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NOVITATES ZOOLOGICAE.

VOL. VI., 1899.





# NOVITATES ZOOLOGICAE.

A Journal of Zoology

*IN CONNECTION WITH THE TRING MUSEUM.*

EDITED BY

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*(WITH SIXTEEN PLATES.)*

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# NOVITATES ZOOLOGICAE.

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No. 1.

## NEW SPECIES AND GENERA OF THE FAMILIES *DREPANULIDAE*, *THYRIDIDAE*, *URANIDAE*, *EPIPLEMIDAE*, AND *GEOMETRIDAE*

FROM THE OLD-WORLD REGIONS.

By W. WARREN, M.A., F.E.S.

FAMILY *DREPANULIDAE*.

1. *Cobanilla erminea* sp. nov.

*Forewings*: brown-black, with darker transverse striae; basal area pinkish ochreous, varied with grey and silvery scales, bounded by a dark brown line or shade from costa at one-third, sharply angled on the subcostal, and curved inward to near base of inner margin; from two-thirds of inner margin an obscure dark line runs straight and oblique towards apex as far as vein 6, where it is most acutely angled, and runs back to meet a brown costal streak at two-thirds: except for the two brown streaks the costa is pale throughout; marginal area less brown than central, with transverse sooty specks; discocellular dark, with slight silvery dots at the angles.

*Hindwings*: uniform brown, with a curved deeper brown cloud beyond the discocellular; faint traces of darker specks towards apex; inner margin and the course of the lower veins studded with silvery scales: fringe of both wings concolorous with wing, and slightly glistening.

Underside of forewings dull red, speckled and towards hindmargin suffused with blackish; the outer oblique line distinct, lustrous-edged: of hindwings bright red, spotted with black along costa and hindmargin. Vertex, face, palpi, legs, and abdomen beneath brilliant red; shoulders nearly white; thorax ochreous grey: abdomen like hindwings.

Expanse of wings: 34 mm.

One ♂ from St. Aignan, November 1897 (A. S. Meek).

A second example from Kei Island, much worn, evidently belongs to the same species, the undersurface being precisely the same; but above the whole of the wings is reddish fawn-colour, with a few brown striae, and the basal area but slightly paler. It is apparently a local form.

2. *Cobanilla fulgens* sp. nov.

*Forewings*: olive-brown; the costa paler, pinkish, with a few black scales; the costal edge ochraceous; discocellular marked with dots of white scales; the costa and outer half of wing lustrous pearly, leaving only a triangular space

including the cell and a patch at anal angle of the deep ground-colour; fringe lustrous red-brown.

*Hindwings*: deepening in tint towards hindmargin; fringe as in forewings, but preceded by a broad lustrous line; discocellular as in forewings.

Underside of forewings reddish grey, the grey becoming darker towards hindmargin; a dark grey oblique outer line, and grey cell-spot; hindwings redder throughout, dappled with dull grey; fringe of both wings bright red. Face, fillet, legs, and underside of abdomen crimson; thorax and abdomen pinkish grey, the latter along dorsum olive-brown like the wings.

Expanse of wings: 34 mm.

One ♂ from Mount Dulit, Borneo (Hose).

Apex of forewings produced; hindmargin excised to vein 3, where there is a blunt elbow.

### 3. *Cobanilla triumbrata* sp. nov.

*Forewings*: yellowish fulvous; the costa broadly paler, more pinkish, and speckled with blackish scales; an oblique diffuse deeper fulvous shade from one-third of inner margin; a second at two-thirds, slightly sinuous, neither reaching the costa; a broad marginal deep fulvous fascia containing an obscure dentate submarginal line, only distinct at anal angle, where it forms two blackish lilac-edged spots on veins 1 and 2; fringe fulvous, marked with blackish beyond cell and above anal angle, these blackish patches preceded by lilac-grey marginal lunules or streaks; discocellular marked in white.

*Hindwings*: similar, the deeper shades less distinct, the whole central space between them being filled up with fulvous.

Underside yellow, with transverse bright fulvous striae, and fulvous suffusion at anal angle of both wings and apex of hindwing. Head, thorax, and abdomen like wings; top of face, palpi, and forelegs crimson.

Expanse of wings: 39 mm.

One ♀ from Penang, May 1897 (Curtis).

Along with this ♀ came a ♂, with the same locality and date, which is certainly *Oreta cerenica* Swinh., described from Singapore; though different in appearance, size, and coloration, they may prove the same species.

The species described by me as *Cobanilla hepaticata*, from Sandakan, Nov. Zool. IV. p. 13, is undoubtedly identical with Swinhoe's *Oreta cerenica*.

### 4. *Cobanilla unilinea* sp. nov.

*Forewings*: dull fulvous, with a lilac tinge; the lower arm of the angulated discocellular marked with white scales; a deeper fulvous diffuse shade from costa just before middle, traversing the discocellular, and very obscurely curved to towards base of inner margin; a deeper fulvous slightly flexuous line, edged externally with pale yellowish from just beyond middle of inner margin into apex; fringe deep fulvous.

*Hindwings*: with paler costal area; deeper fulvous central and marginal shades; the submarginal area with a few black scales and traces of two curved rows of darker spots between the veins; discocellular marked as in forewings.

Underside yellower; the fulvous streaks and suffusion brighter; the oblique line of forewing continued more broadly across middle of hindwing. Face and palpi



bright scarlet ; thorax and abdomen like wings ; the shoulders and base of patagia pinkish white.

Expanse of wings : 48 mm.

One ♀ from Ron Island, July 1897 (Doherty).

The apex of forewings bluntly rounded and but slightly produced, the hind-margin only faintly indented below it, then curved.

##### 5. *Cyclura confusata* sp. nov.

*Forewings* : greyish liver-colour, tinged with glossy lilac ; the costal area paler ; the whole wing crossed by numerous irregularly waved blackish lines, arranged in pairs and forming indistinct fasciae ; tawny patches beyond and below the end of cell, and above anal angle ; fringe brown-black.

*Hindwings* : similar ; the whole of the marginal apical area tawny, with the black lines thickened.

Underside ferruginous, mixed with blackish grey ; a thick postmedian blackish shade on both wings. Head, thorax, and abdomen like wings.

Expanse of wings : 39 mm.

One ♀ from Laiwni, Obi, September 1897 (Doherty).

The venation is unusual and considerably different from that of the typical species ; vein 6 is shortly stalked with 7 ; 8, 9, 10 are stalked, anastomosing shortly with 11 near origin, and 8 anastomosing shortly with 7 near apex.

##### 6. *Cyclura inconspicua* sp. nov.

*Forewings* : dull lilac-grey, speckled with fuscous and black ; a slight brownish suffusion near base, and a brownish median shade, swelling out at end of cell and embracing the white cell-spot, then oblique and narrowed to inner margin before middle : a line of brown submarginal spots, that at anal angle conspicuous ; fringe rather darker.

*Hindwings* : the same, with only a faint brown cloud in centre ; inner margin spotted with black.

Underside pale ochreous grey ; the forewings with an oblique black streak from three-fourths of inner margin towards apex, before which it becomes obsolete, and is followed by many coarse black spots ; hindwings with a dark blotch at costa only. Face brown ; thorax like wings ; abdomen paler.

Expanse of wings : 24 mm.

One ♀ from St. Aignau, November 1897 (Meek).

Differs from the type of the genus in venation ; 10 and 11 are long-stalked ; 6 short-stalked with 7 and 8 ; 9 absent (? coincident with 10).

##### 7. *Oreta obtusa* Wlk.

The type of this species in the British Museum is without antennae ; but the oblique line on the forewings is straight, not curved as in *catama* Moore, and the underside of forewings is almost wholly brownish red : in *catama*, on the contrary, the yellow and red tints of the upperside are even more strongly contrasted below than above ; the antennal serrations in *catama* are distinctly separate ; in *obtusa* coalescent ; so the two species must be kept apart. *Oreta obliquilinea* Hampson are merely smaller and less distinctly marked specimens of *obtusa* Wlk., with which they agree on the underside.

8. *Phalacra albilinea* sp. nov.

*Forewings*: pale wood-colour, finely black-speckled; the lines indistinct; a double dark line near base, angled in midwing; at about two-fifths and three-fifths of costa arise two grey irregularly dentate-crenulate lines, vertical in direction to the median vein, then oblique and approximating, to inner margin at one-third; the space between them pale yellowish ochreous; the space immediately preceding and following, as well as a subcostal streak, brownish ochreous; at five-sixths of costa a double lunulate line vertical to vein 4, then sharply oblique to inner margin at two-fifths, clear white, with fine black edges joined by black dashes at the veins; a strongly dentate submarginal line, the teeth outwardly marked in black; an oblique grey cloud below apex from hindmargin to outer line; marginal line fine, grey; fringe concolorous, with grey mottling; two black dots on the discocellular.

*Hindwings*: paler; the pale central fascia as in forewings, but equally wide throughout, preceded by a subbasal brownish ochreous band, internally dark-edged, and followed by a brownish lunulate line; outer line black, straight, slightly lunulate below costa, and preceded by a brownish lunulate line; submarginal and marginal areas as in forewings; two black dots on discocellular.

Underside whitish ochreous, dusted with grey; the cell-dots black; traces of three external grey lines, parallel to hindmargin. Face brown; palpi black; vertex and fillet whitish ochreous; thorax and abdomen brownish ochreous.

Expanse of wings: 39 mm.

One ♂ from the Khasias, February 1897.

## FAMILY THYRIDIDAE.

9. *Banisia albisignata* sp. nov.

*Forewings*: very pale ochreous, faintly striated with darker; the costal edge marked with five or six black dashes, indicating the origin of transverse fasciae, traces of which are barely discernible near costa and along inner margin, especially one just beyond middle of the latter; an obscure dark spot at bottom of the discocellular; a diffuse greyish cloud below and beyond cell; a large roundish whitish space at apex, ending in a point at end of vein 5, internally dark-margined, containing two dark spots and some scattered blackish scales; fringe concolorous.

*Hindwings*: white; with a slightly darker fascia near base edged by two blackish lines; and a more diffuse and broad central band formed of black interlacing striae, partly tinged with ochraceous, but without any defined edging; marginal area rather bright ochraceous, inwardly edged by a fine darker, nearly straight line, with a paler tooth-shaped mark from apex; fringe ochraceous, white at anal angle.

Underside much brighter-coloured; the apical white blotch black-edged, and with a black cloud below it; the costa whitish; hindwings with the dark markings almost obsolete. Face and palpi ochraceous; thorax like forewings; abdomen whitish, slightly tinged with ochreous down the back.

Expanse of wings: 26 mm.

One ♀ from Warri, Niger Coast Protectorate, July 1897 (Dr. Roth).

This species belongs to the group including *atripunctalis* Wlk., *trifascialis* Moore, *tritropha* Swinh., and *interalbicans* Warr., distinguished by the comparatively shorter and broader wings and obsolescence of the usual transverse markings.

10. *Bansia piperata* sp. nov.

*Forewings*: pale yellowish, crossed by five or six parallel, partially confluent orange bands, with somewhat angular edges: the pale bands of yellow ground-colour between them formed of series of globular spots: costal region finely dusted with black; marginal area with innumerable very minute black points and scratches, some of which extend into the base of the orange fringe.

*Hindwings*: the same.

Underside very similar, but more distinctly marked; the costal edge more strongly marked with blackish dashes than on upperside. Head, thorax, and abdomen yellow spotted with orange.

Expanse of wings: 16 mm.

One ♀ from Ron Island, July 1897 (Doherty).

11. *Bansia rectiviata* sp. nov.

*Forewings*: pale rufous brown, the veins darker; finely reticulated with darker and with the lines deeper brown; costa at base browner; a curved line at one-fifth; a straight thick brown line from before middle of costa to before middle of inner margin; a little beyond it two fine brown lines start from the costa, the first irregularly waved and partly double to two-thirds of inner margin, the second running obliquely outwards to below vein 4, and then forked to before and above anal angle; a curved brown line from before apex to the end of vein 4; fringe concolorous, with slightly darker basal line.

*Hindwings*: with a straight dark line near base, another near middle, double below the median, and there forming an irregular annulus; a straight thick line from middle of costa towards anal angle continuing the straight line of forewings; two fine curved lines beyond, becoming submarginal and throwing off spurs to hindmargin.

Underside the same. Head, thorax, and abdomen concolorous with wings.

Expanse of wings: 30 mm.

One ♀ from Ansus, Jobi Island, April, May 1897 (Doherty).

12. *Hypolamprus cossoides* sp. nov.

*Forewings*: fulvous yellow, suffused towards base along costa and inner margin with vinous brown, and marked with irregular transverse striae of the same colour; a linear cell-spot vinous; slight marginal spots between the veins; fringe concolorous.

*Hindwings*: similar.

Underside paler, with the markings fainter; traces of a vinous curved ante-median streak on both wings. Head, thorax, and abdomen yellowish, mixed with vinous scales: the shoulders altogether vinous.

Expanse of wings: 54 mm.

One ♂ from St. Aignan, November 1897 (Meek).

Forewings with costal insinuate in middle, convex before apex, which is shortly falcate; hindmargin sinuous; hindwings broad; the apex bluntly rectangular; hindmargin well rounded.

As it agrees with *Hypolamprus* in the venuration, I have placed it in that genus; but it will probably require a new one.

13. *Hypolamprus submarmorata* sp. nov.

Intermediate between *H. leopardata* Warr., from Cedar Bay, Queensland, and *H. unicolor* Warr., from Amboina : of the same size as the former, the forewings with the markings much less distinct : in the hindwings the dark central band forms between veins 5 and 6 a quadrate deep brown spot, and the pale fasciae on each side form two square **white** spots with a dark central line.

Underside without the subcostal and cellular coppery patch ; the whole of both wings thickly and regularly studded with small black points and striae.

Four ♀♀ from St. Aignan, October 1897 (Meek).

*Isothauma* gen. nov.

Like *Sicalodes* and *Rhodoneura* in shape and markings, but differing in the structure of the cell : in the above-mentioned genera the upper half of the discocellular is vertical and the lower oblique ; in *Isothauma* the reverse is the case, the upper half being oblique and the lower vertical ; this is especially noticeable in the hindwings, where the cell is very broad. Cell-spots formed by tufts of raised scales.

Type : *Isothauma opalinula* Mab. (*Sicalodes*), from Madagascar.

*Neothyris* gen. nov.

*Forewings* : elongate ; costa shouldered at base, abruptly convex before apex, straight or even inflected between ; apex minutely subfalcate ; hindmargin curved, much more oblique in the lower half ; inner margin truncate at base.

*Hindwings* : longer than broad ; apex prominent, bluntly rounded ; hindmargin rounded.

Antennae of ♂ slightly thickened towards base, pubescent or shortly ciliated, of ♀ filiform, simple ; basal joint surrounded by an involucre of scales, more conspicuous in ♂ ; forehead with a slight projecting tuft of scales below ; palpi stout, porrect, the basal joint as large as the second, distinct and hairy, the third much smaller and smoother ; tongue and frenulum present. Hindtibiae with four long slender spurs : all the femora fringed beneath with hairs.

*Neuration* : cell less than half of wing ; discocellular vertical ; first median at five-sixths, second, third, and lower radial all close together from round lower angle of cell ; upper radial and vein 7 from upper angle, the latter curved upwards at origin ; 8, 9 very long-stalked ; 10 and 11 free. Hindwings with the two subcostals short-stalked, the upper anastomosing for some distance with the costal ; medians as in forewings.

Type : *Neothyris aspirans* sp. nov.

14. *Neothyris aspirans* sp. nov.

*Forewings* : fulvous, suffused with deep brown, and with blackish brown transverse striae between the veins, forming an incomplete reticulation ; costa with dark oblique striae ; a wavy slightly curved blackish line from one-fifth of costa to one-third of inner margin, less distinct above ; an ill-defined oblique dark wavy line from inner margin just beyond, to beneath costa beyond the cell-spot, the included space generally dark brown ; an ill-defined brown cloud beginning narrow at the costa at three-fourths and broadening to anal angle, the space before and beyond it

brighter fulvous ; fringe with the basal half deep brown-black, terminal half white, chequered with brown beyond the veins ; cell-spot oblong, formed of dark scales, preceded in cell of ♂ only by a roundish hyaline spot.

*Hindwings* : with basal fourth pale fulvous, a central curved brown band, broader towards costa, separated by a curved fulvous fascia from the wholly darker marginal third.

The tints in the ♂ are throughout darker than in the ♀ ; the central costal and subcostal areas are streaked with grey scales in the ♂, the cell-spot being likewise ringed with grey.

Underside pale fawn-grey, speckled with darker, with a broad grey-brown marginal band ; both wings with longitudinal rows of dark dots between the veins ; the cell-spots large and black ; large black blotches also below the origin of first median nervule, united to cell-spots by red-brown scales, thus forming a short oblique central streak ; inner marginal area of both wings below submarginal fold without markings. Head, thorax, and abdomen fulvous ; undersurface of antennal involucere, and of first joint of palpi, and the pectus whitish ; legs brown, the tarsi chequered with whitish.

Expanse of wings : 56 mm.

A pair from Woodlark Island, March 1897 (A. S. Meek).

Also a ♀ from St. Aignan, September 1897, from the same collector.

#### 15. *Pharambara subscripta* sp. nov.

*Forewings* : dull greyish brown, covered with small darker striae, forming indistinct reticulations ; the fasciae darker, more clearly marked on costa and inner margin, at one-fourth, one-half, and three-fourths respectively ; the last strongly angled outwards towards middle of wing, in the direction of a small oval dark blotch before the hindmargin ; four small dark costal blotches before apex ; fringe concolorous.

*Hindwings* : without distinct fasciae ; the basal third paler, followed by a broad darker shade, not reaching hindmargin except at anal angle.

Underside with ground-colour pale, and all the striae and markings by contrast darker and more distinct ; a row of black and lustrous metallic scales along the median vein, and another along vein 6 at base of the triangular projection of the third fascia, which is also marked with ferruginous scales. Head, thorax, and abdomen concolorous with wings.

Expanse of wings : 18 mm.

One ♀ from Warri, Niger Coast Protectorate, June 1897 (Dr. Roth).

Here also belongs the example which, in Nov. Zool. Vol. V. p. 224, I wrongly referred to *thiastoralis* Wlk., from South America.

#### *Proterozeuxis* gen. nov.

*Forewings* : elongate ; the costa insinuate in middle, strongly depressed at apex ; hindmargin sinuate, strongly bowed below middle ; inner margin faintly sinuate.

*Hindwings* : small, triangular, the hindmargin sinuate, bulged at middle ; apex subacute ; anal angle subtruncate.

Abdomen (♂) elongated, the anal segments with expansile tuft. Antennae (♂) shortly but distinctly pectinated, the pectinations thickened towards extremity and

pubescent; palpi upturned obliquely in front of face; third joint half as long as second. Frenulum present; tongue ill-developed.

Neuration like that of *Hypolamprus*, but instead of 8 and 9, 7 and 8 are stalked. Cell and main veins of forewings beneath clothed with broad shining argyrescent scales.

Type: *Proterozeuxis splendida* sp. nov.

Distinguished from the other genera by the pectination of the antennae in the ♂ and the stalking of veins 7 and 8 of the forewings.

#### 16. *Proterozeuxis splendida* sp. nov.

*Forewings*: pale bright ochreous, with the striae lines and veins bright ferruginous, the costa shaded with darker; a slightly bent line at one-third of costa to middle of inner margin; a second from middle of costa, outcurved at end of cell, to inner margin before anal angle; third line from costa at two-thirds, contorted to touch second line beyond cell, to hindmargin above anal angle, before which it is forked; fourth line subapical, forked on costa, to end of vein 5; marginal line and fringe deep ferruginous; spaces between the lines with fainter rusty reticulations.

*Hindwings*: similar.

Underside the same, only paler. Head, thorax, and abdomen ochreous mixed with dull ferruginous.

Expanse of wings: 34 mm.

One ♂ from Natal (A. J. Spiller).

#### 17. *Siculodes naevina* ab. *carneata* nov.

Differing from the typical form of *naevina* Moore, from Darjiling,—which is also found in Borneo, the Philippines, and the Aru Islands,—in having the costal and hindmarginal areas of forewings strongly suffused with flesh-colour; the hindwings slightly so; the fringes of both wings flesh-colour. Underside of both wings, except the disc of forewings, the same colour.

One ♂ from the Khasias.

Thus also the Khasia Hill form, which I have called *tuberosalis*, differs from typical *Siculodes argentalis* Wlk., both from India and from the different islands from which it has been recorded.

#### 18. *Striglina asinina* sp. nov.

*Forewings*: dull dark smoky brown, crossed by numerous curved and waved lines of darker striae; a darker blotch on discocellular and another below it, forming part of the lower half of a median fascia; costa bright ochraceous between the dark lines; fringe darker, sometimes tipped with ochraceous.

*Hindwings*: similar.

Underside ferruginous, with the striae and the two blotches blackish and distinct; hindmargin of both wings, especially the hindwings, and the fringes black. Head, thorax, and abdomen like wings; palpi paler; foretarsi internally white, externally black, with the tips of all the joints white.

