*.

Ypthima sempera, Felder, Wien. ent. Monatschr. vii. p. 125. n. 98 (1863).
Camiguen, Philippines, 26th January 1875; Mindanao, February 1875.

27. *Xois fulvida*, sp. n.

Allied to *X. sesara*, but differing constantly in the ochraceous colour of the primaries and the border of the secondaries, also in the discoidal cell of primaries not being dusky excepting at the base, and the narrowness of the dusky external border of these wings; secondaries below rather paler than in *X. sesara*. Expanse of wings 34–38 millim.

Banks of the Wai Levu, Viti Levu, and Kandavu, Fiji, 2nd August 1874.

I have before me eight examples in better or worse condition, and the same number of specimens of *S. sesara*; so that I have no doubt about the constancy of the characters by which these two forms are distinguished.

MORPHINÆ.

28. *Tenaris catops*.

Drusilla catops, Westwood, Gen. Diurn. Lep. p. 335. n. 3, note (1851)

♂ ♀. Aru.

29. *Tenaris myops*.

Drusilla myops, Felder, Wien. ent. Monatschr. iv. p. 109. n. 68, pl. i. fig. 1 (1860).

♂ ♀. Aru.

Very closely allied to *T. dioptrica* of Vollenhoven.

NYMPHALINÆ.

30. *Messaras madestes*.

Messaras madestes, Hewitson, Ex. Butt. ii. *Mess.* pl. i. figs. 3, 6 (1859).

Aru.

31. *Atella Bowdenia*.

Atella Bowdenia, M. R. Butler, P. Z. S. 1873, p. 687.

Tongatabu, July 1874.

32. *Cethosia luzonica*.

Cethosia luzonica, Felder, Wien. ent. Monatschr. vii. p. 107. n. 68 (1863).

Pasananca valley, Mindanao, February 1875.

33. *Cethosia damasippe*.

Cethosia damasippe, Felder, Reise der Nov. Lep. iii. p. 379. n. 550 (1867).

Aru.

This example differs somewhat from one which we have from Dorey; but as we only have a single specimen in each case, and the description by Felder embraces both forms, it would be rash at present to regard them as distinct; at the same time, judging from the absolute constancy of the nearly allied *C. imperialis* from Queensland, it seems highly probable that they are so.

34. *Cynthia deione*.

Cynthia deione, Erichson, Nova Acta Ac. Nat. Cur. xvi. Suppl. pl. 50. figs. 2, 2 a (1833).

Pasananca valley, Mindanao, February 1875.

The specimens of this species were much shattered, as though they had been long on the wing.

35. *Neptis venilia*.

Papilio venilia, Linnæus, Mus. Lud. Ulr. p. 290 (1764).

Aru.

The Aru specimens differ slightly in the broader white band of the primaries from those occurring at Amboina, Ceram, Mysol, and Waigiou.

36. *Neptis lactaria*.

Athyma lactaria, Butler, Ann. & Mag. Nat. Hist. ser. 3, vol. xvii. p. 98. n. 1 (1866).

Aru.

Only a single specimen of each of the preceding species was obtained.

37. *Hypolimnias nerina*.

♀. *Papilio nerina*, Fabricius, Syst. Ent. p. 509. n. 277 (1775).

♀. Aru.

H. auge of Cramer is the male of the Javan form.

38. *Hypolimnias lasinassa*.

♂. *Papilio lasinassa*, Cramer, Pap. Exot. ii. pl. ccv. A, B (1779).

♂. Aru.

The female of this is figured by Cramer as *P. manilia*.

39. *Hypolimnias eriphile*?

♀. *Papilio eriphile*, Cramer, Pap. Exot. iv. pl. cclxxvi. A, B (1782).

♀. Kandavu, Fiji.

This is somewhat smaller than Cramer's figure; and the subapical white band of the primaries is frequently obscured. It

may possibly be a dark variety of the following species, and not identical with that from Amboina.

40. *Hypolimnas pallescens*.

♀. *Diadema pallescens*, Butler, P. Z. S. 1874, p. 282. n. 47.

Diadema bolina, var., Butler, Brenchley's 'Cruise of the Curaçoa,' p. 463, pl. xlviii. figs. 3, 4 (1873).

♂ ♀. Kandavu, Fiji.

The specimens of this and the preceding form are all much shattered; they had probably been long on the wing when captured.

41. *Hypolimnas Murrayi*, sp. n.