Expanse of wings: 27 mm.

Six ♂♂, two ♀♀, from Sula Mangoli, October—November 1897 (Doherty), and one ♂ from Dorei, June 1897 (Doherty). In this last the underside is greyish ochreous instead of ferruginous, and the black marginal area much larger.



19. *Striglina mediosecta* Warr., Nov. Zool. Vol. V. p. 424.

The type described from Kei Island, a ♂, was the only one sent. I have since seen another ♂ from Ron Island, accompanied by two ♀♀. These are slightly larger than the ♂♂, and differ especially in being rufous instead of brown, closely approaching in appearance the aberration *calpina* of *S. derasata* Warr.

## FAMILY URANIIDAE.

20. *Stesichora unipuncta* sp. nov.

Intermediate between *S. nivea* Warr. from the Kei Islands, which is spotless, except for three or four costal dots on the forewings, and *titania* Kirsch, from New Guinea, in which the hindwings have three marginal spots. The present species has a single large spot in the tail of the hindwings. The forewings have three or four dots on costa towards base and two larger ones near apex.

Expanse of wings : 48—52 mm.

Two ♂♂ from St. Aignan, August—November 1897 (Meek).

This form also occurs on Goodenough Island.

In view of the slight, though constant, differences in these local forms, it seems advisable to consider all three as subspecies of Walker's *S. puellaris*, from Amboina and the neighbouring islands, which has always five spots on the hindmargin of hindwings. In all the forms the ♂ has a well-marked fovea in the forewings.

## FAMILY EPIPLEMIDAE.

21. *Dirades pendula* sp. nov.

*Forewings* : grey, tinged with fawn-colour ; the costa with fine black scales ; first line blackish, indistinct, outwards curved, from one-third of costa to middle of inner margin, where it forms a small black spot ; second line from five-sixths of costa, strongly curved, black, edged externally with pale, incurved above vein 4, then vertical to inner margin before anal angle ; between veins 4 and 5 the black inner edge swells out into a round spot with black nucleus, and forms another black spot at inner margin ; a row of fine black submarginal dashes ; fringe concolorous.

*Hindwings* : with the outer line yellowish, bluntly angled in the middle, and edged inwardly with black scales below costa and before the inner marginal fold ; some black and fulvous marks along the median vein, and some blackish ill-shaped lunules along margin between veins 3 and 7, which are slightly produced.

Underside pale grey. Head, thorax, and abdomen grey ; face and palpi brown.

Expanse of wings : 16 mm.

One ♂ from Bali, low country, March—April 1896 (Doherty).

22. *Epiplema atrifasciata* sp. nov.

*Forewings* : dark grey ; the costa black-speckled ; first line from one-fourth of costa to one-fourth of inner margin, very indistinct and interrupted, angled outwards in cell, and shortly followed there by the blackish cell-spot, which is followed by a short dash of pale scales ; outer line velvety black and broad, from two-thirds of costa to four-fifths of inner margin, bluntly angled below the middle, then parallel to hindmargin and fine, but preceded near inner margin by black scales running

parallel to it ; some black scales above anal angle, and a short dark curved mark before the hindmargin beyond the cell ; fringe iron-grey.

*Hindwings* : with a narrow sinuous white postmedian line, which forms a slight blunt projection in middle, preceded by a broad blackish fascia ; a double dark dash on the discocellular, forming on the median an acute angle with a broader white dash ; basal area crossed by several broken curved blackish lines ; a blackish submarginal shade ; a sinuous blackish marginal streak from upper tooth to below lower tooth, crossed by two white dashes ; a pale slightly ochreous spot on costa beyond outer line, which there is less strongly marked.

Underside of forewings uniform dull grey ; of hindwings pale grey with dark speckling between the veins. Face and palpi black ; vertex, thorax, and abdomen grey ; the shoulders and patagia paler. Antennae with short broad serrations.

Expanse of wings : 24 mm.

One ♂ from the Khasia Hills, December 1896.

Forewings with apex bluntly rounded, and a slight curved indentation opposite the cell ; inner margin sinuous ; anal angle almost lobed ; hindwings with teeth at veins 4 and 7, and the costa sinuous.

### 23. *Epiplema barbara* sp. nov.

*Forewings* : pale sandy ochreous, dusted and striated with brown ; the costa minutely dotted with black ; first line obsolete ; second brown, from costa just beyond middle, sinuate outwards to vein 4 and there angled, then oblique inwards, and reaching the inner margin at two-thirds as a vertical brown spot ; a small brown curved mark before hindmargin beyond cell, and a diffuse brown cloud at anal angle ; fringe concolorous, with some brown scales along the base.

*Hindwings* : with an oblique brown streak on discocellular ; a double pale brown postmedian line, angled before the lower tooth, then bisinuate to anal angle ; the inner arm is marked by a black-brown blotch on costa, a smaller one on vein 7, and a brown shade in the sinus below the median vein ; externally it is followed by another brownish line, and the space beyond its angle is filled in with pale grey and brownish scales ; a dark brown curved line from tooth to tooth ; a pale ochreous dash above a brown spot at the lower tooth ; some brown striae towards apex.

Underside of forewings dull grey, of hindwings pale ochreous with a few brown striae. Head, thorax, and abdomen ochreous ; face and palpi dark brown.

Expanse of wings : 23 mm.

One ♂ from Kampala, Uganda, January 1897 (Dr. Ausorge).

### 24. *Epiplema bicolor* sp. nov.

*Forewings* : grey, with a faint pink tinge, sparsely black-speckled ; first line at one-third, angled in midwing and denoted by oblique interrupted marks, those towards costa blackish, the three lower ones rufous ; outer line at two-thirds, starting as a broad oblique costal blotch, blackish on costa, rufous below, angled on vein 5, then incurved parallel to hindmargin, and represented by a row of red-brown spots between the veins, which are doubled above inner margin ; an obscure submarginal row of small dark dots ; a chocolate marginal line from below apex, thinning out towards anal angle ; fringe rufous, with paler basal line ; costa marked with black strigulae, and two or three black spots before apex.

*Hindwings*: rufous grey, tinged with violet-brown along costa and at apex; a red-brown postmedian line, parallel to hindmargin, marked with dark dots at the veins; a more indistinct line towards base, and traces of two others between; a violet-brown undulating shade along margin from upper tooth towards anal angle; fringe violet-brown.

Underside of forewings dark grey, dotted with blackish, along costa pale grey; of hindwings pale grey, with a broad smoky-black submarginal fascia. Face and palpi dark chocolate-brown; vertex, thorax, and abdomen whitish grey.

Expanse of wings: 25 mm.

One ♂ from Ron Island, July 1897 (W. Doherty).

Forewings with hindmargin slightly toothed at vein 4, concave above, convex below; hindwings prominently toothed at veins 4 and 7.

A very distinct species.

### 25. *Epiplema diversipennis* sp. nov.

*Forewings*: bluish white, speckled with smoky grey-brown; the costa at base, a broadish curved fascia beyond middle, and a marginal fascia suffused with the same colour; fringe concolorous.

*Hindwings*: with the base whitish and the apex white; a postmedian pale line forming a beak externally on vein 4, preceded by a thick blackish shade, which above vein 4 becomes smoky brown, and followed by a smoky brown shade above vein 4 and a purplish grey one below it; traces of a fine double dark antemedian line, and another nearer base: the space below vein 4 marked with yellow scales; an irregularly waved blackish submarginal line from upper tooth to near anal angle, followed by a brown shade: fringe brown, white at apex.

Underside of forewings smoky brown; of hindwings smoky grey. Head and palpi blackish; thorax whitish; abdomen grey.

Expanse of wings: 24 mm.

One ♀ from ADSNS, Jobi Island, April—May 1897 (Doherty).

### 26. *Epiplema illineata*, nom. nov.

*Epiplema illitirata* Warr., Nov. Zool. V. p. 9.

The name *illitirata* must be altered, as I had already used it for an aberration of *Epiplema angulata*. (Cf. Nov. Zool. III. p. 275.)

### 27. *Monobolodes pallens* sp. nov.

*Forewings*: pale grey, thickly speckled with dark grey; the lines nearly as in the following species, but less diffuse, ferruginous, with darker scales at the veins; fringe iron-grey, with ferruginous line at base.

*Hindwings*: similar, the line appearing less curved.

Underside uniform pale grey, with slight darker dusting. Head, thorax, and abdomen concolorous with wings; face and palpi grey-brown.

Expanse of wings: 25 mm.

One ♀ from Woodlark Island, March 1897 (A. S. Meek).

In both wings the outer line is nearer the hindmargin than in *M. rectifascia*; otherwise the markings are almost identical: but they appear to be good and distinct island forms.

28. *Monobolodes rectifascia* sp. nov.

*Forewings*: dark purplish slate-colour, in certain lights appearing bluish or leaden-coloured; thickly and confusedly striated throughout with darker; the two lines darker, brownish purple: the first very indistinct, apparently strongly curved outwards in middle, as in *M. subfalcata*, from one-fourth of costa to one-third of inner margin, where alone it is plain; second, broader and diffuse, nearly straight, from two-thirds of costa to three-fourths of inner margin, before which it is faintly indented; fringe darker, slightly metallic, preceded by a fine ferruginous line, which extends round the apex along the costa; a faint submarginal shade.

*Hindwings*: somewhat paler, with only the outer line, which is curved, more concise, purplish brown mixed with ferruginous.

Underside uniform dull greyish slate-colour. Head, thorax, and abdomen all concolorous: face and palpi slightly deeper.

Expanse of wings: 25 mm.

Three ♀♀ from Sner, Mevor, May and June 1897 (W. Doherty).

Differs from the type species *M. subfalcata* Warr. from Queensland in the outer line being nearly straight, not strongly bulged below the middle.

29. *Paradirades farinosa* sp. nov.

*Forewings*: pale grey, thickly powdered with darker slightly ochreous strigae; the costa somewhat darker-marked, but without any distinct dark spots; no distinct markings; a dull diffuse dark spot on discocellular, and an irregular dark blotch before middle of hindmargin, through which can sometimes be traced a fine submarginal line; fringe concolorous, with rather darker basal line.

*Hindwings*: sometimes with faint traces of an antemedian and postmedian darker line; the striae generally denser before hindmargin.

Face and palpi deep chocolate-brown; head, thorax, and abdomen like wings. Underside wholly dull grey.

Expanse of wings: 16 mm.

One ♀, four ♂♂, from St. Aignan, September—November 1897 (Meek).

Distinguished at once by the absence of all defined markings.

## FAMILY GEOMETRIDAE.

## SUBFAMILY OENOCHROMINAE.

30. *Noreia venusta* sp. nov.

*Forewings*: leaden grey: the costal edge, the cell-spot, the fringe, and the three transverse lines deep rosy; first line obscure, at one-third; postmedian line at two-thirds, incurved to submedian fold below the cell-spot, then vertical; submarginal line parallel throughout to hindmargin; both formed of sagittate markings between the veins.

*Hindwings*: the same.

Underside with the cell-spots blackish, and the lines dark grey; fringe reddish. Head, thorax, and abdomen grey; face and palpi brown-black.

Expanse of wings: 38 mm.

One ♂ from Mount Dulit, Borneo, February—March 1894 (Hose).

Differing from other species of the genus in the more rounded apex of forewings and in the character of the markings; but the venuration is identical. The hindwings beneath have no tufts of hair.

### 31. *Noreia vinacea* sp. nov.

*Forewings*: deep dove-colour, shot with vinous, especially towards the hindmargin, and with very fine black dusting; first line slender, from one-third of costa, oblique outwards to near middle of inner margin; cell-spot linear, black, distinct; outer line bright vinous edged with pale from beyond middle of inner margin towards apex, rectangularly bent on vein 5 and retracted to costa, the costal arm dark grey; fringe vinous beyond a very concise fine dark basal line.

*Hindwings*: similar, but the vinous line central, the costal area dove-grey; no cell-spot.

Underside dark dove-grey, deeper towards hindmargin; the cell-spots and a sinuous line at two-thirds blackish. Head, thorax, and abdomen shining grey; face and palpi black-brown.

Expanse of wings: 38 mm.

One ♀ from Anus, Jobi Island, April—May 1897 (Doherty).

### 32. *Physetostege* (?) *punctilinea* sp. nov.

*Forewings*: reddish brown, the lines slightly darker, and marked by black vein-dots: first from one-fourth of costa to one-third of inner margin, curved; second from three-fourths of costa to two-thirds of inner margin, angled on veins 6 and 4; a very indistinct submarginal line; fringe reddish, with minute dark dots at the base; cell-spot dark.

*Hindwings*: the same, without first line.

Underside duller, less reddish, with the markings very obscure: the ground-colour becoming darker towards hindmargin, the fringe paler and reddish. Head, thorax, and abdomen like wings; face and palpi dark red-brown; basal joint of palpi sharply white.

Expanse of wings: 36 mm.

One ♀ from Sumba (Everett).

Referred to *Physetostege* provisionally in the absence of the ♂; the hindmargin of both wings is curved.

### 33. *Taxeotis collineata* sp. nov.

*Forewings*: pale greyish fawn-colour, with sparse black dusting; basal and marginal areas usually slightly darker and more thickly dusted than central; costal edge ochraceous; first line dark ferruginous from before one-third of costa to before one-third of inner margin, dentate outwards on subcostal, median, and submedian veins, concave between; outer line deep ferruginous, from costa at three-fourths, curved outwards to below vein 7, there acutely angled and obliquely sinuous inwards to two-thirds of inner margin, followed from angle to inner margin by a blackish externally dentate line, the space between the two lines yellowish; a row of round black marginal dots; cell-spot minute; fringe concolorous.

*Hindwings*: with the outer line continued at two-thirds; cell-spot small.

Underside of forewings grey-tinged, of hindwings whitish, both thickly

peppered with black: a sinuous postmedian line on both wings, thickened on veins; cell-spots and marginal spots black. Face and palpi dark ferruginous; basal joint of palpi ochreous; vertex, thorax, and abdomen like wings; abdomen beneath and legs whitish, like hindwings.

Expanse of wings: 34 mm.

One ♂ from Burdekin River, County Davenport, Queensland.

#### SUBFAMILY ORTHOSTIXINAE.

##### 34. *Bytharia lucida* sp. nov.

*Forewings*: deep yellow, with the costa and hindmargin black-brown, more broadly at the apex; the inner edge of the marginal border crenulate; the costal border slightly lustrous; along the curved edge of the marginal border is a lustrous lunate-edged fascia: fringe black-brown.

*Hindwings*: with marginal border narrower, its edge crenulate, and with a lustrous fascia.

Underside like upper, but with no lustrous scaling. Abdomen, legs, face, and thorax yellow; palpi, vertex, and antennae bronze-brown.

Expanse of wings: 40 mm.

Two ♂♂, one ♀, from New Hanover, February and March 1897 (Webster).

##### 35. *Eumelea apicata* (?) sp. nov.

*Forewings*: yellow, mottled with ferruginous striae; those along the costa purple; indistinct fulvous shades from inner margin at one-fourth and one-half, becoming obsolete above the median vein; apical third occupied by a large purplish chocolate blotch, scarcely reaching lower than vein 3, and enclosing a small yellow space at apex; fringe of the same colour as the blotch, with lunules of the same at base.

*Hindwings*: with a central straight slightly crenulated fulvous line, and before the apex four spots of purplish scales in a line to above middle of hindmargin: fringe purple, with a continuous purple basal line.

Underside the same, but all the striae as well as the lines and blotch purple. Head, thorax, and abdomen yellow, with a few purplish scales.

Expanse of wings: 60 mm.

One ♀ from Kapaur, Dutch New Guinea, low country, December 1896 (Doherty).

Certainly related to *E. genuina* Kirsch (= *craspedias* Meyr.), and possibly an abnormal example of the ♀ of that species; the types in both cases were ♂♂. I may here draw attention to the fact that in Kirsch's figure the central line of the forewings is drawn too strongly; it is rarely expressed above the median; Kirsch called it "*schr. verschwommene*."

This species is evidently identical with an insect described by Pagenstecher, *Jahrb. Nass. Ver.* 1886, p. 155, from New Guinea, as a further development of the form *genuina* Kirsch, which he as well as Snellen sinks along with all the other so-called species as synonyms of *rosalia* Cram. Unfortunately he does not give the sex.

36. *Eumelea aurigenaria* sp. nov.

♂. *Forewings*: olive-yellow, with dense rosy striae, and with the three lines rosy; first and second curved, at one-third and one-half, approximating below; submarginal shade broad, diffuse, to before anal angle, and becoming obsolescent towards costa; a distinct oval ocellus on discocellular; fringe yellow, with a deep rosy line at base, and a rosy line at middle.

*Hindwings*: the same, without first line; the shade very broad at apex; ocellus present.

Underside like upper. Head, thorax, and abdomen yellow, speckled with rosy; shoulders and collar all rosy.

♀. *Forewings*: yellow, with rusty striae, those along the costa only being purplish; the lines rusty purple; first at one-fourth, interrupted; second a little beyond the middle, suberemulate; the distance between these two lines therefore much greater than in the ♂, the ocellus being exactly half-way between them, whereas in the ♂ it is nearer to the central line; submarginal shade much narrower, projecting prominently outwards beyond cell; marginal line of dark brown-red shallow lunules; fringe as in ♂.

*Hindwings*: with the central line distinctly eremulate; the submarginal indistinct.

Underside with the striae and all markings rosy.

Expanse of wings: 52 mm.

One ♂, one ♀, from Lombok, June 1896 (Everett).

For some time past there has been in the Tring Museum a number of examples of this form, from Queensland, marked *aurigenaria*. As I have quite failed to find any trace of such a published species, I am inclined to think it may have been an error for *auriliata*, of which it might be considered a form. It differs, however, from typical *auriliata* in the uniformly smaller size, the absence of the marginal blotches in the ♀, in the yellower fringe, and in the presence of a distinct ocellus in both wings. Moreover, it occurs, besides Australia, in Borneo (Kina Balu), Nias, Oinainisa (Timor), Perak (Gunong Ijau), and Lombok, and is therefore almost as widespread as *auriliata* itself, of which it cannot be reckoned a subspecies or local form.

37. *Eumelea rosalia* Cram., *Pap. Lc.* IV. p. 152. Pl. 368. Fig. F.

I have lately seen three ♂♂ from Tawaya, Palos Bay, taken by Doherty, which answer precisely to Cramer's figure, which need not therefore be any longer looked upon as inexact. Pagenstecher also mentions (*Jahrb. Nass. Ver.* XXXIX. 1886. p. 155) some specimens from the Kei Islands as identical with the typical Amboina form.

38. *Ozola basisparsata* Wlk.

*Forewings*: fawn-colour, with a decided pink flush; thickly sprinkled with darker atoms; first line very obscure, angled in cell and formed of spots between the veins; second at two-thirds, curved below costa, then perfectly straight and slender to four-fifths of inner margin; beyond its upper half a curved line of small spots is faintly visible; submarginal line formed of spots, the four uppermost ones largest, the fourth reaching the margin; a row of minute marginal dots; fringe rufous, brown-tinged along the excision and above anal angle; cell-spot small.

*Hindwings* : whitish at base, speckled with black scales ; cell-spot blackish ; an almost straight slender line at two-thirds ; a submarginal line of black dashes on the veins.

Underside whitish, thickly speckled with red-brown ; the outer line red-brown, with a reddish subcostal streak from it to the outer line of spots. Head, thorax, and abdomen concolorous with wings ; palpi and forelegs rosy-tinged.

Expanse of wings : 32 mm.

One ♂ from Penang, November 1896 (Curtis).

Allied to *O. ceterisaria* Wlk. ; the hindwing rectangularly produced at vein 6 ; forewings with apex falcate ; hindmargin angulated at vein 4, concave above and below.

### 39. *Ozola incompleta* sp. nov.

*Forewings* : whitish, with coarse fuscous atoms ; first line represented by a fuscous costal spot at one-third, not reaching below the median vein ; cell-spot black, with the fuscous atoms denser above and below it ; outer line from costa at two-thirds, concave basewards to vein 2, where it is joined by a second more strongly concave line from the costa, then retracted towards anal angle ; space between these two lines more or less filled up with fuscous ; a triangular blotch of fuscous striae on hindmargin beyond cell, joined by a fuscous line from costa, and a smaller blotch at anal angle ; fringe fuscous, except from veins 2 to 4, where it is whitish ; a marginal row of small black dots.

*Hindwings* : with a fuscous apical blotch, and a fuscous outer line, bluntly angled beyond cell ; cell-spot blackish ; fringe fuscous round the apical blotch, beyond it whitish.

Underside exactly similar. Head, thorax, and abdomen like wings.

Expanse of wings : 27 mm.

One ♂ from S. Flores, November 1896, dry season (Everett).

Forewings long and narrow, costa strongly depressed before apex, which is produced but not falcate, the hindmargin being oblique from apex to vein 4, then slightly indented, and still more oblique to anal angle ; hindwings with both angles rounded, and the hindmargin bluntly prominent at vein 6.

### 40. *Ozola indefensa* sp. nov.

*Forewings* : pinkish ochreous, with coarse fuscous and ferruginous atoms, the lines fine, and sometimes obsolete ; the first basal curved, the second strongly bulged outwards in its upper two-thirds, the curve being crossed within by a straight oblique line, which with the other forms a small blotch on the inner margin ; a brown subapical blotch, and a smaller blotch at the anal angle ; a submarginal line near margin from costa before apex touching the edge of the subapical and anal blotches ; fringe dark fuscous from apex to elbow beyond the dark blotch, and again beyond that at the anal angle.

*Hindwings* : with two brown lines which are joined on the costa, and recede from each other towards the inner margin ; apex washed with fuscous ; fringes dark half-way from apex ; in both wings a row of minute black dots at base of fringes.

Underside the same, with the markings browner.



Expanse of wings : ♂ ♀, 24 mm.

Two ♂♂ from Dorei, July 1897 (Doherty) : also from Claremont Island, in B.M.

SUBFAMILY : PSEUDOTERPNIINAE.

41. *Actenochroma unicolor* sp. nov.

*Forewings* : olive-drab, speckled with black, the speckles thickest along the costa and beyond the outer line, where they are partially confluent ; the lines black, thickened towards costa ; first from one-fifth of costa to one-third of inner margin, slightly angled basewards on median and submedian veins ; second from three-fourths of costa to inner margin shortly before anal angle, thick and concave outwards to vein 4, then oblique inwards, lunulate and dentate outwards on the veins ; an interrupted black marginal line ; cell-spot black, slightly angled ; fringe concolorous, chequered with black beyond veins.

*Hindwings* : without first line, and the second line lunulate and dentate throughout.

Underside pale stone-colour, with a faint pink tinge ; cell-spots black, that in the forewings large ; costa of forewings spotted with black ; a smoky black submarginal fascia beyond second line, the area beyond it smoky grey in forewings, and hardly darker than ground-colour in the hindwings. Face black ; palpi, vertex, thorax, and abdomen concolorous, the abdomen speckled with black.

Expanse of wings : 40 mm.

One ♂ from Mount Dulit, Borneo (Hose).

42. *Hypochroma multicolor* sp. nov.

*Forewings* : pale green, slightly dusted with dark scales ; the costa with fine dark dots ; lines darker, olive-green, passing into blackish towards costa ; first at about one-third, curved outwards above and below median ; second at two-thirds, hardly waved to vein 6, then incurved, dentate, and lunulate ; the first line is preceded and the second followed by a faintly paler shade ; submarginal line dentate, whitish green, preceded by a cloudy fascia of blackish scales, mixed towards costa with reddish, and followed by a blackish blotch beyond cell and an elongated cloud above anal angle, also mixed with reddish ; marginal spots irregular, lunulate ; fringe pale green, with dark mottling beyond veins ; cell-spot black.

*Hindwings* : with thick blackish dusting near base ; the tufts green ; post-median line regularly dentate, followed by slightly raised pale lunules ; patches of blackish and reddish scales before and beyond the submarginal line, which is slightly raised.

Underside of both wings bright yellow ; the forewings below the median dull rosy, passing into whitish on inner margin ; cell-spot of forewings large, purple ; marginal third of both wings deep purple, separated from the yellow basal areas by a small white space ; in the forewings traversed by a submarginal row of white intraneural spots, the apex and a small patch at middle of hind-margin, like the fringes, whitish yellow ; in the hindwings with a patch at anal angle and a larger one below middle whitish yellow. Face, palpi, and antennae

rufous; vertex, thorax, and abdomen concolorous with wings; legs and underside of abdomen ochreous; the forelegs rufous.

Expanse of wings: 36 mm.

One ♂ from St. Aignan, August–November 1897 (A. S. Meek).

### 43. *Hypochroma purpurifera* sp. nov.

*Forewings*: a mixture of whitish, dull green, and dull reddish scales, the whitish predominating; the costal area more greenish, and the hindmarginal greenish mixed with red; the marginal third with transverse black striae; the lines blackish, fairly distinct: first at one-third, nearly vertical, but forming three slight curves; second at two-thirds, irregularly dentate, and incurved below vein 4; submarginal line distinct, whitish, strongly dentate, edged on both sides by pinkish and black scales; a row of marginal black spots between veins; fringe whitish, mottled with black at the ends of veins; cell-spot linear, dark.

*Hindwings*: more reddish-tinged throughout; basal area with the usual tufts; outer line at two-thirds, regularly lunulate-dentate, edged by white lumps of slightly raised scales; submarginal line whitish, wavy; black striae and spots congregated along veins; basal two-thirds of abdominal margin as well as the fringe golden yellow.

Underside of forewings: costal base golden; below median vein and centre of cell dull purple; cell-spot large, velvety black, followed by a subquadrate white blotch; a broad black marginal fascia; the apex and fringe white; hindwings with basal two-thirds golden; cell-spot smaller, followed by a smaller white blotch; marginal border complete. Palpi ochreous, the tips of the joints pale brown; face brownish yellow; vertex and collar ochreous, with a few dark scales; thorax like wings; abdomen smooth, pinkish ochreous, much speckled with black; with a yellow lateral stripe.

Expanse of wings: 48 mm.

One ♀ from Tagela, Solomon I-lands (Woodford).

Nearest allied to *subornata* Warr. and *aurantiacea* Lucas, and above wonderfully like *mascosaria* Guen.

In forewings vein 11 anastomoses with 12, and 10 with 11; 6 and 7 of hindwings separate.

### 44. *Hypochroma viridicoma* sp. nov.

*Forewings*: pale green, darker at base and along costa, sprinkled in places with black scales; costa marked with dense short black striae; inner line from about one-third of costa to one-fourth of inner margin, marked by a darker green shade mixed with black and a few pink scales; cell-spot reddish; outer line from a dark spot at two-thirds of costa, oblique outwards to vein 6, vertical to vein 4, then strongly oblique inwards to middle of inner margin, fine and slightly dentate, dark green, immediately succeeded by a pale space; submarginal line irregularly dentate, pale green, preceded by a red-brown blotch on costa and by patches of mixed pinkish and blackish scales beyond cell and above inner margin, and followed by red-brown patches at the same places; dark lunulate spots along hindmarginal between the veins; fringe pinkish, mottled with darker.

*Hindwings*: with basal half a mixture of black and dull pink scales, with large

pale green confluent tufts of long erect hairs in cell and on submedian fold; rest of the wing as in forewings, with the reddish patches paler.

Underside of both wings yellow, with a broad purplish border with sinuate inner edge, leaving on forewings the apex only whitish, and on hindwings three small white patches, above vein 6, at the end of vein 4, and above anal angle; preceded on hindwings by a narrow whitish space, and on forewings by an oblong white patch above median; cell-spots purple-black, much larger on forewings than on hindwings. Palpi ochreous, darker above; face ochreous below, reddish above, with a pair of ochreous yellow dots on each side; vertex greenish, with an ochreous spot in centre; thorax and patagia green tipped with reddish; abdomen yellowish ochreous above and below, the basal segments with pinkish scales.

Expanse of wings: 39 mm.

One ♂ from Tugela, Solomon Islands (Woodford).

Distinguished by the large green tufts of the hindwings and by the very slightly crenulated hindmargins. In the forewings 11 anastomoses with 12, and 10 with 11; in hindwings 6 and 7 are separate.

#### 45. *Pingasa atriscripta* sp. nov.

*Forewings*: pale greenish ochreous, the costa freckled with blackish; the lines concisely black; first from costa at one-third to inner margin at one-fourth, bluntly angled outwards above median, more strongly below, and with slight angles inwards below costa and on submedian; on the costa it forms a black spot, and above the inner margin is edged with reddish scales; at the extreme base of inner margin are a few reddish grey scales; second line at two-thirds, curved, slightly indented on vein 5, and with minute teeth outwards on the veins, followed by a fascia of grey and blackish scales mixed with reddish beyond cell and at anal angle, the acutely dentate edge of which forms the submarginal line; a row of round black marginal spots between the veins; discocellular marked by two obliquely placed black spots; fringe concolorous, grey towards anal angle.

*Hindwings*: the same, without first line.

Underside white, with broad marginal fascia, which on the forewings leaves a white patch at apex and below middle, and on the hindwings is irregularly edged with white all round; a black oblong cell-spot on forewing, a small one on hindwing; the disc and costa of forewings are slightly tinged with pinkish fuscous. Head, thorax, and abdomen concolorous with wings; face with a broad central velvety black bar; tufts of abdomen edged with reddish grey.

Expanse of wings: 38 mm.

One ♂ from Goodenough Island, December 1896 (Meek).

#### 46. *Terpna tenuilinea* sp. nov.

*Forewings*: dull olive-green, thickly dusted with darker atoms and striae, and in places with whitish scales; costa ochreous, with fine dark striae; basal area narrow, pale green without any dusting, with a rufous mark close to base and edged by a very fine nearly vertical blackish line with rufous on its outer margin; outer line at two-thirds, distinctly angled outwards on vein 4, above which it is concave, then oblique inwards, lunulate and dentate, to two-thirds of inner margin, finely black with a rufous internal edging; a linear cell-mark, black and rufous, followed

by a patch of olive scales; submarginal line crenulate, white, most distinct towards costa, and interrupted below, preceded throughout by a broadish rufous fascia, and followed from veins 5 to 7 by a subquadrate whitish patch on hindmargin; marginal line blackish, thickened between the veins; fringe olive-rufous, chequered with darker at the ends of the veins and whitish beyond the white patch.

*Hindwings*: similar, without basal line; submarginal line shown by white dashes at the tips of the teeth.

Underside white, with a broad brown-black marginal fascia passing into reddish towards hindmargin, leaving the subapical spot white; cell-spot black-brown edged with reddish; a pink streak above the submedian fold; hindwings with no cell-spot, the fascia much darker and submarginal. Face rufous, with mixed whitish and darker scales; vertex, thorax, and abdomen pale whitish ochreous, dusted with rufous and fuscous scales; the tufts of abdomen slightly lustrous.

Expanse of wings: 48 mm.

One ♀ from Tambora, June 1896 (Doherty).

#### SUBFAMILY GEOMETRINAE.

#### 47. *Agathia exquisita* sp. nov.

*Forewings*: pale pea-green, speckled with purplish fuscous; costa grey with darker dots, tinged with purplish towards base and apex; a dark purplish patch at base of inner margin, not reaching above middle; first line grey, from one-fourth of costa to near middle of inner margin, where it joins the second; its edges irregularly crenulate; second line developed into a broad grey-shade from three-fourths of costa to before anal angle, its outer edge regularly dentate and sinuous, its inner edge with a biangulated sinus beyond cell; above the middle this shade is tinged with purple-grey, especially on its inner edge, and externally runs out above vein 7 to apex; the lower part contains a small green spot on the submedian fold; a large purplish submarginal spot above vein 5, and two smaller ones straight above it; fringe delicate pale grey, with a darker basal line, and flecked with darker at apex and ends of veins 3 and 4.

*Hindwings*: with the base narrowly grey; outer two-thirds a mixture of various shades of pearly grey and fawn-colour, edged inwardly by a purplish line, toothed in the middle, and containing traces of a pale grey dentate line, preceded and followed by purplish grey shades; the outer edge of the grey area is dentate, and cuts off irregular patches of green along hindmargin; marginal line purplish below vein 6; fringe as in forewings.

Underside delicate pale green, with a purplish black curved postmedian shade on both wings, followed in the hindwings by a second more diffuse and cloudy shade; costa of forewings whitish, with a purplish blotch before apex; fringe of forewings pale green, of hindwings greyer green, with dark spots at end of veins 3 and 4. Face and palpi ochreous and purple; fillet and antennal shaft purplish; thorax and patagia green flecked with purple scales; abdomen ochreous grey, with green spots on each segment.

Expanse of wings: 39 mm.

One ♀ from Laiwui, Ohi, September 1897 (Doherty).

Allied to *A. obsoluta* Warr. from Java, but quite different on the underside.

**Antharmostes** gen. nov.

*Forewings*: with costa slightly curved; apex subacute; hindmargin obliquely curved.

*Hindwings*: kite-shaped, with a distinct tooth at vein 4; sinuous above, straight below.

Palpi thick, porrect, the terminal joint minute. Antennae of ♂ with short stiff branches, as in *Hemistola* Warr.; frenulum and tongue present; legs short; hindtibiae thickened, with a groove and pencil of hairs, and four stout spurs.

*Nervation*: forewings, cell not half the length of wing; discocellular with upper third vertical, then concave and oblique: first median at three-fifths, second close before third: lower radial from the bend of the discocellular: upper stalked with 7, 8, 9, 10; 11 free. Hindwings, with 3, 4, and 6, 7 stalked; costal shortly approximated to subcostal near base.

Type: *Antharmostes mesoleuca* sp. nov.

Wings without markings; dark green.

48. **Antharmostes mesoleuca** sp. nov.

*Forewings*: dark green: costa pale with fuscous dots; a faintly darker cell-spot; marginal line red-brown, interrupted at the veins; preceded between veins 3 and 4 by a white, red-edged lunule; thickened between 2 and 3, and preceded by a shallow whitish lunule between 1 and 2; fringe rufous.

*Hindwings*: similar; the white lunule running into the tooth at middle; some whitish scales at apex before marginal line.

Underside glossy whitish green, with a very faint reddish tinge towards base of forewings; fringe rufous. Face and palpi above black-brown, palpi beneath ochreous; vertex and thorax faded, apparently green; abdomen ochreous, dusted towards base with reddish fuscous scales.

Expanse of wings: 34 mm.

One ♂ from Warri, Niger Coast Protectorate, October 1897 (Dr. Roth).

49. **Chlorochroma (?) marginata** sp. nov.

*Forewings*: bright apple-green, without markings; costa ochreous white; fringe silvery white, preceded by a deep brown-red uninterrupted marginal line, which is edged inwardly with rufous between the veins, and is continued for a short distance along the costa, strongly lustrous throughout.

*Hindwings*: the same; the discocellular in both wings appears darker green.

Underside glossy whitish green; costal edge of forewings ochreous. Face, palpi, vertex, and antennae ochreous white; thorax green; abdomen ochreous.

Expanse of wings: 22 mm.

One ♀ from Little Kei, June 1897 (H. Kühn).

The right position of this insect is doubtful; the antennae are thickened basewards and subserrate; the palpi longer and thinner than usual; the hindtibia (♀) has a single long spur just above the terminal pair. In the forewings veins 3 and 4 are stalked, vein 2 rising shortly before end of cell; 7, 8, 9, 10 stalked; 11 free. Perhaps related to *Leuconerata* Wlk.

**Chlorodrepana** gen. nov.

*Forewings*: with costa strongly arched, apex acutely produced, falcate; hindmargin sinuate, hardly oblique, with a very faint bend at vein 4; anal angle rectangular.

*Hindwings*: with apex curved, hindmargin nearly straight from vein 6 to anal angle, just bent at vein 4; anal angle lobed.

Antennae (♀) simple, quite short; palpi thin and straight, not reaching front of face; tongue and frenulum invisible.

*Veuration*: forewings, cell not half as long as wing; discocellular angulated, the lower two-thirds oblique; first median at two-thirds, second and third short-stalked; lower radial from the angulation of discocellular; upper radial short-stalked with 10, 7, 8, 9; 11 free, bent close to costal, but not anastomosing with it. Hindwings, with 3, 4, and 6, 7 stalked.

Type: *Chlorodrepana rothi* sp. nov.

50. **Chlorodrepana rothi** sp. nov.

*Forewings*: with basal two-thirds deep green; costa broadly stone-colour, dusted with black atoms; marginal third, except an elongated green patch between costal streak and vein 6, stone-colour densely dusted with fuscous scales, and with a small dark blotch between veins 3 and 4; the colours are separated by a pale line from costa at two-thirds, oblique outwards to vein 6, vertically curved to vein 4, then curved inwards to inner margin at two-thirds; a marginal row of blackish lunules between the veins; fringe fuscous with a pale base.

*Hindwings*: with only the basal half green; costa broadly rosy; inner margin narrowly rosy with fuscous speckles; marginal area darker than in forewings, towards costa mixed with rosy, and with an oval black spot on each side of vein 3.

Underside fulvous; the marginal row of black lunules preceded by a series of broad white lunules, then a broad fuscous fascia with lunulate edges, next an ochreous fascia, also with lunulate edges, broadening to anal angle, preceded by another fuscous fascia, which is diffuse inwards. Face and palpi brown-black; vertex and shoulders stone-colour; thorax green; abdomen greyish ochreous, tinged along the back with rosy.

Expanse of wings: 39 mm.

One ♀ from Warri, end of April 1897.

Sent by Dr. Roth, in whose honour I have named the species.

51. **Comostolodes subhyalina** nom. nov.

*Euchloris inductaria* Hampson, *Fauna Brit. Ind., Moths*, III, p. 499 (*nee* Guen.).

The examples which have for some time been standing in the British Museum Collection as *inductaria* Guen. expand 36 mm.; but Guenée gives the size of his insect, the type of which came from Borneo, as 20 mm. These can hardly be identical. And again, though he acknowledged that his single specimen was in bad condition, Guenée did not call it semihyaline, but green with a yellow tinge. On the other hand, Hampson's description of his *amaragdus*, from the Nilgiris, agrees both in size (18 mm.) and colour (yellow-green) almost exactly with Guenée's own

account of *inductaria*. If therefore this small South Indian species be taken as identical with Guenée's true *inductaria*, I propose the new name *subhimalia* for the very much larger North Indian form, which has hitherto passed for *inductaria*.

52. **Eucrostes rubristicta** sp. nov.

*Forewings* : delicate green, the veins all darker : a red, deeper-centred cell-spot ; first line represented merely by a red spot on submedian vein at one-third ; outer line from four-fifths of costa, below which it is curved, thence straight and oblique, to two-thirds of inner margin, marked on its inner edge by three red spots, one on vein 6, a second, larger, between veins 3 and 4, and the third on the submedian ; fringe white.

*Hindwings* : similar, but without the red dot near base, and with the outer line curved.

Underside whitish green, glossy ; costa of forewings broadly fuscous near base. Head and thorax green ; face damaged ; abdomen wanting.

Expanse of wings : 16 mm.

One ♂ from Kampala, Uganda, end of January 1897 (Dr. Ausorge).

53. **Euxena crypsichroma** Warr., Nov. Zool. III. p. 366 (♂).

The type described was a ♂ from Mount Mulu, North Borneo. Of a pair since received from Mount Dulit, the ♂ agrees well with the type ; but as the ♀ differs considerably, it will be well to describe it. Ground-colour dull green : lines as in the ♂ : cell-spots much larger, pear-shaped, deep brown-black, the narrow end towards costa ; a crenulate dark line before the fringes. Underside not fulvous, but dull olive-fuscous ; the lines darker, diffuse ; the central line of forewings edged with paler lunules, the submarginal line formed of distinct whitish spots ; both pale lines much broader on the hindwings. The yellowish green ground-colour of the ♂ appears to be due to the bright fulvous underside showing through.

54. **Gelasma cynthia** sp. nov.

*Forewings* : dull electric blue, lustrous in certain lights ; costal edge yellow ; the lines olive-green, subdentate : first from one-third of inner margin, where it is subdentate, becoming obsolete in hindwing ; second from two-thirds of inner margin, oblique outwards, dentate externally, diffuse internally, becoming obsolete at vein 6 ; the teeth marked with white dashes on veins ; cell-spot annular, olive-green ; marginal line blue-black ; fringe yellowish white, chequered with dark at the ends of veins.

*Hindwings* : the same, but without first line ; the postmedian reaching both margins.

Underside dull bronzy yellow ; fringe yellow ; a purple blotch at apex of hindwings and anal angle of both wings. Face and top of palpi black ; palpi beneath and third joint ochreous ; thorax like wings ; abdomen discoloured, probably the same.

Expanse of wings : 36 mm.

One ♂ from St. Anna (Woodford).

Related to *G. electrica* Warr. from Rou Island.

55. *Gelasma sublustris* sp. nov.

*Forewings*: dull olive-green, with a strong bluish sheen; costa yellow; the lines dull pearl-white: first from one-fifth of costa to one-fourth of inner margin, faintly curved; second from below two-thirds of costa to three-fourths of inner margin, regularly crenulate; cell-spot also dull whitish, with darker green edge; fringe glossy grey, with no marginal line.

*Hindwings*: the same, without basal line.

Underside paler, blue-grey; fringe grey; costa of forewings yellow. Face and palpi brown-black; vertex and shaft of antennae white, the pectinations ferruginous; thorax and collar olive-green; abdomen ochreous.

Expanse of wings: 37 mm.

One ♂ from Rou Island, July 1897 (Doherty).

Although from the same locality as *Gelasma (Chrysochloroma) electrica*, described in *Nov. Zool.* III, p. 363, I cannot think that it is an aberration of that remarkable species. They both differ from *Chrysochloroma* in having four spurs to the hindtibiae in the ♂.

56. *Gelasma unicolor* sp. nov.