♂. Upper surface velvety black; primaries with a trifid rather narrow lilacine patch, sprinkled with white scales and placed upon a reniform ultramarine field beyond the cell; three subapical white spots, the upper two large and only divided by the upper furcation of the subcostal vein: secondaries with a large central lilacine patch, sprinkled with white and broadly encircled with ultramarine blue. Below smoky brown, darker on the disk excepting towards apex of primaries; these wings with the cell mahogany-red, with the usual black-bordered white spots; an oblique narrow opaline-white band of five spots just beyond the cell; subapical white spots as above, but continued by a series of five other spots with bluish edges; median interspaces black; a submarginal series of pale brown and lilacine lunate spots in pairs followed by a series of simple whitish linear crescents: secondaries with a narrow slightly tapering white band commencing just above the subcostal vein and divided by the nervures; two white spots just beyond its inferior extremity, bordering the anal excision of the abdominal margin; a white subcostal spot beyond the central band; a discal series of six blue-edged white spots almost parallel to the outer margin; submarginal markings as on the primaries, but white. Expanse of wings 83 millim.

♀. Larger than the male, the outer margin of the primaries more excavated as usual, the lilacine patch replaced by a quadrifid greyish band corresponding with that of the under surface; the white discal spots and submarginal markings visible above, more so on the primaries than on the secondaries; the latter wings with the lilacine patch elongated, crossed by black veins; no ultramarine blue on the wings: under surface a little paler than in the male, the submarginal markings of primaries white, as on the secondaries; the oblique band on the primaries and the tapering band and

subcostal spot on the secondaries a little greyer, and therefore not quite so prominent as in the male. Expanse of wings 100 millim.

Kandavu, Fiji.

Only a pair of this species was obtained: it comes nearest to *H. perimele* of Cramer.

42. *Hypolimnias Thomsoni*, sp. n.

Allied to the preceding species, smaller in both sexes; the male with the lilacine patch of primaries less oblique, and that of secondaries smaller; the band beyond the cell on the female is also pure white and quadrid; the discal series of white spots on the upper surface of the female also stops short on the second median interspace, and the submarginal markings are very indistinct; the lilacine patch on the secondaries is semicircular and has a narrow but distinct ultramarine edge: on the underside the red colouring in the cell of primaries is duller, more diffused; the submarginal markings in the male are obliterated, and in the female are blurred; the white band on the secondaries is obliterated in both sexes, but the subcostal spot is present, as also are the small spots on the disk. Expanse of wings, ♂ 74 millim., ♀ 93 millim.

♂. Tongatabu; ♀. Kandavu.

43. *Hypolimnias Moseleyi*, sp. n.

Also allied to *H. Murrayi*, slightly smaller; the male with the lilacine patch of primaries smaller, transversely cuneiform, that of secondaries large and irregularly pentagonal; the band beyond the cell in the female pure white, opaline, with ultramarine margin, quinquefid; the discal spots distinct on the primaries, the submarginal markings about the same, but no trace of discal spots or submarginal markings on the upper surface of the secondaries; the lilacine patch on these wings similar in form and diffused, but broadly encircled with ultramarine blue, as in the male. Wings below more olivaceous than in *H. Murrayi*, the submarginal double lunate spots narrower, and band of secondaries in both sexes only represented by a diffused whitish central patch and an indistinct streak of pale scales from it to the abdominal border. Expanse of wings, ♂ 74 millim., ♀ 90 millim.

Five examples. Tongatabu, July 1874.

44. *Hypolimnias Naresi*, sp. n.

Also allied to *H. Murrayi*, much smaller; the male with the lilacine patch of primaries narrower, trifid, curved, and

that of secondaries a little smaller; the band beyond the cell in the female pure white, opaline, with ultramarine margin, less oblique than in *H. Moseleyi*; the discal series of spots not extending beyond the first median interspace, the uppermost (subapical) bifid spot yellowish; those of secondaries and the submarginal markings on all the wings obsolete; lilacine patch of secondaries unusually white, surrounded with ultramarine blue. Under surface more olivaceous in the male, almost sandy yellowish in the female, the red in the discoidal cell dull; submarginal lunate markings narrow, indistinct, and pale brown, excepting near the posterior angles of the wings, where they are a little more distinct; band of secondaries only represented by a central streak of excised white spots separated by the nervures. Expanse of wings, ♂ 74 millim., ♀ 81 millim.

♂, var. Wings below very dark, submarginal markings wholly obsolete. Expanse of wings 68 millim.

Fourteen examples. Tongatabu, July 1874.

The obscurity of the submarginal markings and usually smaller size of this species readily separate it from *H. Moseleyi*; most of the specimens were a good deal shattered, two pairs only being in fair condition.

45. *Precis hellanis*.

Precis hellanis, Felder, Reise der Nov. Lep. iii. p. 402. n. 601 (1867).

Aru.

46. *Precis ida*.

Papilio ida, Cramer, Pap. Exot. i. pl. xlii. C, D (1776).

Camiguen and Mindanao, Philippines.

47. *Junonia villida*.

Papilio villida, Fabricius, Mant. Ins. ii. p. 35. n. 366 (1787).

Tongatabu, July 1874; banks of Wai Levu, Viti Levu; Kandavu, Fiji, 2nd August 1874.

ACRÆINÆ.

48. *Acræa andromacha*.

Papilio andromacha, Fabricius, Syst. Ent. p. 466. n. 102 (1775).

Kandavu, Fiji, August 1874.

Lemoniidæ.49. *Sospita segecia*.

Sospita segecia, Hewitson, Ex. Butt. ii. *Sosp.* pl. i. figs. 4-6 (1861).

♂ ♀ . Aru.

The two examples obtained have evidently been long on the wing.

Lycænidæ.50. *Holochila intensa*.

Holochila intensa, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. xviii. p. 245. n. 20 (1876).

♀ . Aru.

51. *Pithecopa hylas*.

Papilio hylas, Fabricius, Syst. Ent. p. 526. n. 351 (1775).

Pasananca valley, Mindanao.

52. *Danis alenas*.

♂. *Lycæna alenas*, Felder, Reise der Nov. Lep. ii. p. 268. n. 325, pl. xxxiii. figs. 15, 16 (1865).

♂ . Aru.

53. *Danis coritus*.

Polyommatus coritus, Guérin, Voy. Coq. ii. pl. xviii. fig. 3 (1829).

♀ . Aru.

54. *Castalius roxus*.

Polyommatus roxus, Godart, Enc. Méth. ix. p. 659. n. 142 (1823).

Pasananca valley, Mindanao.

55. *Catochrysops strabo*.

Hesperia strabo, Fabricius, Ent. Syst. iii. 1, p. 287. n. 101 (1793).

Pasananca valley, Mindanao.

56. *Catochrysops ancyra*.

♂. *Lycæna ancyra*, Felder, Reise der Nov. Lep. ii. p. 276. n. 342, pl. xxxiv. fig. 5 (1867).

♂ . Aru.

The species is near to *C. complicata*, but larger ; Felder described it from an example taken in Amboina.

57. *Catochrysops*, sp.?

A small grey-brown species, perhaps *C. caledonica* of Felder much rubbed and faded; it is of the same size, and the markings, so far as I can trace them, appear to be the same.

Tongatabu, July 1874.

There is also in the collection a fragment from Aru which may either belong to this or the following genus.

58. *Nacaduba aluta*.

Cupido aluta, Druce, P. Z. S. 1873, p. 349. n. 16, pl. xxxii. fig. 8.

Pasananca valley, Mindanao.

59. *Nacaduba macrophthalma*.

Lycæna macrophthalma, Felder, Reise der Nov. Lep. ii. p. 275. n. 339, pl. xxxiv. fig. 35 (1867).

Pasananca valley, Mindanao.

60. *Jamides carissima*.

Lampides carissima, Butler, P. Z. S. 1875, p. 615. n. 24, pl. lxxvii. figs. 4, 5.

Tongatabu, July 1874.

61. *Lampides evanescens*.

Lampides evanescens, Butler, P. Z. S. 1875, p. 615. n. 26.

♀. Camiguen, Philippine Islands.

A single much worn example.

62. *Lampides cleodus*.

Lycæna cleodus, Felder, Reise der Nov. Lep. ii. p. 272. n. 334, pl. xxxiv. figs. 20-22 (1867).

Pasananca valley, Mindanao, near Zamboanga.

The silvery greenish-white tint of this species is not well shown in Felder's figures.

63. *Lampides suidas*?

♂. *Lycæna suidas*, Felder, Reise der Nov. Lep. ii. p. 273. n. 335, pl. xxxiv. figs. 18, 19 (1867).

♀. Pasananca valley, Mindanao.

Apparently the female of Felder's species, but decidedly whiter.

64. *Zizera oriens*, sp. n.