*Forewings*: uniform pale olive-green, with a slight iridescent sheen in certain lights; traces of deeper green lines at one-third and two-thirds, the latter lunulate, and more strongly marked on the veins; fringe paler green.

*Hindwings*: the same; both lines angled in the middle.

Underside paler, glossy, without markings. Head, thorax, and abdomen concolorous; vertex and antennae white.

Expanse of wings: 32 mm.

One ♀ from S. Flores, November 1896, dry season (Everett).

57. *Hemistola simplex* sp. nov.

*Forewings*: pale green; the costa narrowly yellowish, and marked with slight purple-grey specks; no lines or cell-spot expressed; the outer line indicated by a red spot on inner margin at two-thirds; marginal line bright red, interrupted by pale spots at the vein-ends, which are followed by red dashes in the concolorous fringe; the marginal line is continued round the apex for a short distance along costa.

*Hindwings*: the same.

Underside whitish green. Face and palpi pale brownish; vertex white, thorax and abdomen pale green, the latter with an interrupted red dorsal stripe.

Expanse of wings: 35 mm.

One ♂ from the North Mountains, Formosa, July 1896, 1500—3000 feet (Jonas).

58. *Hydata (?) dubia* sp. nov.

*Forewings*: dull mealy green, with the hindmargin and fringe paler, yellowish-tinged, an obscure pale space beyond cell curving to inner margin.

*Hindwings*: deeper green.

Underside dull greyish green; central space of forewings paler. Head, thorax, and abdomen greenish; vertex white, palpi ochreous with black apex.

Expanse of wings: 49 mm.



One ♀ from Warri, Niger Coast Protectorate, July 1897 (Dr. Roth).

Having seen only one, and that a by no means perfect, example of this species, I have referred it provisionally to the American genus *Hydrotia*, to some of the species of which it bears a certain resemblance; but it cannot remain there. The hindwings have a rather strongly marked elbow in the hindmargin at the end of vein 6; the palpi are long, horizontally porrect, of uniform width throughout, and blunt at apex; the short antennae (♀) have the shaft broad, loosely lamellate, rough above, and with two rows of short claw-shaped pubescent pectinations.

#### 59. *Iodis viridaurea* sp. nov.

*Forewings*: pale translucent blue-green, speckled with pale olive; the costa finely ochreous; lines thick, dull pale olive, very faint; first line curved, at one-fourth; second at two-thirds, diffuse, externally dentate, and projecting on veins 3 and 4, then incurved to two-thirds of inner margin; marginal area dusted with similarly coloured atoms; the discocellular also olive; fringe concolorous, with faint olive dots at the base.

*Hindwings*: without first line.

Underside glossy blue-green; the costa pale ochreous. Face and palpi pale brown; thorax and abdomen ochreous.

Expanse of wings: 23 mm.

One ♀ from Ron Island, July 1897 (W. Doherty).

A very delicate species.

#### *Leucodesmia* gen. nov.

*Forewings*: broad; the costa slightly curved; the hindmargin obliquely curved.

*Hindwings*: with hindmargin and apex rounded, the anal angle prominent.

Antennae of ♂ pectinated, the apical third simple; of ♀ filiform; palpi porrect upwards; tongue present, frenulum absent; the hindwing rather prominently shouldered at base. Hindtibiae short, thick, with two pairs of closely approximate spurs.

*Neuration*: forewings, cell not half the length of wing, very broad; discocellular twice concave; first median at two-thirds, second and third from end of cell; lower radial from between the concavities of discocellular, upper from top end of cell; veins 7, 8, 9, 10 stalked; 11 free. Hindwings with discocellular oblique and straight, the radial from above its centre; veins 6, 7, and 3, 4 stalked.

Type: *Leucodesmia dispersa* Wlk. (*Comibaena*). *Chloroxygra* Wlk., *conchyliis* Meyr., and *minutata* Druce also belong here. I have hitherto referred them to *Comostolodes*, from which, however, they differ in the absence of a frenulum, and in vein 6 of forewings not being stalked with 7.

#### 60. *Leucoglyphica* (?) *fasciata* sp. nov.

*Forewings*: pearly grey, dusted with olive-green atoms; the markings olive-green; these consist of a basal patch, a central fascia with dentate edges, broadest on costa, where it is paler at centre and contains the dark green cell-spot, a

postmedian fascia with the outer edge sinuate, followed by a thick submarginal parallel line.

*Hindwings*: the same; fringes gone.

Underside whitish. Head, thorax, and abdomen concolorous with ground-colour.

Expanse of wings: 30 mm.

One ♀ from Warri, Niger Coast Protectorate, April 1897 (Dr. Roth).

Though apparently a ♀, judging from the abdomen and long-jointed palpi, this insect has well-pectinated antennae. In the forewings veins 6, 7, 8, 9, 10, 11 are stalked together, 11 anastomosing strongly with 12.

I refer it to *Leucoglyphica* provisionally.

#### 61. *Metallochloa proximata* sp. nov.

*Forewings*: delicate green: the costa broadly yellowish ochreous; from below middle of costa a deeper green slightly waved broad shade runs to beyond the middle of inner margin; from three-fourths of costa a similar shade runs, strongly angled outwards towards hindmargin on vein 6, then nearly parallel and close to hindmargin to anal angle, edged externally by a line of paler green: a row of yellowish ochreous lunules between the veins along hindmargin, each containing a purplish crescent with some purplish scales along the margin: fringe yellowish ochreous: cell-spot dark purple, edged with ochreous scales.

*Hindwings*: the same, without median line, and the outer line curved parallel to hindmargin.

Underside pale green: fringes and costa of forewing yellow. Face and palpi pale below, dull reddish above: vertex, thorax, and abdomen green: abdomen with five dorsal metallic red-brown plates, more brilliant in the ♂.

Expanse of wings: ♂ 24 mm.; ♀ 24—26 mm.

One ♂, three ♀♀, from Tugela, Solomon Islands (Woodford).

Nearest to *M. dotata* Warr. from Queensland, and *M. differens* from the Tenimber Islands.

#### 62. *Nemoria pisina* sp. nov.

*Forewings*: bright pea-green: the costa narrowly pale: lines whitish, the first curved above, vertical below, at one-third; the second at two-thirds, curved below costa, then straight and oblique, parallel to hindmargin, approaching first on inner margin: fringe white.

*Hindwings*: with the central line only.

Underside uniform whitish green. Face and palpi dull reddish above, pale below: vertex and shaft of antennae white: thorax and abdomen bright green.

Expanse of wings: 22 mm.

Six ♂♂ from Selam, Tenimber Islands, March and April 1897 (Micholitz).

This species must come very near *N. delicataria* Moeschl. from Surinam. The green is very liable to fade: of the six specimens two only are bright green, two quite bleached, and two partially worn; in neither of the fresh specimens, nor in one of those somewhat worn, is there the slightest trace of a discal spot: but in all the other three a minute blackish spot is visible in the forewings, in one example in the hindwings also.

63. *Oenospila lucifimbria* sp. nov.

*♂. Forewings*: deep sea-green; the costa yellow; the lines pale bluish green; first from below one-fourth of costa to beyond one-third of inner margin, slightly waved; second from two-thirds of costa to two-thirds of inner margin, irregularly dentate-lunulate; cell-spot obscurely deeper green; marginal line thick, deep purple, scarcely interrupted on its outer edge by the pale veins; fringe glossy yellow.

*Hindwings*: without first line.

Underside somewhat paler; the fringes yellow; costa of forewing narrowly yellow. Face and palpi dull reddish above, paler below; fillet white; vertex dull yellow; shoulders, patagia, basal segments, and segmental divisions of abdomen green; thorax and rest of abdomen dull ochreous, probably faded from green. ♀ pale apple-green, the lines white, and the marginal line much finer.

Expanse of wings: 29 mm.

One ♂, one ♀, from Tugela, Solomon Islands (Woodford).

The worn condition of the ♀ **may** account for the difference in coloration and markings. The hindtibiae of the ♂ are large, much thickened, with a largely expansible pencil of pale ochreous hairs, and four spurs; the tarsi short.

64. *Syndromodes coerulea*.

*Microloxia* (?) *coerulea* Warr., Nov. Zool. III, p. 368.

This species, doubtfully referred to *Microloxia*, must, as the nomenclature shows, be transferred to *Syndromodes*.

65. *Syndromodes vivida* sp. nov.

*Forewings*: emerald-green; the fringe green; costal edge cream-white; the two lines marked by inconspicuous pale vein-dots: first at one-fourth, second at three-fourths, sinuous; cell-spot and marginal dots minute, whitish.

*Hindwings*: with only the outer line.

Underside pale green, darkening towards costa of forewings. Face, palpi, and forelegs rufous; vertex and shaft of antennae white; thorax green; abdomen ochreous, the basal segments with some red scales above.

Expanse of wings: 23 mm.

One ♂ from Natal.

Near to *unicolor* Warr.

66. *Thalassodes gigas* sp. nov.

*Forewings*: pale bluish green, finely rippled with whitish; the costal edge finely white; the two lines represented by diffuse whitish shades: the first narrow, and only distinct on inner margin; the second just beyond middle broad and waved; a very fine brown marginal line, slightly swollen at ends of veins; fringe silvery white, with the tips mixed with brown scales.

*Hindwings*: with the outer pale shade angled at vein 3, subdentate throughout.

Underside whitish green. Palpi whitish, pale brown above; face whitish. (?) tinged with green; shoulders, patagia, and first segment of abdomen green;

thorax and rest of abdomen whitish; forelegs tinged in front with reddish; antennae ferruginous.

Expanse of wings: 54 mm.

One ♀ from Tugela, Solomon Islands (Woodford).

Allied to *T. marinaria* Guen., and *inmissaria* Wlk.

#### 67. *Uliocnemis elegans* sp. nov.

*Forewings*: emerald-green, deeper towards base; the costa white from near base to three-fourths; a minute blackish cell-dot; lines fine, white; first from below one-fifth of costa, angled on submedian fold, indistinct and vague above, thicker and plain on inner margin; second from three-fourths of costa straight to the top of a small pinkish blotch at anal angle, which it margins internally; from the costa to the lower radial this line is faintly wavy; submarginal line wavy, incurved from apex to hindmargin below vein 4, and again to the anal blotch, which it traverses as three blackish lunules, the centre one itself being followed by a distinct black lunule; fringe greyish green, with a fine white basal line; four minute black marginal dots, three subapical, and the fourth below vein 4.

*Hindwings*: with elongate white cell-spot; a larger pinkish blotch at apex, bordered internally by the outer white line, which to vein 5 is oblique and wavy, thence turning at a right angle straight to inner margin above anal angle; submarginal line as in forewings, ending in quite a small pale blotch at anal angle containing a large black spot; two small black marginal dots in the apical blotch; fringe as in forewings.

Underside greenish white, more green in the basal two-thirds; cell-spot and marginal dots of forewings and apical blotch of hindwings black; costa whitish in both wings. Palpi very long, second joint whitish, tinged externally with greenish; terminal joint darker; face green; fillet and antennae white; thorax (damaged) apparently green, with a white blotch behind; abdomen on dorsum green, with a central white stripe; anal segments and sides white; the antennae in the ♀ strongly pectinated.

Expanse of wings: 33 mm.

One ♀ from St. Aignan, November 1897 (Meek).

Allied to *U. partita* Wlk., and *calliptera* Meyr., distinguished by the absence of any white suffusion; but vein 5 of the forewings, between outer and submarginal lines, is marked with white. The hindwings have the hindmargin rounded.

#### 68. *Uliocnemis pulchella* sp. nov.

*Forewings*: pale yellowish green, thickly powdered in parts with white; costa irregularly pale grey-brown, towards base somewhat varied with the white scales; first line at one-fourth obscure; grey-brown and oblique, almost horizontal, outwards to below subcostal, then green across the white scales, and marked by a brown spot on the submedian fold; outer line finely white, and irregularly dentate, from three-fourths of costa to three-fourths of inner margin, parallel to hindmargin, edged internally by grey-brown below costa; below vein 5 this line forms an acute angle inwards, its apex being marked by a triangular dark greenish grey spot; submarginal line thick, white, slightly bent at middle, starting from a white blotch at anal angle and diverging from hindmargin, above vein 7 finer and retracted to

costa; a slight white cloud from outer line at vein 6 to apex; marginal line white preceded by darker green spots between the veins, each of which is joined to submarginal line by whitish scales; fringe greyish white.

*Hindwings*: whitish at base, with a broad green curved band before middle, edged by a white band and powdered with white scales, which become fewer towards the submarginal line; this is broadly white and runs from apex to anal angle, close before the hindmargin, which is like that of forewings; cell-spot white, indistinct.

Underside of forewings white; the costa, as above, grey-brown; an elongated roundish green blotch beyond cell, and two subcostal green blotches before apex; the disc slightly powdered with green; the spot beyond cell below vein 5 and the marginal spots olive-green; fringe whitish grey; hindwings and the fringe wholly white; marginal spots dark olive. Palpi olive-brown, each joint tipped with white; face olive-brown, edged above and below with white; vertex and shaft of antennae white; shoulders olive-brown in front, white at apex; patagia and thorax white; abdomen greenish with white belts.

Expanse of wings: 35 mm.

One ♀ from Ron Island, July 1897 (Doherty).

The hindwings are slightly toothed at vein 4; antennae subserrate, with fascicles of cilia.

A delicate species, superficially something like *U. chalybeata* Moore.

#### 69. *Uliocnemis woodfordi* sp. nov.

*Forewings*: pea-green; the costa narrowly white except at base; the lines very slender, white; first from below one-fourth of costa to one-third of inner margin, bluntly angled in cell and on submedian fold; second line from three-fourths of costa to three-fourths of inner margin, straight, but finely and regularly lunulate; submarginal line irregularly lunulate outwards, touching hindmargin at a white spot between veins 3 and 4; fringe white, pale green towards base beyond a whitish marginal line; cell-spot minute, red-brown.

*Hindwings*: with cell-spot white; outer line less regularly lunulate, bent at vein 4, and above it forming a broad white dentate edge to a brown and lilac-grey apical blotch; submarginal line as in forewings, becoming a dark brown-shade through the apical blotch; a small black dot at the end of veins 6 and 7. These also are present on forewings, but very minute.

Underside whitish green; brighter green in forewings from base to second line, which, as well as the cell-dot, is distinctly marked; hindwings with small brown apical blotch. Palpi white, green-finged above; face green; fillet and vertex white; shoulders, patagia, and basal segments of abdomen green; thorax and a central dorsal line on abdomen together with the anal segments white.

Expanse of wings: ♂ 26—28 mm.; ♀ 32 mm.

Four ♂♂, one ♀, from Tugela, Solomon Islands (Woodford).

The ♀ has the apical blotch of hindwings larger, purple and grey, instead of brown and lilac.

Distinguished by the straight second line and absence of anal blotch on forewings.

## SUBFAMILY STERRHINAE.

70. *Chrysocraspeda concentrica* sp. nov.

*Forewings*: dull pink, thickly covered with dull red strigae, which along costa and more broadly along hindmargin are condensed into a dull purplish suffusion: a curved dull red line at four-fifths, indistinct towards costa, with the pinkish ground-colour paler on each side of it; hindmargin narrowly yellow, pointed at apex; the edge of the red ground-colour irregularly crenulate and brighter: a dull pale cell-spot; fringe yellow.

*Hindwings*: with a small round dull red basal patch, edged and centred with darker; a thick curved dull red line at two-thirds; the rest as in forewings; but the whole of the central area paler, not dusted with red.

Underside duller. Face deep red above, paler below; vertex, antennae, and basal segments of abdomen dark red; thorax and abdomen generally pinkish.

Expansion of wings: 23 mm.

One ♂ from St. Aignan, November 1897 (Meek).

Like *C. regalis* sp. nov., with the yellow hindmarginal band uninterrupted in middle.

Another ♂ from Woodlark Island, March 1897 (Meek), has the whole wing deep red.

71. *Chrysocraspeda croceomarginata* Warr., Nov. Zool. III. p. 370.

When describing this species from South Java, I had only a ♀. Along with a second ♀, evidently referable to this species, since received from Tambora, Island of Sambawa, came also three ♂♂, captured at the same time, and presumably the same species. These differ rather considerably from the ♀♀, and might easily be taken for a distinct species. The ground-colour is a paler greyer rosy, but thickly speckled with deeper; the costa, deep red at base, becomes yellow, in one instance broadly yellow, towards apex; beyond the red cell-spot there are traces in both wings towards the costa of an outwardly bent deep red postmedian line; the rosy tint reaches the hindmargin, and there becomes deep red, leaving only some very shallow lunulate spaces of yellow between the veins. In the ♀ the hindmargin is broadly yellow, with a red tooth at middle to the margin. In the hindwings of the ♂♂ the white discal spot is continued, but less markedly, to the base of the discocellular.

Three ♂♂, one ♀, from Tambora, Island of Sambawa, June 1896, 2500—4000 feet (Doherty).

72. *Chrysocraspeda regalis* sp. nov.

*Forewings*: bright blood-red, very finely speckled with darker, without markings; hindmargin narrowly yellow, acutely pointed at apex and anal angle; edge of red ground-colour irregularly crenulate and brighter red; fringe yellow.

*Hindwings*: the same, but with a silvery white oval cell-spot. In both wings the red ground-colour assumes a deeper, more purplish tint before the yellow hindmargin.

Underside precisely similar, but paler and duller. Head, vertex, antennae, thorax, and abdomen concolorous with wings.

Expansion of wings: 30 mm.

One ♂ from St. Aignan, October 1897 (Meek).

The hindmargins of both wings are rounded; the red ground-colour does not protrude in the middle into the yellow border and fringe.

### 73. *Craspedia albilavata* sp. nov.

*Forewings*: silky white, uniformly dusted with minute blackish scales.

*Hindwings*: the same; fringe of both wings white.

Underside of forewings tinged with grey-brown along costa and on basal half; traces of two curved and wavy brownish lines beyond middle; costa yellowish; hindwings with an obscure cell-spot. Face and palpi brown above, white beneath; vertex, thorax, and abdomen white.

Expanse of wings: 26 mm.

One ♂ from Keelung, Formosa, August 1896 (Jonas).

In certain lights traces can be detected of two pale ochreous curved and waved lines beyond middle; possibly in well-marked, fresh specimens they may be plainer. The hindmargin of hindwings is bluntly elbowed in middle.

### 74. *Craspedia dissimulans* sp. nov.

*Forewings*: white, sparsely sprinkled with black atoms; costal edge finely ochraceous, broader towards apex; lines ochraceous: first very faint, from about one-fourth of inner margin oblique to cell, where it fades out; second line distinct, brownish ochraceous, from below costa shortly before apex to just beyond middle of inner margin fringe ochraceous, the tips browner; cell-spot faint, ochraceous.

*Hindwings*: with the line central; fringe and cell-spot as in forewings.

Underside white, without markings. Face and upper edge of palpi black-brown; palpi pale below; vertex, basal third of antennal shaft, and collar ochraceous; thorax and abdomen white.

Expanse of wings: 30 mm.

One ♀ from Warri, Niger Coast Protectorate, May 1897 (Dr. Roth).

Attention should be drawn to the extraordinary resemblance between this insect and *Leucetaera simplicata* Wlk. from India and Borneo. In *dissimulans* the costa of forewings is more broadly ochraceous towards apex; the outer line of forewings is quite straight, and on hindwings runs to nearly middle of inner margin. In *simplicata* the costa of forewings is darker and more broadly ochraceous near base; the outer line of forewings is notched on the veins towards the costa, and in the hindwings reaches the abdominal margin at one-third from anal angle. The neutralisation, of course, will at once distinguish the species.

*Dissimulans* belongs to a group of species of simple markings, of which five others already described by me occur in Africa: viz. *lucipennis* from the Cameroons; *melliflua* from Natal; and *flavissima*, *pyraliata*, and *transsecta* from Warri.

### 75. *Craspedia habilis* sp. nov.

*Forewings*: bone-colour, dusted with very fine fuscous atoms, particularly towards hindmargin; a slender, slightly tremulous, fuscous line from five-sixths of costa to two-thirds of inner margin, retracted a little towards costa; a minute dark cell-spot; fringe concolorous, with a fine dark line at base.

*Hindwings* : with the line central, beyond the small cell-spot.

Underside paler, glossy, without dusting ; the forewings grey-tinged towards costa, and with traces of the line ; no cell-spot ; fringe-line more distinct than above ; hindwings without markings. Face and palpi black-brown ; collar dull ferruginous ; vertex, thorax, and abdomen bone-colour.

Expanse of wings : 26 mm.

One ♂ from Warri, Niger Coast Protectorate, May 1897 (Dr. Roth).

Hindwings with the hindmargin visibly elbowed at middle.

#### 76. *Eois roseocincta* sp. nov.

*Forewings* : olive-ochreous, with two broad oblique deep rosy fasciæ : the first from inner margin near base, reaching costa in middle, where it extends from one-third to two-thirds, and contains a small space of the ground-colour in the centre ; the second marginal : fringe deep rosy : cell-spot small, dark, on the outer edge of central fascia.

*Hindwings* : with the outer and abdominal margin rosy ; fringe rosy, with a darker tint at base : cell-spot black, following a slight rosy basal blush.

Underside duller, the rosy tints more diffused. Face and palpi dark brown-red ; fillet white : thorax and abdomen olive, the latter almost wholly suffused with rosy.

Expanse of wings : 16 mm.

One ♀ from Dar-es-Salaam, German East Africa.

Both wings elongate and narrow : the two subcostals in the hindwings not stalked. Unfortunately all the legs of the only specimen are broken off.

Near *Eois exquisita* Warr. from the Upper Shire River, but the rosy tints of the forewings quite differently arranged.

#### 77. *Perixera lapidata* sp. nov.

*Forewings* : pale stone-colour, finely dusted with blackish atoms ; the lines more distinct than usual ; first at one-fourth, marked by dark grey dots on veins, outcurved above and below the median vein ; outer line at five-sixths, dark grey, subdentate, the teeth darker ; submarginal line pale between two darker shades formed of denser atoms ; a row of marginal black spots ; fringe concolorous.

*Hindwings* : similar : both wings with small black cell-spot.

Underside without dusting ; exterior and marginal rows of spots blackish : a reddish grey suffusion in cell of forewing reaching to the costa. Palpi dark red above, pale below ; face olive-fuscous above, pale below ; head, antennæ, thorax, and abdomen concolorous with wings, the abdomen more dusted with grey.

Expanse of wings : 34 mm.

One ♂ from St. Aignan, Louisiade Arch., November 1897 (Meek).

Distinguished by the entire absence of red scaling, except the upper side of palpi. The hindtibiae are simple, without fringe of hairs.

#### 78. *Perixera venusta* sp. nov.

*Forewings* : pale greyish ochreous, with dense dusting of fine dark grey atoms : first line obscure, grey, twice curved, marked by dark dots on the veins ; cell-spot black ; outer line at five-sixths grey, denticulate, the teeth denoted by dark dashes on the veins ; beyond the cell-spot is a distinct sinuate fascia of grey-edged orange



lunules, not reaching above vein 6 : and beyond the outer line a less conspicuously orange fascia, interrupted above and below the middle ; margin beyond the pale subterminal line more thickly dusted with grey : a marginal row of black spots between veins, and a row of smaller dots at the vein-ends : fringe concolorous.

*Hindwings* : the same : the submarginal band less orange.

Underside whiter ; spots of the outer and marginal line distinct ; costa of forewings greyish at base, with a rufous subcostal edge. Palpi above deep red ; face fuscous above, paler below : vertex and antennae white ; thorax and abdomen pale ochreous, dusted like wings.

Expanse of wings : 39 mm.

Five ♂♂, two ♀♀, from St. Aignau, September—November 1897 (Meek).

This species is allied to *P. cretacea* Warr. from Woodlark Island, but in that the ground-colour is chalk-white and the markings less distinct. The hindfemora are smooth, not clothed with curved hairs.

### 79. *Pisoraca inornata* Warr., Nov. Zool. V. p. 241.

This species was described from ♀♀ only. The ♂, which I have now seen, is a true *Pisoraca* as far as the spurs of the hindtibiae are concerned ; but whereas in *leonaria* Wilk. only the hindfemora are clothed with curled hairs, in *inornata* the hindtibiae are also clothed on the inner side with a very dense brush of hairs, which almost conceal the single spur. This single ♂ is much less marked than the ♀♀, the median shade being quite absent, and only the vein-dots of the inner and outer lines distinct. It was taken at Warri, at the same date as the ♀♀, by Dr. Roth.

### 80. *Problepsis albidior* nom. nov.

*Problepsis apollinaria* Butler, Ill. Lep. Hel. VII. p. 7 (*nov.* Guen.).

*Problepsis deliaria* Hampsn., Fauna Brit. Ind., Moths, III. p. 462 (*nov.* Guen.).

The specimens from Kulu, described by Mr. Butler under the above name, differ from *deliaria* Guen., to which species they are referred by Hampson, *loc. cit.*, in having the ocellus of forewing larger, rounder, and paler, and in their larger size (40 mm.), whereas Guenée gives 34 mm. for that of *deliaria* ; in all other respects Guenée's description of *deliaria* applies well. I have lately met with a ♀ from Ichang which undoubtedly belongs to the same form.

### 81. *Ptochophyle tristicula* ab. *fasciata* nov.

Along with seven others, all ♂♂, of this species, four from St. Aignau and three from Goodenough Island, is a single example from the latter locality which differs so much from the usual slightly marked type form that it deserves to be named. In the forewing the space between the median shade and submarginal line is filled up with rufous brown, forming a broad fascia, in the inner concave edge of which lies the black cell-spot. This fascia is enlarged on the hindwing so as to embrace all the anal area, leaving only the apical and basal areas yellowish ; the white cell-dot of the hindwing lies within the fascia. By way of compensation the yellow areas appear to be less densely strigulated with rufous than in the typical forms, so that the contrast between the two shades is heightened.

82. *Traminda submarginata* sp. nov.

*Forewings*: pinkish ochreous, more or less densely covered with very fine short transverse reddish striae; a small linear reddish cell-spot, often obscure, or even unmarked; an oblique, outwardly pale-edged reddish line from three-fifths of inner margin to four-fifths of costa, generally obsolete before costa, followed shortly by a curved cloudy shade, marked by red dashes on veins, generally, like the preceding line, obsolete before costa; in one strongly marked example these red dashes are prolonged along the nervules to their origin; fringe concolorous, with sometimes a red speck at apex.

*Hindwings*: similar; the cell-spot oval, white; fringe sometimes with a red speck at the angle.

Underside pale ochreous, finely dusted with reddish, with a diffuse vinous submarginal fascia, incomplete on hindwings. Head, thorax, and abdomen concolorous; the face somewhat darker.

Expanse of wings: 24 mm.

Three ♀♀ from Tambora, Sambawa, June 1896, 2500—4000 feet (Doherty).

Forewings with hindmargin sinuous, the bend at vein 4 inconspicuous; the angle of hindwings not acute.

## SUBFAMILY ASTHENIXINAE.

*Asthenotricha* gen. nov.

*Forewings*: broad, triangular; the costal, hind, and inner margins all curved; the apex prominent; hindmargin subcrenulate.

*Hindwings*: with the costa strongly and broadly shouldered along inner half, hindmargin curved and subcrenulate; anal angle square.

Antennae lamellate, serrate beneath and pubescent; palpi short; tongue and frenulum present; basal two-thirds of costal area of hindwings above clothed with mealy scales, with a long oblique tuft of hairs rising from near base of shoulder.

*Nervation*: forewings, cell barely half as long as wing; discocellular concave, the lower half oblique; first median at two-thirds, second at seven-eighths; radials normal; 7, 8, 9, 10 stalked, 11 anastomosing with them to form a simple areole. Hindwings, with costal anastomosing with subcostal for two-thirds of cell; the subcostal nervules not stalked.

Type: *Asthenotricha dentatissima* sp. nov.

83. *Asthenotricha dentatissima* sp. nov.

*Forewings*: deep yellow, tinged with reddish fulvous, and crossed by many largely dentate fulvous lines, of which the antemedian and postmedian are marked with purplish fuscous; cell-spot purplish; fringe yellow, with a fine fulvous line at base.

*Hindwings*: similar; the mealy scales and tuft of hair brick-red.

Underside pale glossy yellowish, without markings. Thorax and abdomen like wings; head parts damaged.

Expanse of wings: 30 mm.

One ♂ from Mpwapwa, German East Africa.

The only example is not in a good state of preservation; there appears to be a deeper fulvous streak in both wings through the cell to hindmargin, marked in places with still darker scales.

## SUBFAMILY TRICHOPTERYGINAE.

**Anisocolpia** gen. nov.

*Forewings* : like *Remodes* ; the ♂ having an incision on hindmargin above anal angle.

*Hindwings* : of ♂ with a single large lobe at base of inner margin, covered by a membranous lid : the hindmargin bluntly rounded above vein 6 : two of the lower veins absent ; costal anastomosing with subcostal beyond the end of cell. Hindtibiae of ♂ contorted, the tarsi short ; palpi long, porrect.

Type : *A. ignobilis* Butler.

84. **Carige combinata** sp. nov.

*Forewings* : olive-ochreous, thickly dusted with fine black atoms : the lines all double, somewhat diffuse, dark olive-fuscous mixed with rufous ; first straight and vertical, from two-fifths of costa to two-fifths of inner margin ; second from three-fourths of costa to two-thirds of inner margin, bent outwards in middle of wing ; third line from below apex to anal angle, bent inwards at middle to join the second line, and followed there by an obscure submarginal line ; cell-spot black ; fringe ochreous.

*Hindwings* : pale ochreous, with grey striae and suffusion ; an indistinct double curved grey postmedian, and blotched submarginal line ; cell-spot dark grey.

Underside yellower, with all the markings reproduced. Head, thorax, and abdomen concolorous.

Expanse of wings : 30 mm.

One ♂ from S. Flores, November 1896, dry season (Everett).

The central pectinations of the antennae unusually long and with long ciliations.

85. **Coptogonia lucens** sp. nov.

*Forewings* : bright moss-green, crossed by numerous dull lustrous lines, those beyond the middle all bent in below the median and running parallel to the indentation in the margin ; of the dark green spaces one subbasal, one antemedian, one just beyond middle, a postmedian and a submarginal, are deeper green than the rest, the last three marked with purplish black below costa, beyond cell, and at submedian fold ; the bladderly fovea at three-fourths of inner margin, which marks the end of the submedian vein, marked above by silvery white scales, surrounded with purplish black streaks ; fringe mixed green and lustrous.

*Hindwings* : grey, darker towards apex : the first lobe small and bladderly, the second ochreous, the third dark grey.

Underside greenish grey, darker towards hindmargin. Head, palpi, and thorax green ; abdomen ochreous green ; antennae black ; tufts of abdomen ochreous.

Expanse of wings : 30 mm.

One ♂ from Woodlark Island, March 1897 (Meek), in very good condition.

Differs from *C. turpipennis* Warr. from Batchian, the type of the genus, in having the anal angle not lobed, and the projection below vein 4 on hindwing more decidedly hooked.

**Episteira** gen. nov.

Agrees with *Steirophora* Warr. and *Synneurodes* nov. gen. in having a keel beneath abdomen in the ♂, but possessing in addition a folded and scaled semi-erect lobe at base of hindwings: the palpi are four times as long as head, rough-scaled, the second joint four times the length of third; legs shorter and stouter, hindtibiae without spurs. In the hindwings the cell is very wide and short, not being one-third of wing: discocellular concave; costal approximated to subcostal for nearly the whole length of cell, and there joined by a bar; vein 6 rises from end of subcostal, which is shortly bent towards extremity, vein 7 rising from the bend and running straight to an angle in hindmargin, vein 6 reaching hindmargin at middle; vein 4 from lower angle of cell, veins 1, 2, 3 all absent.

Type: *Episteira colligata* sp. nov.

86. **Episteira colligata** sp. nov.

*Forewings*: bright pale green, tinged in parts with deep green, the markings in the main purplish or black; the pale ground-colour is confined to the basal patch, a narrow sinuous space in the middle, containing the large oblique oval black cell-spot, a submarginal band, and a horizontal ray along veins 3 and 4; between the basal area, which has a black spot on the median, and the central pale space are six crenulated purplish black partially forked lines, the ground-colour between them being darker green and the outermost one sinuous; beyond the centre are six sinuous minutely dentate narrower lines; a submarginal line of dark blotches, and a marginal line of squarish spots; from the cell-spot a ray of dull violet runs along the lower radial to hindmargin, and a slight violet-tinge is visible along vein 2; fringe green.

*Hindwings*: fuscous, the cell semitransparent and paler.

Underside dull cinereous. Head, thorax, and abdomen green; antennae wholly ochraceous; palpi pale green, marked above with fuscous scales.

Expanse of wings: 34 mm.

One ♂ from S. Flores, November 1896, dry season (Everett).

87. **Holorista (?) spectabilis** sp. nov.

*Forewings*: pale dull olive-green, dusted with darker; a darker line near base, angulated on the veins; a darker spot on costa before middle, from which a double dark line rises, oblique outwards to the median, then inwards, describing a strong angle on the submedian fold towards the basal line; two double lines beyond the middle, strongly dentate, olive-green below costa, then marked with black along the veins and touching the antemedian line in the middle; a partially double submarginal line, forming blackish teeth on the veins and green ones between them; a similar marginal line, the black teeth on the veins touching the black marginal spots; fringe olive-green.

*Hindwings*: deep pink, with a large oval coal-black blotch occupying the centre of the wing; the lobe and the hyaline space covered by it very ample, the edge of the lobe thickened, deep red.

Underside of forewings olive-green suffused with pinkish, with a black blotch at base of the three median nervules corresponding to that on the upperside of the hindwings; hindwings pink. Head, thorax, and abdomen olive-green; legs tinged with pinkish. The palpi are three times as long as the head, laterally flattened

and thickly fringed above and below with long slightly curved hairs; hindlegs long, without spurs, and with a long tuft of pink hairs from the femoro-tibial joint: there appear also to be the rudiments of a very short keel at base of abdomen; the antennae are broken off.

Expanse of wings: 37 mm.

One ♂ from Natal, which may probably require a separate genus.

#### 88. *Remodes* (?) *rubriplaga* sp. nov.

*Forewings*: pale green, with broad darker green vertical bands; the postmedian band, between vein 4 and the submedian fold, filled with brick-red scales.

*Hindwings*: suffused with dull rosy throughout.

Underside of both wings suffused with rosy. Head, palpi, and thorax green: abdomen more ochreous; antennae black.

Expanse of wings: 32 mm.

One ♀ from Laiwui, Ohi, September 1897 (Doherty).

The only example is much wasted; but the red patch on the postmedian band and the rosy-tinged hindwings leave no room to doubt the distinctness of the species.

#### *Synneurodes* gen. nov.

Like *Steirophora*, with a keel beneath the basal segments of abdomen in the ♂, the hindwings without a lobe; differing, first, in the extreme shortness, as compared with the rest of the group, of the palpi, which reach only a little in front of face, and are rostriform, with the terminal joint decumbent, and, secondly, in the neuration of the hindwings in the ♂; cell half as long as wing; discocellular well-angulated; costal anastomosing with subcostal till close to end of cell; the two subcostals together from upper end; radial from the angulation of discocellular; all three median nervules as well as vein 1 complete; the hindmargin is bluntly angled at vein 7. Legs long and slender; hindtibiae with minute terminal spurs.

Type: *Synneurodes brevipalpis* sp. nov.

#### 89. *Synneurodes brevipalpis* sp. nov.

*Forewings*: pale green, with the transverse lines dark green and purplish black; basal area edged by a double thick blackish line, becoming green below submedian vein, and containing a single thick black line, which below the submedian is oblique outwards; central fascia more regular than usual, and not oblique; its inner and outer edge marked within by blackish lunules or spots at the veins, and with a double crenulate black line down the centre, the inner and outer edges being themselves double towards costa; a double somewhat obscure blackish lunulate submarginal fascia, blotched beyond cell; followed by a single line of dark Y-shaped spots, and a row of marginal lunules; the pale bands throughout traversed by a waved grey-green line: fringe green: cell-spot small, between the two middle crenulate lines.

*Hindwings*: semitransparent, greyish fuscous, darker towards hindmargin.

Underside smoky cinereous, with the dark fasciae all showing through. Head, thorax, and abdomen (apparently) green: basal segment of abdomen and meta-thorax each with a black ring; antennae annulated above, fuscous and green, ochraceous below; palpi darker beneath.

Expanse of wings: 34 mm.

One ♂ from S. Flores, November 1896, dry season (Everett).

Much resembling *S. punctatissima* Warr., but the forewings are not so narrow and elongate, nor the hindmargin and the markings so oblique.

SUBFAMILY TEPHROCLYSTHINAE.

90. *Chloroclystis fragilis* sp. nov.

*Forewings*: whitish, with the lines and markings pale olive-ochreous; the basal line and the edges of the central fascia marked with blackish scales; first line at one-third, curved, and slightly waved; second at two-thirds, bluntly angled on vein 4; the first followed, and the second preceded, by an olive fascia, the space between traversed by a waved line; the central fascia is preceded and followed by a broad pale fascia, also traversed by a waved olive line; submarginal line pale, waved, preceded by an olive band marked by darker scales at costa and beyond cell, and followed by a paler band; marginal line dark, interrupted; fringe concolorous.

*Hindwings*: similar, but the postmedian line more sharply angled.

Underside pale whitish ochreous, with the markings faint. Head, thorax, and abdomen concolorous with ground-colour of wings; the palpi, thorax, and abdomen varied with olive-ochreous.

Expanse of wings: 14 mm.

Two ♂♂ from St. Aignan, September 1897 (Meek).

91. *Chloroclystis infuscata* sp. nov.

*Forewings*: dull greenish overlaid with fuscous, so thickly that only the edges of a darker central fascia can be made out, being limited by faintly paler bands; a dark marginal line, interrupted by paler spots on the veins; fringe fuscous.

*Hindwings*: the same.

Underside paler, less clouded with fuscous; a thick dark shade just beyond the middle, angled in centre; a cloudy roundish cell-spot; hindmargin more fuscous; the fringe paler, slightly greenish-tinged, with darker chequerings. Head, thorax, and abdomen dull greenish.

Expanse of wings: 21 mm.

One ♀ from Baram, Borneo, October 1891 (Everett).

92. *Chloroclystis marmorata* sp. nov.

*Forewings*: dull white; the basal area tinged with pale ochreous and dusted with black scales; a broad median fascia dark grey, the edges broadly, and a central line narrowly, still darker, followed by a broad pale fascia with a grey central line; the inner edge of the median fascia is well curved, the outer strongly indented opposite the cell and on submedian fold; marginal area smoky grey, with faint indications of a pale waved submarginal line; fringe pale grey, with a still paler base beyond a very fine dark grey marginal line.

*Hindwings*: similar, only the outer edge of median fascia plainly marked.

Underside whitish grey, with faint markings. Head, thorax, and abdomen whitish; palpi dark at tips; abdomen with a dark ring at base and the segmental divisions darker.

Expanse of wings: 17 mm.

Two ♀♀ from Warri, June 1897 (Dr. Roth).

93. *Megatheca* (?) *ampla* sp. nov.

*Forewings*: dull pale green; the transverse lines dark grey and blackish; basal area and central fascia dusted with blackish, and edged by blackish lines; central fascia with three internal denticulate lines, the outer two grey, the inner one blackish, forming with the inner edge a darker narrower band; the pale green bands preceding and following the central fascia traversed by a grey thread; submarginal line indistinct, preceded by a darker, externally lunulate-edged band; a row of dark marginal lunules; fringe greenish.

*Hindwings*: the same, without basal patch; the lines of the central fascia invisible.

Underside duller; forewings with large dark cell-spot, which on the upper side is lost in the inner edge of central fascia. Head, thorax, and abdomen grey-green.

Expanse of wings: 22 mm.

One ♀ from Lombok, 1500 feet, June 1896 (Everett).

As the specimen is a ♀, its location is doubtful: but it bears the prominent forehead of *Megatheca*.

Genus *Pasiphila* Meyr., *Tr. N. Z. Inst.* 1883, p. 66

*Helastiodes* Warr., *Nov. Zool.* 11, p. 110.

In proposing the genus *Helastiodes*, I stated that the antennae of the ♂ were **pectinated**. This is not correct. They are biciliated with fine fascicles of cilia; and as the type species *bilineolata* Wik. was put forward by Mr. Meyrick as the type of his genus *Pasiphila*, which he afterwards sunk to *Chloroclystis*, it follows that if the species with fasciculate antennae are separated from *Chloroclystis*, as I think they should be, his name *Pasiphila* must stand for the genus.

**Prorocorys** gen. nov.

Agreeing in neuration with *Chloroclystis*, veins 10 and 11 of forewings stalked, 11 anastomosing strongly with 12, and 10 with 8, 9. Antennae of ♀ short, thick, lamellate. Distinguished by the structure and scaling of the palpi; these are long and porrect, as in *Rhinoprora*, but instead of being smoothly scaled the scales are rough and thickened at the end of first and second joints into a projecting crest, the third joint alone smoothly scaled, its shaft narrow, swelling out into a lengthened club.

The lines of the wings formed of lustrous metallic scales.

Type: *Prorocorys gemmata* sp. nov.

94. *Prorocorys gemmata* sp. nov.

*Forewings*: ground-colour pale yellow, but almost hidden by rich red-brown suffusion and dusting; a roundish blotch in the end of cell, a submarginal series of wedge-shaped spots, and the extreme hindmargin and fringe alone remaining yellow; a steely spot at base; basal and subbasal strongly dentated and outcurved steely lines; median and postmedian much interrupted and less dentated lines; a very sinuous and broader outer line, and a wedge-shaped submarginal line, all

steely: the veins beyond the middle are marked with black; the yellow fringe is slightly mottled with darker at the ends of some of the veins.

*Hindwings*: similar: the yellowish cell-blotch with another between it and the inner margin.