♂. Allied to *Z. pygmaea* of Snellen; larger, lilacine blue

above; the apical area and external border of primaries brown, the base of costa whitish: secondaries with the costal border broadly and the external border narrowly brown, base blackish blue; abdominal border white, sericeous, with slightly cupreous reflections; markings much as in *Z. pygmæa*, but the marginal and submarginal markings less distinct, and the series of small black spots across the disk of primaries forming an almost straight line. Expanse of wings 24 millim.

Pasananca valley, Mindanao.

A very ragged and broken example, perhaps the female of the above, is in the Camiguen series; it appears to have been of a smoky brown tint, sprinkled with bluish scales on the surface; but it is so much injured that it may even belong to a distinct species.

Z. oriens is as large as *Z. maha* of Kollar.

65. *Nilasera æxone*.

Amblypodia æxone, Hewitson, Ill. Diurn. Lep. p. 5. n. 15, pl. iii. figs. 20, 24 (1863).

♀. Aru.

Papilionidæ.

PIERINÆ.

66. *Terias invida*, sp. n.

♂. Gamboge-yellow, with almost the pattern of *T. alitha* and *T. lorquini*, the costal margin being narrowly black-brown; the apical area broadly (with oblique slightly concave inner edge), the outer margin rather broadly black-brown, but only separately represented on the median interspaces, where (as usual) its inner edge is bisinuated; inner border broadly edged with black-brown, the anterior margin of this border being distinctly sinuated before the middle: secondaries with a broad external border, gradually narrowing towards the apex, and with the inner edge regularly sinuated from first median branch to apex; a basal black-brown spot. Wings below as usual—that is to say, paler than above, and with the markings of *T. hecabe*. Expanse of wings 40 millim.

♀. Primrose-yellow, with almost the pattern of the male, but paler; the inner border of primaries not sinuated, and the inner edge of the outer border of secondaries quite regular, without a trace of sinuation. Wings below similarly marked to those of *T. cæsiops*. Expanse of wings 34 millim.

Pasananca valley, Mindanao.

This species is very near to the following, but much smaller, and with the inner or anterior edge of the inner border of the primaries distinctly sinuated; this, I believe, is not an individual variation, but characteristic of the smaller species, and is the first indication of a step in the direction of the *T. hecabe* group, in which this border is very much abbreviated or wholly missing.

a An arrangement of the species of the present group to show gradation to *T. hecabe* would be as follows:—

1. *T. celebensis*, Wall.; 2. *T. tominia*, Voll.; 3. *T. zama*, Feld.; 4. *T. zita*, Feld.; 5. *T. rahel*, Fabr. (= ? *T. sinensis*, Luc.); 6. *T. Lorquini*, Feld.; 7. *T. alitha*, Feld.; 8. *T. invida*, Butl.; 9. *T. tilaha*, Horsf.; 10. *T. eumede*, Feld.; 11. *T. hecabe*, Linn.

There is, however, a distinct break between the two groups; and this makes the suggestion (Trans. Ent. Soc. 1882, p. 489) that one of the most heavily bordered of them is a variety of *T. hecabe*, the more preposterous. Of the eleven forms associated by Pryer, five only occur in Japan; and of these two are admitted hybrids. *T. hecabe* itself is Chinese; *T. hecabeoides* and *T. æsiøpe* are Himalayan; *T. brenda* strictly African; *T. sari*, Malayan, having never been taken excepting in Java, Borneo, and Malacca: these species also belong to five different sections of the genus, some of which (as shown above) approach nearly to one another, but without actually running together; thus *T. brenda* belongs to the same section with *T. solifera* and *T. senegalensis*, a section characterized by its white or whitish females; it is strictly African, no species being known from any other part of the world. Next to this comes the *T. hecabe* group, in which the females are sulphur-yellow; thirdly, the *T. æsiøpe* group, readily distinguished from both the preceding (and from any *Terias* found in Japan) by the irregularly sinuous transverse subapical red-brown streak on the under surface of the primaries; fourthly, we have the *T. sari* group, in which the sinuation of the outer border of primaries is distinctly oblique and the apical area of these wings below is occupied by a large quadrate reddish chocolate patch; and lastly the *T. tilaha* group, to which the more heavily bordered *T. sinensis* belongs, and which is characterized by the black or black-brown internal border to the primaries.

67. *Terias alitha*.

Terias alitha, Felder, Wien. ent. Monatschr. vi. p. 289. n. 51 (1862).

♂ ♀. Pasananca valley, Mindanao.