Underside dull brownish cinereous, with the cell-blotches, hindmargin, and fringes paler. Thorax and abdomen like wings, a mixture of red-brown, yellow, and steely scales: basal and anal segments of abdomen yellower: shoulders and collar yellow, speckled with brownish: vertex yellowish, with a steely spot in middle: face yellow, with two red spots above: palpi yellowish, with the ends of all the joints brown.

Expanse of wings: 30 mm.

One ♂ from Tugela, Solomon Islands (Woodford).

The single ♀ is quite perfect, and a very remarkable-looking insect.

#### 95. *Tephroclystia devestita* sp. nov.

*Forewings*: grey, slightly rufous-tinged: the cross-lines indistinctly marked, commencing as darker spots on the costa, and all angled below the subcostal vein: traces of basal, antemedian, and median lines, the first close to base, the second at one-third, forming the inner edge of the broad central fascia: outer line diffuse at two-thirds, the upper arm concave, the lower straight and oblique: followed by a broad pale fascia, with its edges and a dark line down its centre parallel to the outer line: marginal area rather darker, with the submarginal line pale and indistinct, preceded by slight dark dashes on the veins: the marginal area on the costa marked by two dark spots, of which that following the pale fascia is conspicuous: fringe concolorous, with darker line at base.

*Hindwings*: with the outer lines curved.

Underside duller and greyer. Head, thorax, and abdomen concolorous with wings.

Expanse of wings: 18 mm.

One ♂ from Kampala, Uganda, January 25th—30th, 1897 (Dr. Ansoerg).

An inconspicuous species, much resembling *T. tenuiata* of Europe.

#### 96. *Tephroclystia medionotata* sp. nov.

*Forewings*: ochreous grey, with very obscure traces of the usual oblique pale and dark lines: a diffuse paler streak from near base along centre of wing to hindmargin below apex: crossing this streak in the middle of the wing, the pale ochreous lines become white and the darker grey ones blackish: a fine black interrupted marginal line: fringe grey, silky, with pale base, and two darker grey lines: a faint dark cell-spot.

*Hindwings*: with hardly any markings.

Underside grey, dusted with darker. Head, thorax, and abdomen ashy grey.

Expanse of wings: 28 mm.

Two ♂♂ from Kuku-nor, Thibet.

Both wings are very narrow and elongate; hindmargin of forewing very oblique, as long as inner margin. Hindwings with apex rounded, and anal angle almost obsolete.



## SUBFAMILY HYDRIOMENINAE.

**Chaetolopha** gen. nov.

*Forewings*: narrow, elongate: costa convex before apex, which is acute and slightly produced: hindmargin oblique, curved towards anal angle.

*Hindwings*: with well-rounded hindmargin.

Antennae of ♂ nearly simple; palpi porrect, rough; hindtibiae with four spurs.

*Neuration*: as in *Tephroclystia*: 10 and 11 stalked, 10 anastomosing with 8, 9, and forming a single areole. Discocellular of hindwings angled. The abdomen of ♂ bears curved lateral tufts of hair, and a similar tuft stands on vein 2 of the hindwings beneath.

Type: *Chaetolopha acyntis* Meyr. (*Scordylia*).

97. **Ochyria minuta** sp. nov.

*Forewings*: dull bronzy brown: the edge of the basal patch, the central fascia, and the edge of the submarginal line deeper-coloured than the intervals: the lines edging the basal patch and median fascia, as well as the submarginal line, irregularly wavy, finely bluish white: fringe concolorous: a large dark cell-spot.

*Hindwings*: dull grey, with darker fringe.

Underside dull cinereous. Head, thorax, and abdomen like wings.

Expanse of wings: 14 mm.

Two ♂♂ from Moroka, British New Guinea, October 1895, 3500 feet (Anthony).

Unusually small for the genus. The antennae strongly serrate and ciliated.

98. **Photoscotosia multiplicata** Warr., Nov. Zool. V, p. 28, and  
ab. **atrifasciata** nov.

The two ♀♀ from Mount Arjuno, Java, from which the description was taken were both worn. I have since seen three quite fresh examples from the same locality, two being ♂♂. The ♂♂ are rather paler both above and below than the ♀♀; the colour of the central fascia above is dull reddish brown, the basal and marginal areas being tinted with grey-green. One of the ♂♂ is, however, very different from the typical form, and may be distinguished as ab. *atrifasciata*. In this the basal patch and central fascia are smoky blackish brown, while the space between them as well as the marginal area is dull reddish brown, all the lines being very obscure and undefined.

**Propitex** gen. nov.

*Forewings*: elongate, narrow: costa slightly curved throughout: apex rounded: hindmargin obliquely curved.

*Hindwings*: narrow: the apex rounded.

Antennae of ♂ simple; eyes large; palpi porrect, second joint very long gradually narrowing; third short; frenulum very fine; hindtibiae with four spurs.

*Neuration*: forewings, cell not half as long as wing: discocellular vertical for two-thirds, then oblique; first median nervule at two-thirds, second immediately before third: lower radial from above the bend in discocellular: upper radial from well below the upper end: 7, 8, 9 stalked, 10 and 11 stalked, 10 anastomosing with 8, 9, forming a single areole. Hindwings, costal anastomosing with subcostal

to close to end of cell; 6 and 7 stalked; discocellular oblique; radial from the centre; first median at one-half, second at four-fifths.

Type: *Propithec alternata* sp. nov.

Allied to *Chastolopha* Warr., but the discocellular of hindwings oblique, not angled.

99. ***Propithec alternata*** sp. nov.

*Forewings*: pale pearl-grey, with very fine dark dusting; a purplish brown band at one-third, broader on costa than on inner margin, and edged on both sides with pale yellow; outer third of wing purplish grey, limited by a straight oblique yellow line almost parallel to hindmargin, the dark tint being deepest next the line; a faint whitish straight submarginal shade, followed again by deeper purplish; veins towards hindmargin yellowish; fringe grey chequered with purple.

*Hindwings*: uniform dull ochreous yellow, with a faint paler postmedian streak; fringe dark grey.

Underside of forewings dull coppery red, speckled with black along costa, and marked with black between the veins towards the apex, with two white spots one above the other; a pale straight yellow band, distinct only near costa, corresponding to the yellow line of the upper side; hindwings purplish grey, flecked with whitish; the veins and cell fulvous; a curved yellowish postmedian band, and a submarginal band of whitish spots between the veins. Thorax and abdomen olive-grey, face and tips of palpi whitish, palpi externally olive-brown.

Expanse of wings: 19 mm.

One ♂ from Ron Island, July 1897 (Doherty).

100. ***Triphosa moniliferaria*** Oberth. ab. ***depleta*** nov.

In this form, which appears very rare,—only one out of forty-two specimens from Ta-t sien-lu,—the abbreviated dark costal half of the central fascia is still further reduced to a simple black oblique mark from middle of costa, formed by the cell-spot being confluent with a black costal spot above it.

One ♂ from Ta-t sien-lu, West China.

SUBFAMILY: DEILINIINAE.

***Chloroctenis*** gen. nov.

Very closely related to *Aplochlora* Warr., but, whereas that genus has the antennae perfectly simple, even in the ♂, the ♀ of this has them shortly pectinated; those of the ♂, which I have not yet met with, will almost certainly be more strongly pectinated. The palpi also differ, being short, thick, and decumbent, with the third joint hidden in the sealing; neuration of *Aplochlora*.

Type: *Chloroctenis similis* sp. nov.

101. ***Chloroctenis similis*** sp. nov.

*Forewings*: dull mealy green, with a dark cell-spot and pale green fringe.

*Hindwings*: similar; the hindmargin faintly elbowed at middle.

Underside throughout uniform pale flesh-colour, the fringes greenish. Head, thorax, and abdomen apparently concolorous.

Expanse of wings : 26 mm.

Two ♀♀ from Warri, June 1897 (Dr. Roth).

Very much like *Aplochlora incisibilis* Warr., Nov. Zool. IV. p. 76, from Akassa, River Niger; but differing in the underside, which is dull reddish without any dark submarginal fascia.

The wings of this species appear exceedingly fragile.

102. **Eugnesia fasciata** sp. nov.

*Forewings* : yellow, crossed by five orange-red fasciae, basal, antemedian, postmedian, submarginal, and marginal, the first abbreviated, the second curved, third and fourth sinuous, coalescent on the median vein : cell-spot orange-red : costa metallic grey-brown, formed of coalescing strigae : fringe yellow, chequered with brown.

*Hindwings* : similar : the cell-spot a blotch : the postmedian fascia angled in middle.

Underside the same, but duller. Head, thorax, and abdomen yellow, varied with orange : the shoulders grey-brown, like the costa of forewings.

Expanse of wings : 36 mm.

Three ♀♀ from St. Aignan, October—November 1897 (Meek).

Intermediate between *E. aurantiaca* Warr. from Queensland and *E. sanguinata* Warr. from Ron Island.

103. **Heterostegane subfasciata** sp. nov.

*Forewings* : yellow freckled with orange : costa marked with metallic fuscous, most densely towards base : no antemedian lines visible : a small brown cell-spot : a faint denticulate orange line at two-thirds, and a metallic brown line from costa at five-sixths to anal angle, slightly irregular and interrupted at the veins : a row of metallic brown marginal spots : fringe yellow.

*Hindwings* : similar : the two outer lines curved, and distinct only at costa and on inner margin : a dark spot on costa at middle : cell-spot brown.

Underside ochreous yellow : the basal third of forewings, especially along costa, dusted with brown : a broad, rather diffuse, brown fascia at one-third, a narrow crenulated line beyond middle, and a broad brown fascia at three-fourths, partially connected by a brown shade with hindmargin above middle and above anal angle : marginal line continuous, brown : hindwings the same : face and palpi ferruginous : vertex, thorax, and abdomen orange : collar bronzy brown.

Expanse of wings : 18 mm.

One ♂ from Baram, Borneo, October 1891 (Everett).

SUBFAMILY OURAPTERYGINAE.

104. **Thinopteryx marginata** sp. nov.

Both wings dull pinkish grey, more pink towards the margins, with the usual oblique yellowish discal space : the lines dark grey : distinguished by having the marginal space of both wings above and below pale lemon-yellow without striae : fringe of the same colour, with pink basal line.

One ♂ from West China.

Expanse of wing : 52 mm. Smaller than the Japanese forms.

## SUBFAMILY BRACCINAE.

105. *Arycanda evanescens* sp. nov.

*Forewings*: dull slate-colour; all the markings, except the cell-spot, which is round and black, very indistinct; a small blackish dot at base; a curved basal line, represented by blackish spots at costa, on median vein, at the base of first median nervule, and on submedian at the end of the fovea; a similar spot at the basal end of the fovea; close beyond the cell-spot a faint curved median line can be discerned, followed by three curved lines, of which the second is thickest, and all more or less evanescent before costa; in the third, between veins 2 and 3, is a spot of black scales; fringe slate-colour.

*Hindwings*: with a straight antemedian darker line and the three lines, as on forewings, beyond the round black cell-spot.

Underside, with the cell-spots larger and more oval; no lines, but a broadish smoky submarginal fascia on both wings. Head and thorax slate-colour; the face with a slight dark bar above; outside of palpi, tips of shoulders, and a median bar on patagia blackish; basal segment of abdomen only slate-colour; the rest dull yellow.

Expanse of wings: 44 mm.

One ♂ from Sula Mangoli, November 1897 (W. Doherty).

Nearest to *A. obsoleta* Warr.

106. *Bracca flavitaenia* sp. nov.

*Forewings*: black, with white markings; a semioval blotch at one-third in base of cell, bounded below by the submedian fold; a large irregular oval blotch at two-thirds, extending from base of vein 7 to below vein 2; a curved submarginal row of small spots, those between veins 3 and 4 and on either side of vein 7 the largest, and a flattened semielliptical blotch on inner margin from one-fifth to three-fifths; below the apex beyond the two larger spots of the submarginal row are two bluish white wedge-shaped marks; the fovea in the ♂ is white; fringe black.

*Hindwings*: with basal half white, discoloured at extreme base; outer half deep yellow, with a broadish black inner margin, the external edge of which is dentate on the veins; a marginal row of acutely wedge-shaped black marks, connected by the black veins with the teeth of the inner black margin; between the veins a submarginal row of deep black oblong spots, the three below apex largest.

Underside of forewings the same, but instead of the submarginal row of white spots a nearly marginal series, interrupted beyond cell; of hindwings with black costa, and a large quadrate black patch before apex; the wedge-shaped marginal spots obsolete, except below apex. Head and thorax black; thorax with white lateral spots and one central between the patagia; abdomen yellow, with basal segments white.

Expanse of wings: 48 mm.

One ♂ from Sula Mangoli, November 1897 (Doherty).

107. *Bursada atribasalis* sp. nov.

*Forewings*: black, with two deep yellow blotches; one oblong, near base, resting on the median vein; the other transverse and oblique, beyond middle, narrowed above and bulged in the middle, from below three-fifths of costa towards anal angle; fringe concolorous.

*Hindwings*: deep yellow, with a broad black marginal fascia from before apex to anal angle, its inner edge with slight yellow teeth along the veins; basal third black, with sinuous outer edge; costa narrowly black between basal and marginal black areas.

Underside like upper. Head, thorax, and abdomen blackish; abdomen with yellow lateral spots; palpi and some scales externally round the eyes yellow.

Expanse of wings: 35 mm.

One ♂ from Pulo Besi, north of Obi, September 1897 (Doherty).

Distinguished at once by the black basal area of hindwings.

The hindwings are slightly indented opposite cell and near anal angle, and bulged outwards between.

108. *Bursada basistriga invadens* subsp. nov.

Differing from the type form of *basistriga* Wlk. only in the fact that the two oblique yellow blotches of the forewings are produced upwards so as nearly to touch the costa; in the hindwings of the ♂♂ the costal dark border is much narrower than in the ♀♀, a difference which is not noticeable in the type form.

Three ♀♀, three ♂♂, from St. Aignan, October and November 1897 (A. S. Meek).

The ♂♂ all smaller than the ♀♀.

But along with the examples of this form, and taken flying with them, are eight ♂♂ in which the preponderance of the orange over the black coloration is so striking a feature as to merit a distinctive aberrational name. Though not so much smaller than the ♀♀ as are the ♂♂ of *invadens*, they agree with them in the much narrower marginal border of both wings. The two dark fasciae at one-third and two-thirds tend to become split up each into two narrow bands, of which the inner one becomes interrupted or obsolete; in one example the outer arm likewise is wholly interrupted in the middle, while in a second both fasciae have vanished entirely, leaving only the inner and hindmargins narrowly black; and in this case the orange ground-colour passes into yellow. For the less-interrupted aberrations I propose the name *interruptata*, and for the last-mentioned form that of *obsoleta*. As tending to prove that these are merely aberrations of the subspecific form *invadens*, it may be mentioned that in one of the examples the right wing shows the two fasciae entire, while the outer fascia of the left wing contains indications of its division into the two narrower bands.

109. *Bursada interspilata* sp. nov.

*Forewings*: brown-black; a curved yellowish patch, dusted with fuscous scales, at base of cell, extending below it as far as the submedian fold; at two-thirds a pale cream-coloured fascia from just below costa to above anal angle, its outer edge sinuous, with a small tail from inside edge towards anal angle; in the middle of the dark fascia separating this fascia from the yellow patch is a yellowish spot on the

median vein, varying in size and distinctness; in one example in which the cell-patch is nearly obsolete this spot is wanting; fringe wholly concolorous.

*Hindwings*: rich orange, with a broad brown-black border along costa and hindmargin, swollen at anal angle and interrupted by the orange ground-colour, which is here thickly dusted with fuscous scales, and followed by a black projection pointing towards apex, and produced laterally along vein 1 as a wedge-shaped mark towards base of wing, leaving the inner marginal edge orange.

Underside of forewings with the three patches bright orange, all enlarged, the first connected with base by a yellow stalk: the fringe pale beyond cell and submedian fold. Hindwings as above, but the projection above anal angle disconnected, and the inner margin wholly orange. Head, thorax, and abdomen concolorous; the abdomen with lateral orange stripes.

Expanse of wings: ♂ 32 mm.; ♀ 34 mm.

Four ♂♂, two ♀♀, from St. Aignan, Louisiade Islands, October 1897 (A. S. Meek).

Distinguished from the nearest allied forms by the absence of the basal shoulder and semihyaline patch of forewings, and by the wholly brown fringe of the upper side.

#### 110. *Bursada radicata* sp. nov.

Akin to *B. basistriga* Wlk., but the ground-colour velvety olive-brown, with all three yellow markings much narrower, the middle one sometimes as slender as the basal streak; in the hindwings the dark border is much broader at the anal angle, and is produced along the inner margin to the base of the wing. In one ♀ the hindwings are marked with a distinct black cell-spot.

Expanse of wings: 40 mm.

Four ♂♂, two ♀♀, from Goodenough, D'Entrecasteaux Islands, December 1896 (A. S. Meek).

#### 111. *Bursada unifascia* sp. nov.

*Forewings*: brownish black, with a speck of yellow on the median vein near middle; a broad postmedian fascia, narrowly touching costa at three-fifths towards anal angle, its margins sinuous and irregularly crenulate; fringe concolorous.

*Hindwings*: yellow; a broad brown-black marginal fascia from before apex to above anal angle, diffusely extended along inner margin, with a blunt projection in the diffuse area above anal angle, and a similar projection from costa before the commencement of the marginal fascia.

Underside similar, but the forewings with a broad oblique dark central fascia, containing a yellow spot in its midst, and a yellow subbasal blotch prolonged narrowly in the middle to the base. Head, thorax, and abdomen brown-black.

Expanse of wings: 35 mm.

Two ♂♂, three ♀♀, from Woodlark Island, 1895 (A. S. Meek).

Nearest to *B. interspilata* Warr. from St. Aignan.

#### 112. *Craspedosis extenuata angustata* subsp. nov.

Differs from typical *extenuata* Wlk. in having the large discal white blotch of forewing, which in that species almost touches the costa, restricted to a small oval blotch between veins 2 and 5; the white fascia of the hindwing much

narrower : and the first **three** segments of the abdomen black above, the black extending laterally nearly to anal segment; *extenuata* has only the basal segment black.

One ♂, expanding 48 mm., from Laiwui, Obi, September 1897 (Doherty).

The type of *extenuata* is from Timor, and I have only seen ♀♀ of this species; it is possible that this ♂ may represent the normal form of that sex; but bearing in mind the difference in locality, and especially the difference in the colouring of the abdomen, I have little doubt that it is a good local form.

#### 113. *Craspedosis leucosticta candidior* subsp. nov.

Differs from *leucosticta* Warr. from Queensland in having the pale discal streak broader and much purer white, and the slaty tints much more brightly blue-tinged.

Five ♂♂, three ♀♀, from St. Aignan, August—October 1897, type (A. S. Meek); and three ♂♂, one ♀, from Goodenough, December 1896 (A. S. Meek).

Of these the Goodenough examples are nearest typical *leucosticta*, the white markings of forewings in two cases being narrower; and in the hindwings the white discal band has the prominent projection in the outer edge. In the examples from St. Aignan, which are somewhat shorter and broader-winged, this projection is reduced to a slight bend or curve.

#### 114. *Craspedosis niveosignata* sp. nov.

*Forewings*: deep purple-black; obscure traces of two darker lines at one-fourth and one-half; beyond the latter a vertical white fascia extending from above vein 6 to the submedian fold; the inner edge sinuous, the outer crenulate; this fascia is broadest at vein 5 and narrowed towards each end.

*Hindwings*: purple-black, with a broad central fascia, not quite touching either costal or inner margin, its inner edge straight, its outer strongly curved and subcrenulate; fringe of both wings slightly paler.

Underside the same. Head and thorax purple-black; abdomen with basal and anal segments black; the rest yellow, with broad black segmental bands.

Expanse of wings: 44 mm.

One ♂ from Ron Island, July 1897 (Doherty).

#### 115. *Craspedosis semicrocea* sp. nov.

*Forewings*: uniform dark slaty blue; fringe concolorous. In some specimens a faintly paler oval blotch in discernible in the middle of the wing.

*Hindwings*: the same.

Underside similar: all the parts of the body concolorous, except the last four segments of abdomen, which are yellow above and below.

Expanse of wings: 45 mm.

Five ♂♂, two ♀♀, from Sner, Mefor, May and June 1897 (Doherty).

#### 116. *Pitthea abbreviata* sp. nov.

Like *P. continua* Wlk., but the yellow fasciae are much more restricted; the first on forewings not more than half as wide as in *continua*, stopping short at vein 1, and subdivided into three by the thickened black subcostal and median veins. The fascia of the hindwing proportionally smaller, ending well before

hindmargin, and without any trace of an orange patch beyond it. Underside of forewings like upper; of hindwings like those of *continua*, but the fringe beyond the orange blotch always black.

Expanse of wings: 45 mm.

Several examples from Warri, Niger Coast Protectorate, May 1897 (Dr. Roth).