68. *Terias diversa*.

Terias diversa, Wallace, Trans. Ent. Soc. ser. 3, vol. iv. p. 324. n. 20 (1867).

♂ ♀. Camiguen, Philippines.

69. *Terias sulphurata*.

Terias sulphurata, Butler, P. Z. S. 1875, p. 617. n. 32.

♂. Aru.

70. *Terias aprica*, sp. n.

♂. Upper surface as in the preceding species; gamboge-yellow: primaries with slender black costal margin; apical area black-brown, commencing at apical third of costa, its inner edge oblique and concave, with four shallow sinuations, terminating in a nearly right angle upon the third median branch; external border rather narrow, bisinuated on the median interspaces, below which it expands abruptly, becoming as wide as the lower edge of the apical area: secondaries with slender greyish margin and small black spots at the extremities of the veins. Wings below lemon-yellow, with faint traces of the usual dark brown markings on the basal half, but with no trace of the sigmoidal subapical streak of *T. sulphurata*; marginal points extremely minute. Expanse of wings 42 millim.

♂. Tongatabu.

This species is slightly larger than the preceding, from which, however, it may chiefly be distinguished by the almost immaculate under surface and the total absence of the characteristic subapical sigmoidal streak on the under surface of the primaries; it belongs in fact to the same group with *T. hecabe*, and not with *T. aesiopae*.

71. *Terias vallivolans*, sp. n.

Bright lemon-yellow; primaries with the costal margin very narrowly black; apical area commencing at about the apical third of costa, its inner edge inangled and irregular, terminating in a rectangle on the third median branch; outer border upon the median interspaces narrow, unevenly bisinuated, expanding below the first median branch, but not very greatly, and notched just above the submedian vein: secondaries with a narrow, abbreviated, tapering, internally sinuated external dark brown border, commencing at the extremity of the first subcostal branch, but barely traceable beyond the second median branch. Under surface slightly paler; margin

and fringe dotted with black, the margin at the extremities of the veins, and the fringe at the extremities of the internervular folds : primaries with the usual discoidal dark brown markings in outline ; secondaries with the usual squamose brown markings. Expanse of wings 43 millim.

♂. Pasananca valley, Mindanao.

In pattern and coloration nearest to *Terias Mariesii*, var. *e* (Trans. Ent. Soc. 1880, pl. vi. fig. 5), but with narrower wings, the primaries with straighter costal margin and more rounded apex, the apical area with more angular inner edge, the outer border narrower on all the wings, that of secondaries as in my fig. 6, and that of primaries not produced along the inner border, as in *T. Mariesii*.

72. *Terias hecabe*.

Papilio hecabe, Linnæus, Mus. Lud. Ulr. p. 249 (1764).

♂. Aru.

73. *Terias puella*.

Xanthidia puella, Boisduval, Voy. Astr. Léop. p. 60, pl. ii. fig. 8 (1832).
Terias virgo, Wallace, Trans. Ent. Soc. ser. 3, vol. iv. p. 328. n. 35 (1867).

♂ ♀. Aru.

Boisduval's figure agrees well with Aru specimens of the male.

74. *Appias domitia*.

Pieris domitia, Felder, Wien. ent. Monatschr. vi. p. 285. n. 41 (1862).

♂. Pasananca valley, Mindanao.

75. *Appias mindanensis*, sp. n.

Tachyris domitia (part.), Semper (nec Felder), Stett. ent. Zeit. 1875, p. 401.

♂. Bright reddish orange, the veins black, the outer margins, the apical border of primaries, and the anal border of secondaries broadly greyish : primaries below deep cadmium-yellow, crossed beyond the middle by a squamose interrupted transverse grey streak ; veins beyond the middle black : secondaries bright golden cadmium-yellow, a rather broad discal grey-brown band from the second subcostal to the first median branch, beyond which band the veins are black ; abdominal border at base sulphur-yellow. Expanse of wings 72 millim.

♂. Pasananca valley, Mindanao.

I cannot agree with Semper in his belief that this and the

preceding are varieties of one species ; nor can I admit, without further evidence than the statement of his collector as to a single pair taken by him *in copulâ*, that *A. zamboanga* and *A. asterope* are both females of *A. domitia*. If one of these prove to be the female of *A. domitia*, it will be sufficiently curious, since the males of the two nearly allied species *A. nero* and *A. figulina* have females only differing from themselves in the presence of black borders to the wings and a broken black band on the primaries. Of these sexes there can be no question, though as species they differ in characters less marked than those existing between *A. domitia* and *A. mindanensis*—both also occurring commonly at Malacca, as the latter species do in Mindanao: the females, although less common than the males, agree with them in tint and in under-surface characters ; both are marked with black above, as in my figure of *A. figulina*.

Now, if M. Semper still believes *A. zamboanga* (not to mention *A. asterope*) to be the true female of *A. domitia*, he must (holding the views which he has expressed as to the variability of that species) admit, at any rate, the total distinctness of *A. nero*, and obliterate from his paper the following words:—“ Mehr Licht hierüber kann erst das Bekanntwerden des ♀ von Nero Fabr. geben, wofür ich *figulina* Butler, von der ich kürzlich im Neuchâtel Museum ein Exemplar ohne Abdomen gesehen habe, nicht halten kann ;” since he will certainly regard *A. figulina* as only a vermilion-coloured and more heavily banded form of the blood-red *A. nero*.

PAPILIONINÆ.

76. *Ornithoptera arruana*.

Ornithoptera arruana, Felder, Wien. ent. Monatschr. iii. p. 391. n. 32 (1859).

♀. Aru.

77. *Papilio gordion*.

Papilio gordion, Felder, Reise der Nov. Lep. i. p. 66. n. 50 (1865).

Pasananca valley, Mindanao.

78. *Papilio idæoides*.

Papilio idæoides, Hewitson, Exot. Butt. i. Orn. & Pap. pl. i. fig. 2 (1855).

Pasananca valley, Mindanao.

79. *Papilio Ledebouria*.

Papilio Ledebouria, Eschscholtz, Kotzeb. Reise, iii. p. 206, pl. iii. fig. 7 (1821).

Pasananca valley, Mindanao.

80. *Papilio Schmeltzi*.

Papilio Schmeltzi, Herrich-Schäffer, Stett. ent. Zeit. 1869, p. 78. n. 57, pl. i. fig. 1; Auss. Schmeltz. ii. fig. 106 (1869).

Kandavu, Fiji.

81. *Papilio alcidinus*, sp. n.

Allied to *P. Laglaizei* from New Guinea (Ann. Soc. Ent. France, 1878, pl. v.), but differing as follows:—The bands above greener, the central band of primaries of more equal width throughout, more angular and less oblique, so that its lower extremity is well separated from the external angle; subapical band broader, more angular, well divided from the costa; secondaries with the greenish area wider, divided by a broad uninterrupted black belt, with its outer edge towards apex zigzag; no submarginal black spots; tail longer: primaries below with the black belt bounding the subapical white band broader and continuous with the external black border, which is also broader, and not undulated as in *P. Laglaizei*; secondaries with the orange abdominal streak longer, tapering towards the base; inner discal series of black spots larger, six (instead of four) in number; the black submarginal lunules between the tail and the anal angle separate, not united into a wavy stripe as in *P. Laglaizei*. Expanse of wings 112 millim.

Aru.

An exact copy on the upper surface of *Alcidis aruus* of Felder.

82. *Papilio emalthion*.

Iliades emalthion, Hübner, Samml. exot. Schmeltz. (1816-30).

♀. Mindanao.

Hesperiidæ.

83. *Pamphila eurotas*.

Pamphila eurotas, Felder, Sitzb. Ak. Wiss. math.-nat. Cl. xl. p. 461, n. 52 (1860).

♂. Aru.

84. *Pamphila angustula*.

Pamphila angustula, Herrich-Schäffer, Stett. ent. Zeit. 1869, p. 79. n. 58.

Fiji; banks of the Wai Levu, Viti Levu.

85. *Pamphila sunias*.

Pamphila sunias, Felder, Sitzb. Ak. Wiss. math.-nat. Cl. xl. p. 462. n. 54 (1860).

Camiguen, Philippines, 26th January 1875.

86. *Suastus*, sp. n.?

Allied to *S. gremius*, Fabr., but too much rubbed and broken to form the type of a new species.

Mindanao.

87. *Thanaos inornatus*, sp. n.

♂. Above dark olive-brown, with slight cupreous reflections; body darker than the wings. Palpi below sordid whitish: primaries below smoky brown, slightly paler towards the inner margin; apical area diffused lilacine greyish: secondaries lilacine, irrorated with smoky brown, especially towards the base: body below grey. Expanse of wings 33 millim.

Aru.

88. *Plesioneura insulata*.

Plesioneura insulata, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. x. p. 154. n. 31 (1882).