### 117. *Tigridoptera subradiata* sp. nov.

*Forewings*: pale bluish slate-colour; the base narrowly and diffusely, and the submedian fold for four-fifths, buff; a blackish spot near base on submedian fold; two black spots near beyond, obliquely one below the other, above the subcosta and below the median vein respectively; basal line bent on the median and swollen on all the veins; cell-spot oval, black, followed by four lines of black spots all bent on vein 6, the first of largish subconfluent spots on veins, the second of smaller spots not confluent, the third a cloudy continuous shade, the last a row of elongated black spots between the veins, followed by a semiobsolete similar row; fringe concolorous; all the rows of spots are interrupted on the submedian fold, except the last.

*Hindwings*: with a straight line, swollen on veins near base; a nearly round black cell-spot; the rest as in forewings, but the cloudy shade is absent; longitudinal streaks of buff below the costal vein, beyond the cell, and on the submedian fold, all stopping as in the forewing at the last row of spots.

Underside with large round black cell-spots and a very broad black submarginal fascia, which in the forewings, except at apex, is diffused to the hindmargin. Head and thorax slate-colour; face with a black bar at top; shoulders and patagia spotted with black; shoulders laterally buff; abdomen yellow, with basal segment slate-colour.

Expanse of wings: 65 mm.

One ♀ from Mindoro (Platen).

Allied to *caul* H. S. and *percosata* Wlk. from Java, and to *radolata* Warr. from Palawan; distinguished by the underside.

### 118. *Xanthomima disrupta* sp. nov.

*Forewings*: deep yellow; the costa finely black, more broadly at base; a black central bar from costa towards anal angle, very broad on costa, bent at right angles below vein 3 to inner margin at three-fourths; a submarginal black band, also broadest on costa, bent on vein 7, and again below vein 3 to inner margin just beyond the central band; a black marginal border; the narrow yellow space between the last two more or less clouded with darker except between veins 3 and 4; a broad black horizontal streak above vein 1 from base to hindmargin, touching inner margin at base; fringe black.

*Hindwings*: without the horizontal streak; the other three much narrower than in forewings, the central one of uniform width; costal edge narrowly black.

Underside the same, but the two outer bands forming one broad fascia containing an orange-yellow spot between veins 3 and 4; central band of forewings showing a black cell-spot attached to its inner edge. Head, shoulders, metathorax, and basal segment of abdomen black; collar, patagia, and abdomen yellow; pectus and legs grey.

Expanse of wings: 52 mm.

One ♂ from Ali, Shortland Islands (Webster).



## SUBFAMILY BISTONINAE.

119. *Blepharoctenia perclara* sp. nov.

*Forewings*: wholly pale straw-colour, without a trace of darker dusting; a strong curved black line near base, thickened on costa and produced to base; a black spot on costa at middle; a strongly marked black outer line, also thickened on costa, angled rectangularly on vein 5, and minutely on the submedian fold, strongly concave between, followed between veins 3 and 4 by a black spot, and from vein 4 to 5 by an irregular black streak, barbed on vein 5, and again followed by a black spot, beyond which the straw-coloured fringes are marked with black.

*Hindwings*: with the outer line only, this sharply angled on vein 5; some black scales close to base, indicating first line.

Underside exactly like upper. Head, thorax, and abdomen straw-colour; face with a broad black bar at top; palpi dark above; basal segment of abdomen with an interrupted black ring; antennae black; legs spotted with black; the forelegs almost wholly black.

Expanse of wings: 60 mm.

One ♂ from Keelung, Formosa, August 1896 (Jonas).

120. *Eubyja* (?) *expansa* sp. nov.

*Forewings*: whitish, densely speckled with olive-grey; the lines all of the same tint; first curved, at one-fourth, preceded by an ill-defined shade; median outcurved beyond cell, to inner margin before middle, obscurely crenulate; this and the first line are thickened at costa; outer line from three-fourths of costa to middle of inner margin, finer and regularly dentate, approximated to median line from vein 6, and followed by an indistinct shade; submarginal wavy, white, preceded by a somewhat interrupted lunulate shade, and followed by a less distinct one; fringe whitish, with slight dark marginal spots between veins.

*Hindwings*: similar, but less dusted with darker; no first line; outer line not approximated to median; a small olive-grey cell-spot.

Underside white, not speckled; forewing slightly suffused with grey; apical area dark grey, enclosing a square white apical spot; outer line distinctly dentate; submarginal straight; the angulated discocellular marked in grey; hindwing white, with grey apex and outer line marked towards costa only. Head, thorax, and abdomen concolorous.

Expanse of wings: 68 mm.

One ♀ from River Niger, between Akassa and Onitsha (Dr. Cook).

Ovipositor exerted; tongue present; palpi very short; costal area of forewings beneath clothed with down.

121. *Eubyja turpis* sp. nov.

*Forewings*: dingy whitish, suffused and speckled with smoky fuscous and ochreous scales; the lines blackish; first from one-fourth of costa to inner margin close to base, angled on the median vein; second from three-fourths of costa to three-fifths of inner margin, angled outwards on vein 5, and again below vein 3, joined at inner margin by a smoky blackish obscure central shade, which passes just outside the dark cell-spot; submarginal line obscure, preceded and followed by darker clouds; a row of dark marginal spots.

*Hindwings*: with the outer line only, preceded by a distinct linear black cell-spot; submarginal shade darker and more distinct.

Underside paler, with indications of the outer line. Head, thorax, and abdomen dingy grey, the abdomen with darker segmental rings.

Expanse of wings: 46 mm.

One ♀ from S. Flores, November 1896, dry season (Everett).

This, or a cognate form, occurring at Dharmasala, is considered by some to be identical with Guenée's North American species *cognataria*.

## 122. *Eubyjodonta comitata* sp. nov.

*Forewings*: white, sparsely speckled with fuscous, the costa more densely marked; a black crenulated line from one-fourth of costa to one-fifth of inner margin, preceded by a broad brown shade; a black outer line from three-fourths of costa to three-fourths of inner margin, outcurved from vein 7 to 4, then incurved to the submedian fold, where it is angled, then oblique inwards, and again angled on vein 1; this line forms small teeth inwards on all the veins, and is followed by a brown shade, which beyond the cell and above the anal angle is diffused to the hindmargin, showing there a faint pale submarginal line; fringe chequered, white and brown; at middle of costa is a dark grey spot, giving rise to a very faint sinuous median line.

*Hindwings*: with the base brown edged by a curved black line; the outer black line bluntly angled beyond cell, the brown shade beyond it faint.

Underside with all the markings dark grey, the brown tints hardly visible; cell-spot of forewings black, with the discocellular narrowly white, of hindwings dark grey and linear. Face brown, becoming greyish white above, like the vertex and thorax; metathorax and tips of patagia brown; basal segment of abdomen brown and black; rest of abdomen greyish white, mixed towards base with rufous and black scales.

Expanse of wings: 70 mm.

Two ♂♂ from Sidemi, Amurland, July. In one specimen the white is almost pure.

Differs from typical *Eubyjodonta* in having only the hindwings excavated in the hindmargin.

## 123. *Eubyjodonta concinna* sp. nov.

*Forewings*: creamy white: the markings concise and black; first line from one-third of costa to one-fourth of inner margin, vertical to the median, along which it is shortly bent at right angles, then curved towards base; preceded by a thicker, more diffuse, black shade, which stops at the submedian vein; outer line at three-fourths, sinuous, bluntly outcurved beyond cell from vein 6 to 4, and less strongly again on the submedian fold, emitting slight teeth basewards along the veins, and followed beyond a narrow pale space by a diffuse ochreous grey band, the outer edge of which is lunulate, the lunules on each side of vein 7 being black and double, between veins 6 and 4 single and less black, and between 4 and 2 marked only at their edges with blackish scales; submarginal line pale, with the marginal space beyond slightly ochreous-tinged and marked with blackish scales; fringe cream-white; a black spot at middle of costa, from which a slightly outcurved vertical black median line runs, passing over the distinct black cell-spot, and ends in a dark

spot beyond middle of inner margin; between this and the costal spot another less distinct but more vertical blackish line runs nearer the base.

*Hindwings*: with neither of the basal lines, the median line single, inside the cell-spot, the outer line angled beyond cell, the submarginal lunules distinct below vein 6 to anal angle.

Underside similar, with all the markings less distinct. Face below grey: above and on vertex cream-white: shoulders cream-white, with thick black tips: thorax and patagia the same, but the tips of the patagia and metathorax and the centre of thorax black: abdomen somewhat darker (probably from grease), with an oblong black mark at the dorsal edge of second segment: antennal pectinations black, with the shaft white.

Expanse of wings: 52 mm.

One ♂ from Ili district, in May.

The same remark applies to this species as to *comitata*, only the hindwings having the hindmargins excavated.

### **Hirasodes** gen. nov.

Closely related to *Hirasa* Moore, both structurally and superficially: but the ♂ antennae are stontly and evenly pectinated nearly to the tips. In the forewings in both genera the second subcostal anastomoses with the first.

Type: *Hirasodes contubernalis* Moore (*Hirasa*).

### SUBFAMILY ASCOTINAE.

#### 124. **Alcis rufilimes** sp. nov.

*Forewings*: greyish white, speckled with grey; the basal and marginal areas suffused with rufous: lines black; first from nearly one-third of costa to one-fourth of inner margin, curved and waved; outer line from two-thirds of costa to two-thirds of inner margin, slightly dentate at the veins, and between veins 4 and 6 forming a strong external angle touching the submarginal line, which is pale and regularly dentate; the marginal area between the veins is speckled with grey, the veins themselves pure rufous; beyond the cell a dark grey patch stands touching the hindmargin; both lines start from dark brown costal spots: and there is another midway between these, from which a cloudy curved median shade arises, traversing the wing: space between outer and submarginal lines on the costa deeper rufous; a row of blackish marginal lunules before the fringe, which is grey and rufous.

*Hindwings*: similar, but without any basal patch: the angle of second line less prominent, and blunter.

Underside dull whitish, with the markings indistinct, except along the costa, which is ochreous: cell-spots indistinct. Face and palpi dark brown; top of face and vertex ochreous; shoulders pale: thorax and abdomen rufous and grey.

Expanse of wings: ♂ 42—44 mm.: ♀ 56 mm.

Two ♂♂ from Warri, July 1896; one ♂, one ♀, Warri, May 1897 (Dr. Roth).

The antennae of ♂ are strongly plumose to four-fifths; fovea, tongue, and frenulum all present: the palpi are porrect, the second joint thick, hairy below, bluntly rounded off at apex, the third joint being entirely hidden; hindtibiae slightly thickened; veins 10 and 11 short-stalked.

125. *Chogada epistictis* Meyr. ab. *flavifasciata* nov.

Among several examples of this species from St. Aignan, collected by A. S. Meek between August and November 1897, many of them considerably below the average size, there occurs one which differs so much from any forms hitherto distinguished, that I here describe it. Both wings with basal two-fifths whitish, with pale grey dusting; the outer three-fifths suffused with smoky grey and dusted with blackish; cell-spot blurred; only the exterior line distinct: this is followed by a lichen-yellow band; and a spot of the same colour lies on vein 6 towards the hindmargin beyond the submarginal line.

The specimen is a ♀.

126. *Chogada munda* sp. nov.

*Forewings*: white, sparsely speckled with fuscous scales, more thickly striated along costa and in the apical region: the lines fuscous; first from one-fourth of costa curved to one-fifth of inner margin; outer line thick, lunulate-dentate, from three-fourths of costa to two-thirds of inner margin, bent outwards slightly beyond cell: a row of fuscous marginal spots; fringe white.

*Hindwings*: with a broad dark line close to base, and a postmedian sinuous line; cell-spot ocelloid, white, with fuscous edge.

Underside like upper. Head, thorax, and abdomen white, dusted with fuscous; tip of metathorax and basal segment of abdomen marked with dark fuscous.

Expanse of wings: 48 mm.

One ♀ from Edukumbaan Hills, Zululand, May 1895.

The sole example is considerably wasted, but appears quite distinct from any described species; the forewings probably have a discal spot like that of hindwings, when fresh.

127. *Darisa adamata*.

*Boarmia adamata* Feld., *Reise Nov.* t. 126. f. 5. 5a.

“ “ C. & S., *Cat.* No. 3305.

“ “ Hmps., *Fauna Brit. Ind., Moths*, III. p. 273.

The venation in the forewings of this species is variable. Vein 10 sometimes anastomoses with the costal, at other times not. In one ♀ the right wing shows it as anastomosing, but no sign of 11; in the left wing, however, after the anastomosis, vein 11 is seen separating from 12. In either case it might be said that 10 and 11 were coincident and anastomosed with 12, 11 sometimes remaining coincident with 12. But in many cases vein 10 does not anastomose with 12 at all, and vein 11 is seen rising out of 12. It therefore seems preferable to refer the species to the genus *Darisa*, belonging to the *Medasina* group.

128. *Deileptenia maculata* sp. nov.

*Forewings*: brownish ochreous, speckled with blackish; the lines black; first at one-third, double, irregularly waved and slightly oblique inwards, the included space tinged with rufous; second at two-thirds, also double, forming a strong narrow projection outwards between veins 5 and 6, then strongly incurved to just beyond middle of inner margin, the included space rufous, marked with a deeper cloud just below costa, and by a large black blotch between veins 3 and 5; submarginal line

pale, lunulate, especially in the upper half, where below costa and opposite cell the teeth are filled in with black ; cell-spot distinct, black ; an obscure waved central shade ; a row of black marginal spots ; fringe concolorous.

*Hindwings* : with a dentate curved postmedian and obscure pale submarginal line ; cell-spot black ; a dark black-brown blotch on inner margin between the two lines.

Underside pale wood-colour speckled with black, and with all the lines marked in dull blackish. Face, palpi, and shoulders rufous brown ; thorax and abdomen paler.

Expanse of wings : 44 mm.

One ♂ from Penang, March 1897 (Curtis).

Forewings of ♂ without fovea ; veins 10 and 11 coincident, touching 12 at a point.

### 129. *Deinotrichia dentigerata* sp. nov.

*Forewings* : grey, finely black-speckled : the lines black, double, and strongly dentate throughout ; first at one-fourth, dentate on the veins, and with a dark line preceding it ; the median, which is single, projecting outwards beyond cell, then running in to touch the base of cell-spot, thence vertical and dentate to inner margin ; outer line slightly projecting beyond cell, then strongly curved inwards from vein 5 to vein 1, followed by a similarly dentate shade ; submarginal line pale, uniformly dentate, edged on both sides with darker, the inner dark edge thick and filling up the teeth ; all three interrupted by a pale space between veins 3 and 5 ; a row of dark marginal dots before the grey fringe.

*Hindwings* : similar, but without first line.

Underside dingy whitish, with a broad smoky marginal band and black outer line and cell-spot ; the line sinuous on the forewings, angulated on the hindwings. Head, thorax, and abdomen all grey.

Expanse of wings : 36 mm.

One ♂ from Penang, December 1896 (Curtis).

Very much like *Aleis nilgirica* Hampson.

### 130. *Diplurodes contacta* sp. nov.

*Forewings* : dull white ; basal area darkened with brown and reddish scales, and limited by a double diffuse sinuous line at one-fourth ; a large black-brown blotch on discocellular, touching costa, and with a small paler line in middle ; a dark costal spot at two-thirds, from which a median shade descends, marked only by pairs of dots on the veins ; marginal third filled up with brownish purple, its inner edge forming a rounded protuberance between veins 5 and 2, which nearly touches the cell-blotch ; the outer line can be faintly traced within this edge by a row of pale spots on the veins ; a pale blotch in middle of hindmargin ; a row of dark marginal lunules ; fringe purplish grey, paler beyond the pale blotch ; inner margin broadly suffused with reddish scales.

*Hindwings* : with basal two-thirds whitish, varied with greyish striae ; a grey cell-spot, and the beginning of a grey line on inner margin at two-thirds ; outer third purplish brown ; fringe paler except at apex.

Underside similar, but duller. Face and palpi brown ; vertex ochraceous ; thorax and abdomen mottled with purplish and grey ; metathorax paler.

Expanse of wings : 36 mm.

One ♀ from Mount Arjuno, Java (Doherty).

Nearest to *D. cestita* Warr. from the Klasia Hills.

### 131. *Ectropis nigrocellata* sp. nov.

*Forewings* : pale ochreous, densely covered with coarse and partially confluent transverse fuscous striae, a blotch beyond the cell and the apex alone remaining pale : lines obscure, more or less hidden by the dark tints : first from one-fourth of costa, curved, to inner margin at one-fifth ; median from a dark spot at centre of costa to two-fifths of inner margin ; outer, partially double, from about three-fourths of costa sinuous to three-fifths of inner margin, followed beyond cell by a darker patch ; submarginal line indistinct, pale ; cell-spot represented by a large diffuse roundish blotch of black scales ; fringe concolorous, with marginal black spots at base between the veins.

*Hindwings* : the same.

Underside smoky black : the cell-marks large, deep black, preceded and followed by whitish spaces : a white patch at apex of forewings : head, thorax, and abdomen greyish ochreous, dusted with darker.

Expanse of wings : 52 mm.

Three ♀♀, one ♂ : one ♀ from Sner, Mefor, May—June 1897 (Doherty), the others from Ron Island, July 1897 (Doherty). These last somewhat paler, more ochreous in tint, with less dark suffusion, the black discal blotches on the upper surface smaller in the forewings and nearly obsolete in the hindwings : the undersides are, however, alike in all the examples.

The venuration is somewhat peculiar ; the cell is only two-fifths of the wing, and veins 7, 8, 9 are stalked as usual, but both 7 and 8 rise very much nearer the base than is generally the case.

### *Lophobates* gen. nov.

*Forewings* : elongate, narrow : costa almost straight ; hindmargin oblique, slightly curved : anal angle obtuse.

*Hindwings* : broader ; hindmargin well-rounded, subcrenulate ; abdominal margin sinuous, with a lobe near base, bearing beneath a tuft of hair.

Antennae of ♂ strongly bipectinate nearly to apex ; palpi porrect, densely haired ; hindtibiae swollen, with a small pencil of hairs and four short spurs.

*Nervation* : forewings, cell half as long as wing ; discocellular vertical ; first median at three-fourths, second at eleven-twelfths ; radials normal ; 7, 8, 9 stalked ; 10 and 11 coincident, anastomosing with 12, 10 connected by bar with 8, 9. Hindwings : costal approximated to subcostal for half the length of cell ; vein 7 before end ; medians as in forewings.

Type : *L. ochreicostata* sp. nov.

### 132. *Lophobates ochreicostata* sp. nov.

*Forewings* : fuscous brown ; the costal area ochreous, thickly dusted with fuscous, the line dividing the two areas sinuous and oblique from one-fourth of inner margin to hindmargin below apex ; first line curved, fuscous, from nearly one-third of costa to one-fourth of inner margin, marked by a dark spot on median

vein : second line from five-sixths of costa, irregularly dentate in the pale costal area, then oblique and curved inwards to inner margin beyond middle, approaching first line on the median : submarginal line ochreous, preceded on costa by an oblique fuscous blotch, and scarcely visible in the dark area except as a pale lunular mark on submedian fold : fringe brown, with a slightly paler basal line : a small black cell-spot.

*Hindwings* : wholly fuscous brown, except the extreme base.

Underside cinereous : costal area of forewings ochreous, much striated and spotted with dark fuscous. Face, palpi, and abdomen fuscous brown : vertex, thorax, and basal segment of abdomen ochreous.

Expanse of wings : 32 mm.

In some numbers from the Khasias.

### 133. *Psilalcis intermedia* sp. nov.

*Forewings* : ochreous grey, speckled with fuscous, and towards hindmargin with fine blackish striations : costa ochreous, dotted with black, and with four black spots, at one-fourth, two-fifths, three-fourths, and five-sixths respectively, from which the lines run : first and second simply curved inwards : third, indistinctly denticulate and marked with black dots on veins, angled on vein 6, and oblique to inner margin, almost touching the second line : submarginal pale, wavy, with dark clouds before it beyond cell and above anal angle : a row of distinct black marginal spots : fringe pale, mottled with darker at ends of veins : cell-spot blackish, just beyond second line.

*Hindwings* : with a dark cloud near base : a linear dark cell-spot : an obscure waved double postmedian line, the inner area fuscous, the outer ochraceous : submarginal line interrupted, dentate, with mixed darker shading on both sides.

Underside greyish ochreous : base of forewing discoloured with grey : first and second lines marked on and near costa : a broad blackish marginal band, leaving pale spaces on costa, at apex, and below middle of hindmargin : hindwings with this band shown only at apex : both wings with dark cell-spot. Head, thorax, and abdomen concolorous.

Expanse of wings : 28 mm.

One ♂ from Mount Arjuno, Java (W. Doherty).

This species is very much like *Boarmia thricophora* Hmps. from Sikkim ; but the antennae are merely pubescent, and the hindwings have no fringe of long hairs along inner margin ; the forewings have a small fovea.