Aru.

89. *Plesioneura proserpina*, sp. n.

Allied to *P. alysos* of Ceylon; black-brown; primaries crossed obliquely in the middle from costa to submedian vein by a broad semihyaline white belt, its inner edge angulated at the first median branch and its outer edge at the third median; five small white spots in a subapical zigzag series; under surface slightly paler, the palpi and a ventral longitudinal stripe white. Expanse of wings 42 millim.

Aru.

The two preceding species belong to the same group in the genus; but the differences are well marked and appear to be constant. A form very close to *P. proserpina* occurs at Waigiou.

HETEROCERA.

Lithosiidæ.

90. *Argina cribraria*.

Phalæna cribraria, Clerck, Icones, tab. 54. figs. 4, 4 a (1759-64).

Matuku, Fiji, July 24th 1874.

91. *Damalis alciphron*.

Phalæna-Attacus alciphron, Cramer, Pap. Exot. ii. p. 58, pl. cxxxiii. fig. E (1779).

Wild Island, Admiralty group.

92. *Hypsa dama*.

Noctua dama, Fabricius, Sp. Ins. ii. p. 216. n. 39 (1781); Donovan, Ins. New Holl. pl. xxxix. fig. 1 (1805).

Aru.

93. *Cleis aruana*.

Cleis aruana, Butler, Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 395. n. 8 (May 1877).

Aru.

Nyctemeridæ.

94. *Nyctemera fasciata*.

Nyctemera fasciata, Walker, Cat. Lep. Het. vii. p. 1665 (1856).

Kandavu, Fiji.

95. *Nyctemera alternata*.

Nyctemera alternata, Walker, Cat. Lep. Het. Suppl. v. p. 1879 (1866).

Camiguen, Philippines.

96. *Pitasila inconstans*.

Pitasila inconstans, Butler, P. Z. S. 1880, p. 672. n. 47.

Camiguen, Philippines.

Catephiidæ.

97. *Cocytodes modesta*.

Catocala modesta, Van der Hoeven, Léop. Nouv. pl. vii. fig. 8.

Matuku, Fiji, July 24th, 1874.

Ann. & Mag. N. Hist. Ser. 5. Vol. xi.

29

Ophideridæ.

98. *Phyllodes cerasifera*, sp. n. (Fig. 3, p. 427.)

Allied to *P. consobrina* of Silhet, but larger; the primaries paler, more uniform; the secondaries with the anal patch considerably larger, more rounded, the central white patch upon it extending transversely upwards almost to the edge of the rose-red border. Expanse of wings 156 millim.

Pasananca valley, Mindanao.

Unfortunately only one damaged example was obtained. Allied species occur also in Borneo and Java, that from the latter locality having been mistaken by Walker for the *P. inspicillator* of Guénée (an Amboina form, figured by Boisduval, and, in my opinion, not distinct from *P. conspicillator* of Cramer from the same locality). The species of *Phyllodes* can be arranged naturally in three groups as follows:—

1. *Species with an orange external border to the secondaries**.

- a. Border of secondaries traversed by an irregular black line; primaries traversed longitudinally by a black line.

Phyllodes semilinea, Walker, Journ. Linn. Soc. vii. p. 176. Borneo.

- b. Border of secondaries not traversed by a black line; primaries with two silvery white spots.

Phyllodes ornata, Moore, Descr. Lep. Atk. ii. p. 166 (1882). Darjiling.

- c. Border of secondaries abbreviated, longitudinal line of primaries and silver spots wanting.

Phyllodes ustulata, Westwood, Cab. Or. Ent. 57, pl. 28. fig. 1. Darjiling.

2. *Species with an orange band across the secondaries.*

Phyllodes Eymdhovii, Vollenhoven, Tijd. voor Ent. 1858, p. 86, pl. vi., = *P. fasciata*, Moore, P. Z. S. 1867, p. 69. Java and Darjiling.

3. *Species with a rose-red anal patch on the secondaries, usually more or less interrupted by a white patch.*

- a. Species small, the red patch not touching the anal margin, darker towards anal margin, but not suffused with white.

Graphigona roseifer, Felder & Rogenhofer, Reise der Nov. Lep. v. pl. cxiv. fig. 7 (1875). Amazons.

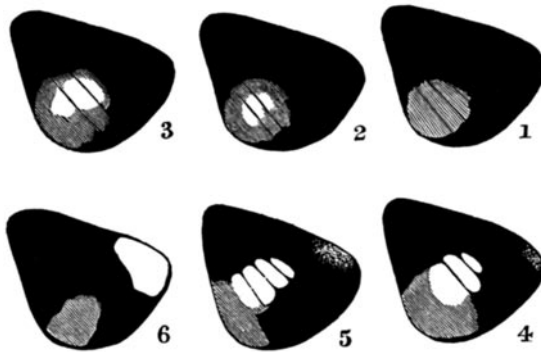
* *Phyllodes dux*, of Saalmüller, Stett. ent. Zeit. xlii. p. 441, from Nossi-Bé, if it be a true *Phyllodes*, will fall into this group; but a coloured figure forwarded to me by the author shows palpi with conical terminal article, indicating that it belongs to a distinct genus; the costa of primaries is also curved upwards at apex.

- b. Species large, the red patch touching the anal margin, slightly suffused with white in some examples.

Phyllodes roseigera, Butler, P.Z. S. 1883. Andamans. (Fig. 1.)

- c. The red patch more rounded, of a more crimson tint, with a conspicuous snow-white centre.

Phyllodes consobrina, Westwood, Cab. Or. Ent. 57, pl. xxviii. fig. 2 Silhet. (Fig. 2.)



Hind wings of *Phyllodes* (reduced).

- d. The red patch considerably larger, the white patch within it also larger, extending nearly to the inner edge of its red zone.

Phyllodes cerasifera, Butler, suprâ. Mindanao. (Fig. 3.)

- e. The red patch crescent-shaped, only extending halfway round the white patch, which is rounded and very large; apex cinereous.

Phyllodes floralis, sp. n. Borneo. (Fig. 4.)

- f. The red patch still more abbreviated, so as only to encircle one third of the white patch; the latter oblong.

Phyllodes Verhuellii, Vollenhoven, Tijds. voor Ent. 1858, p. 159. Java. (Fig. 5.)

- g. The red patch dark, elongated, not suffused with or interrupted by white; the apex of secondaries broadly ash-grey or white.

♀. *Phyllodes conspicillator*, Cramer, Pap. Exot. ii. pl. xevii. figs. A, B (1779) = ♂ *P. inspicillator*, Guénée. Amboina. (Fig. 6.)

In Cramer's figure the white patch appears to have travelled quite across the secondaries, from the centre of the red anal patch to the apex; moreover, as the white emerges from the red it seems to give off atoms in advance, so that the apical patch becomes gradually larger and whiter from its commencement in *P. floralis* (in which species the white is first seen to emerge from the red). Dr. Leuthner proposes the term "chromatropy" for this alteration in the position of colour-patches.

We see in this case how important it is to describe all the local forms which are known to be constant, since only by so doing can we hope to discover the laws which regulate the disposition of the colours and markings on the Lepidoptera.

Thermesiidæ.

99. *Azazia rubricans*.

Ophiura rubricans, Boisduval, Fauna Lép. Mad. p. 106, pl. xvi. fig. 1.
Aru.

Hydrocampidæ.

100. *Hydrocampa*, sp.

Near *Zebronia? meritalis*; perhaps new, but too much injured for description.
Mindanao.

Botididæ.

101. *Astura fluminalis*, sp. n.

Primaries grey, semitransparent, the borders narrowly ochreous, and a large oblong spot of the same colour just beyond the cell; basal area tinged with ochreous; two irregular blackish stripes, as in most species of *Botys*, the outer one abruptly inangled from below the first median branch; a blackish spot near the end of the cell, and a submarginal series bounding the external border, the inner edge of which is irregularly zigzag; secondaries ochreous, with a small spot at the end of the cell, two irregular series towards outer margin, and a large subanal spot dusky: body ochreous. Under surface nearly as above, but the stripes across the primaries obsolete. Expanse of wings 27 millim.

Banks of the Wai Levu, Viti Levu.

One imperfect example, but so distinct from any species hitherto described, that I do not hesitate to characterize it.

LI.—*On the Embryology of Hydra*. By Dr. A.
KOROTNEFF*.

As to the evolution of *Hydra* we are still in much uncertainty, although its principal phenomena have already been indicated by the two earlier observers Kleinenberg† and

* Translated by W. S. Dallas, F.L.S., from the 'Zeitschrift für wissenschaftliche Zoologie,' Band xxxviii. pp. 314-321.

† N. Kleinenberg, 'Hydra, eine anatomisch-entwicklungsgeschichtliche Untersuchung,' Leipzig, 1872.