### 134. *Racotis boarmiaria illustrata* subsp. nov.

*Forewings* : pale olive-green, thickly peppered with olive-brown : the markings olive-brown : costa with a few fine black strigae, and three dark brown spots at one-fourth, one-half, and three-fourths, denoting the origin of the lines, which are diffuse and interrupted, marked by brown dashes on the veins : the first at one-fourth, slightly curved : second sinuous, curved below costa, then oblique, touching the lower end of the large lunate olive-brown cell-spot, to inner margin before middle : both the first and second lines marked with rufous blotches on inner margin : outer line broader and very diffuse, marked by a double series of brown vein dashes with a paler one in centre : submarginal line pale, denticulated,

preceded and followed by irregular rufous shading, with a pale spot of the ground-colour in middle touching hindmargin; olive-brown marginal spots between the veins; fringe pale greenish.

*Hindwings*: similar; the cell-spot smaller.

Underside pale ochreous, without speckling; costa with fine black striae and three dark spots; cell-spot black, larger on forewings; a broad smoky black submarginal fascia diffused to hindmargin of forewings beyond cell. Head, thorax, and abdomen ochreous green mottled with brown.

Expanse of wings: 48 mm.

One ♂ from Penang (Curtis). A distinct pale local form.

### 135. *Racotis zebrina* sp. nov.

*Forewings*: with the ground-colour, where visible, much paler and brighter than in *R. squalida* Butler, or *boarmiaria* Guen.; the dark markings being likewise deeper and more defined; the fovea in ♂ glassy and conspicuous; basal patch formed of dark olive streaks, mixed with black, and edged by a distinct pale thick line; inner edge of central fascia dark olive, followed in cell by a cloudy black spot; discal ocellus very black and plain, followed **immediately** by the central shade; outer edge of fascia formed of subcontiguous blackish vein-spots, succeeded by an interrupted pale line; the broad dark fascia beyond much more distinct, especially the series of dark humles which are edged by the pale submarginal line; marginal spots blackish; fringe fuscous olive.

*Hindwings*: the same.

Underside bright pale ochreous, with broad smoky black submarginal fasciae and cell-spots; the basal area mottled with coarse smoky brown blotches. Head, thorax, and abdomen dark olive-fuscous.

Expanse of wings: 48 mm.

Two ♂♂ from Warri, Niger Coast Protectorate, June 1897 (Dr. Roth).

Over and above its smaller size and more brightly contrasted markings, the species may be distinguished at once from *R. squalida* Butler by the ♂ antennae. In *squalida* the pectinations are quite short and straight, nearly at right angles to the shaft, ciliated laterally and apically; in *zebrina* they are much longer and coarser, oblique and thickened towards the tips, with strong ciliations.

### 136. *Serraca spissata* sp. nov.

Allied to *S. costaria* Guen., but rather smaller, the ground-colour brighter, more ochreous; the markings and lines darker. The hindwings, instead of having the hindmargin fully rounded, are narrower, and towards the anal angle subtruncated; the inner margin beneath with **three** parallel rows of brushlike hairs, and above also hairy below vein 2, which has the same direction as in *costaria*, leaving the median at right angles just before 3, and then curved and running parallel to it. In one example the whole width of the central fascia is occupied by fuliginous, this tint extending also, but narrowed, from inner margin of forewings to the middle. Underside and body as in *costaria*.

Two ♂♂ from Nias Island.



**Systema** gen. nov.

*Forewings*: ample, triangular; costa nearly straight, convex at apex; apex rounded; hindmargin obliquely curved.

*Hindwings*: round, with rounded hindmargin and rather prominent anal angle.

Antennae of ♂ bipectinated to three-fourths, the branches long; palpi perfect, hairy, terminal joint short and hardly visible; tongue and frenulum present; no fovea.

*Nervation*: forewings, cell half as long as wing; discocellular vertical; first median nervule at two-thirds, second and third from end of cell; radials normal; 7, 8, 9 stalked; 10 and 11 coincident. Hindwings with costal approximated to subcostal for nearly one-half cell; 6 and 7 from end of cell; 3 close before lower end.

Type: *S. semicirculata* Moore (*Eupithecia*).

In this genus I include also *dentilinea* Warr., *albibasis* Hampson, *concinna* Warr., and *albipicta* Warr., placed together in one subsection by Hampson, and said to have vein 10 of forewings stalked with 7, 8, 9; but this I do not find to be the case in the examples I have seen.

## SUBFAMILY SEMIOTHISINAE.

137. **Acadra ancillata** sp. nov.

*Forewings*: whitish, dusted with olive-ochreous and fuscous, and with greyish suffusion in places; the lines dark brown, oblique outwards from costa, bluntly angled below it and oblique to inner margin; first from costa at one-fifth to near base of inner margin; second from middle of costa to one-third of inner margin; third from two-thirds of costa to middle of inner margin, broad and straight, the first and second being fine and waved; followed closely by a darker, more diffuse shade, which runs to hindmargin below apex; submarginal line indistinct, indicated by a brown costal spot; a small pale spot beyond the angle of third line; each of the three lines is accompanied on the inner side by an obscure grey shade or line; a marginal row of dark brown dashes; fringe pale, chequered with brown; cell-spot blackish, sometimes obsolete.

*Hindwings*: with straight dark brown antemedian line, preceded by an olive-fuscous shade, and followed immediately by a black cell-spot; an irregularly waved postmedian line, obscurely double and followed by a broad olive-grey fascia.

Underside white, coarsely speckled with dark brown; a dark brown central shade, crenulate postmedian line, and broad submarginal fascia; costa of forewings and veins yellowish. In the ♀ the postmedian line of hindwings is preceded and followed beyond the cell by spots of black scales. Head, thorax, and abdomen whitish, varied with greyish ochreous.

Expanse of wings: 30 mm.

A pair from Goodenough Island, December 1896 (Meek).

138. **Acadra tessellata** sp. nov.

*Forewings*: whitish ochreous, thickly and rather coarsely speckled with fuscous; first line from a brown costal blotch at nearly one-fourth, bent in cell, then oblique and curved to inner margin below fovea; outer line from a brown blotch at two-thirds,

oblique outwards to near hindmargin, sharply angled above vein 6, then straight and oblique to inner margin before middle; in this lower course it is double, the outer arm darker and running into the depressed apex, which is black: the upper part of outer line is followed by a chestnut costal blotch, beyond which the apex itself is white, filled in with fuscous speckles: an aggregation of dark striae at anal angle: from costa a little before middle an oblique brown blotch is attenuated to the middle of the angle of the outer line: from inner margin just before outer line an upright line is dimly visible, seen through from the underside: fringe and marginal line below apex black, ochreous below middle.

*Hindwings*: quite different: a blackish mark close to base: an obscure double waved dark line before middle: a dark fuscous postmedian line angled on vein 4, and followed by an ochreous line: a similar ochreous submarginal line: the space between these two, of uniform width throughout, olive-ochreous, densely dusted with blackish and divided by the ochreous veins into oblong patches: the basal and marginal areas ochreous, speckled with black: fringe ochreous.

Underside pale ochreous, speckled with fuscous: the lines dark fuscous: forewings with a somewhat interrupted narrow submarginal fascia: hindwings with it broad. Face and palpi dark fuscous: thorax and abdomen ochreous, speckled with fuscous.

Expanse of wings: 39 mm.

One ♂ from Dorei, Dutch New Guinea, June 1897 (Doherty).

A peculiarly marked and elegant species: the apex of forewing is depressed and subfalcate: hindmargin sinuous, the anal angle rounded off. Hindwings with slight tail at vein 4, crenulate above, nearly straight below.

### 139. *Azata costiguttata* sp. nov.

*Forewings*: greyish fawn-colour, with fine fuscous and blackish speckles, the marginal third darker, being suffused except at apex with olive-brown: the lines olive-brown, thickened towards costa, bent below the subcostal vein, then oblique and parallel inwards, at one-fourth, one-half, and two-thirds respectively: the first and second indistinct, the latter broadened at costa, the exterior darker, edged with paler, and slightly tremulous: followed on costa by a large brown triangle with rounded apex, between veins 3 and 4 by a round black spot, and above inner margin by a black cloud: marginal line brownish, thicker along the excision, which is very inconspicuous: fringe pale ochreous, darker beyond the excision: cell-spot blackish.

*Hindwings*: similar, the base paler: no first line: outer line distinct and wavy: submarginal line indicated by a sinuous series of obscure blackish clouds.

Underside yellow, with fulvous speckles: the three lines fulvous, indistinct: the third followed by a broad brown fascia, which beyond cell and above anal angle reaches to hindmargin, leaving paler spaces at middle and below apex: between veins 6 and 7 beyond the outer edge of this fascia is a paler yellowish oval space containing some massed blackish scales towards margin. Head, thorax, and abdomen concolorous with wings: the face and palpi slightly darker.

Expanse of wings: 29 mm.

One ♀ from Mikindani, German East Africa, January—May 1897 (Reimer).

Hindmargin of hindwings faintly crenulate in upper half.

From the description Mabilie's *crassilembaria* from Madagascar must largely resemble this species, but in that the hindmargin of hindwings is said to be produced into an angle at middle.

140. *Azata separata* sp. nov.

*Forewings*: dirty whitish, thickly striated and dappled with fuscous ochreous; beyond the outer line wholly suffused with fuscous, except towards apex; first and second lines dull brown, indistinct; first at one-fourth, second before middle, both curved below costa, then vertical and approximated; outer line thick, brown, nearly straight from two-thirds of costa to two-thirds of inner margin, edged internally with yellowish; a dark spot between veins 3 and 4 between outer line and hindmargin; fringe concolorous, with paler base beyond a dark marginal line; no distinct cell-spot.

*Hindwings*: similar, without first line.

Underside white, with dense and longer fuscous brown striae; costa and veins tinged with yellowish; outer line followed by a broad fuscous and fulvous fascia, not reaching hindmargin. Head, thorax, and abdomen ochreous cinereous; the face dark brown.

Expanse of wings: 26 mm.

One ♀ from Mikindani, German East Africa, January—May 1897 (Reimer).

Hindmargin of forewings hardly emarginate below apex; of hindwings with slight tooth at middle.

141. *Azata triplaga* sp. nov.

*Forewings*: pale wood-brown, dark brown beyond outer line, sprinkled with short brown and black striae; the three lines brown, obscurely edged with dull lustrous scales, each starting from dark brown costal blotches, at one-fourth, one-half, and before three-fourths, the first angled in cell, the second and third on vein 6, the last double, and followed on costa by a larger brown triangular blotch, and by black and lustrous scales between veins 3 and 4, and on submedian field; apical area paler than the rest of marginal space; fringe dark brown with paler base, beyond an interrupted blackish marginal line; cell-spot obscure, dark.

*Hindwings*: with diffuse antemedian brown line incurved at middle before the distinct black cell-spot; a brown lustrous-edged irregularly crenulate postmedian line, and traces of a submarginal line in the dark brown marginal area.

Underside yellow, speckled with black-brown; central line and submarginal fascia deep ferruginous, the latter running to hindmargin on forewings beyond cell, and sometimes marked by black spots on both edges. Head, thorax, and abdomen ochreous, with deeper ochreous speckles.

Expanse of wings: 28—33 mm.

Two ♀♀ from Mikindani, German East Africa, January—May 1897 (Reimer).

Hindmargin of forewings only faintly emarginate below apex.

142. *Nadagarodes flavipectus* sp. nov.

*Forewings*: pale silvery slate-colour, with an iridescent sheen; the costa spotted yellow and fuscous; four oblique slightly darker bands: the first from middle of costa to before middle of inner margin, narrow; the second broader and bent below costa, from two-thirds of costa to two-thirds of inner margin; the third and fourth submarginal and marginal, with the paler and regularly crenulated submarginal line between them; a row of black marginal dots; fringe concolorous, glossy.

*Hindwings* : the same.

Underside duller, without any marking : the marginal third deeper ; the costa of forewings marked with yellow. Thorax and abdomen like wings ; face and vertex chocolate-brown ; fillet and base of antennae whitish ; palpi, pectus, and fore-coxae bright orange.

Expanse of wings : ♂ 37 mm. : ♀ 37—39 mm.

One ♂, three ♀♀, from Tugela, Solomon Islands (Woodford).

#### 143. *Hyperythra simplex* sp. nov.

*Forewings* : dull greyish olive, with a few fuscous strigulae, and tinged with reddish except along costa ; the lines dull reddish except on costa, where they are olive-brown ; first at one-fourth, indistinct, narrow, curved ; second in middle, diffuse and thick, but narrowing towards inner margin ; third at three-fourths, curved, followed by a dull reddish grey shade, diffused to hindmargin except at apex : fringe dull reddish.

*Hindwings* : mostly rufous, yellower along inner margin, without first line.

Underside deep yellow, dotted and striated with fulvous red ; central line fulvous, blotched ; cell-spots purplish, edged with fulvous ; marginal area of forewings wholly fulvous, except a pale triangular and subapical patch : of hindwings mixed with yellow. Palpi yellowish, apical joint white above ; face reddish grey and yellow, the sides white : head, thorax, and abdomen dull yellowish.

Expanse of wings : 35 mm.

One ♂ from Sula Besi, October 1897 (Doherty).

Superficially like *H. latea* Cram., and like that species, with the cell of hindwing only one-fifth of wing, but entirely without its distinguishing secondary sexual characteristics ; hindmargin of both wings curved, not crenulated. But for the length of cell, it would be a *Petrodara*.

#### *Idiotephra* gen. nov.

*Forewings* : elongate, narrow ; costa faintly sinuous, being slightly convex near base and towards apex ; apex blunt ; hindmargin strongly oblique, scarcely curved.

*Hindwings* : twice as broad as forewings, the costa strongly gibbous ; hindmargin bluntly prominent in middle, and somewhat lobed at anal angle.

Antennae of ♂ long, bipectinate, the apical third filiform ; palpi porrect, roughly haired, the joints indistinct ; tongue and frenulum both well-developed ; hindtibiae much thickened, with four spurs, the inner middle one longer than the other three, which are quite short ; patagia lengthened ; pectus densely haired.

*Neuration* : forewings, cell nearly half as long as wing ; discocellular vertical ; first median at three-fifths, second close before end of cell ; radials normal ; 7, 8, 9 stalked from close before end of cell ; 10 free, anastomosing at a point with 11, which rises out of 12. Hindwings with the costal vein running nearly straight ; subcostal curved upwards, the first subcostal branch rising at one-half, and slightly curved at first away, but approximating to the second at an equal distance beyond the discocellular, then widely diverging ; first median at one-half, second and third from end of cell, and widely diverging ; a strong straight fold from base close above the median, almost touching third median, and curved to hindmargin just below the second subcostal ; the submedian fold straight, and similarly strongly developed.

Type : *Idiotephra curvivena* sp. nov.

Easily distinguished by the abnormal shape and venuration of the hindwings. Perhaps allied to *Tephрина*.

144. *Idiotephra curvivena* sp. nov.

*Forewings* : pale mouse-colour, slightly freckled with darker ; inner line very obscure, at one-fifth, marked by a darker spot on the median ; outer line at four-fifths, slightly bent on vein 6, then oblique, parallel to hindmargin, slender and marked by largish dark spots on veins ; submarginal very faint, pale, and denticulate ; marginal spots small, black ; fringe concolorous ; cell-spot large, black.

*Hindwings* : with the outer line at two-thirds, hardly curved ; cell-spot very large, black ; hindmargin darker.

Underside whitish grey, more or less suffused in forewings with darker, in the hindwings with only the hindmargin darker ; lines and cell-spots obscurely darker ; costa of forewings pale ochreous, spotted with fuscous. Head, thorax, and abdomen like wings : face and palpi brown.

Expanse of wings : 33 mm.

One ♂ from River Niger, between Akassa and Onitsha (Dr. Cook).

145. *Petrodava olivata insularis* subsp. nov.

Since describing the type specimens of this species from Dar-es-Salaam, I have seen others agreeing with them in all respects from Barberton and Mikiindani, both on the east coast of Africa. The present form from Madagascar differs from them all in several points, so that it seems necessary to describe it as at least a subspecies.

♂. *Forewings* : not olive-green, but yellow as in the ♀ of *olivata* : first line scarcely expressed ; middle line oblique, not vertical ; marginal brown area with three darker chestnut blotches, touching the third line, at costa, beyond cell, and at anal angle ; the costal blotch followed by a small yellow patch.

*Hindwings* : as in the type, both above and below.

Underside of forewings with no yellow patch in middle, and at apex of hindmargin only the costa remaining yellow. Vertex, thorax, and abdomen yellow.

Expanse of wings : 34 mm. only.

One ♂ from Antanambé, Antongil Bay, Madagascar, March and April 1897 (Mocquerys).

146. *Tephрина (?) convergens*.

*Forewings* : pale brown, dusted and suffused with darker brown ; the lines dark brown, thick, with slight lustrous edging externally ; first from two-fifths of costa to one-third of inner margin, angled in cell ; second from three-fourths of costa to beyond middle of inner margin, acutely angled close to hindmargin ; submarginal at seven-eighths, angled in the hindmargin ; a subcostal diffuse brown streak, through the angles of all the lines ; fringe brown, with two dark brown lines, one at base, the other in the middle.

*Hindwings* : with the two outer lines only, the first central, the other half-way between it and hindmargin, parallel to each other.

Underside yellow, slightly striated with brown ; forewing with a short brown

line from inner margin before middle, and a curved brown line at two-thirds, beyond which the whole marginal area is brown except the apex; hindwing with similar lines, but no marginal shade. Abdomen grey-brown, short (?). Head wanting.

Expanse of wings: 28 mm.

One ♀ from West China.

#### SUBFAMILY ENNOMINAE.

#### *Adelphocrasta* gen. nov.

*Forewings*: shaped very much as in *Gonodontis elelia*, but with more prominent apex; the inner margin before the lobe at anal angle straight.

*Hindwings*: also like *Gonodontis*; but the tooth at vein 4 more prominent. the costal margin straight, the shoulder at base being scarcely perceptible.

Antennae of ♂ **simple, filiform**; hindtibiae thickened, with four spurs. The rest as in *Gonodontis*.

*Neuration*: forewings, cell nearly half as long as wing; discocellular concave; first median at three-fourths, second at eleven-twelfths; radials as in *Gonodontis*, 7, 8, 9 stalked from before end of cell; 10 free; 11 out of 12.

Type: *Adelphocrasta hypocausta* sp. nov.

It seems certain that this species cannot be considered congeneric with *elelia* Cram.

#### 147. *Adelphocrasta hypocausta* sp. nov.

*Forewings*: pale dingy ochreous, speckled with fuscous; costa with a deep brown blotch at base, an oblique one at one-fourth, a double one at three-fifths, and a paler brown mark at five-sixths; the inner line starting from the second blotch is acutely angled on the subcostal, then runs oblique to one-fifth of inner margin; the outer line from the outer spot of the third blotch is angled on vein 6, then runs oblique to middle of inner margin, subdentate and marked by dots on veins; the median line, only plain from inner margin to median vein, runs oblique from the first spot of the double blotch; a slightly curved line runs from three-fourths of costa to two-thirds of inner margin, where it is followed by a large chestnut-brown blotch; submarginal line very obscure, starting from the subapical blotch, is marked by a small white spot below vein 7; fringe brown; cell-spot dark.

*Hindwings*: with obscure diffuse central and submarginal shades, and a nearly straight denticulate postmedian line.

Underside yellowish, speckled with ferruginous; the three lines ferruginous interrupted; marginal third, ferruginous and dove-colour, edged internally by a dark fuscous line, the apical and anal areas remaining pale yellow; submarginal line more visible than above; hindwings with a ferruginous broad submarginal fascia with distinct dentate edge externally, beyond which the marginal area is uniform dove-colour. Head, thorax, and abdomen like wings above.

Expanse of wings: 44 mm.

One ♂ from Penang, 1897 (Curtis).

The intervals along the submedian fold between first and second line, and again beyond third line, and the discal area just beyond cell are all paler and whiter, but can hardly be called semihyaline.

148. *Coenina cervina* sp. nov.

*Forewings* : pale pearl-grey, thickly dusted with fine black atoms ; a double oblique sinuate line from costa at three-fourths to inner margin beyond middle, the inner arm fulvous, the outer grey ; inner margin from base tinged with fulvous, and a patch of the same at anal angle ; fringe pale, with a dark line at base.

*Hindwings* : with the postmedian line white, broadening towards apex, preceded by a broad fulvous orange shade, and followed by a grey-brown shade, which along the hindmargin becomes bright fulvous ; abdominal margin whitish ; fringe white.

Underside whitish, with grey specklings ; the bright fulvous tints much more diffused. Face and palpi whitish, varied with fulvous ; thorax pale grey ; abdomen darker.

Expanse of wings : 32 mm.

One ♂ from the Congo, 1870.

Also from Abyssinia, in the British Museum Collection.

149. *Corymica fulvimaculata* sp. nov.

*Forewings* : yellow, much speckled and varied with fulvous dots and patches ; the costa more finely dusted with dark brown scales ; fovea large even in the ♀ ; first line angulated, represented by fulvous patches, one in middle of cell, and two obliquely below it, above and below the submedian vein, its upper half marked by a patch of dark brown scales on the subcostal vein and a less conspicuous brown mark on costa near base, before and beyond which the costal edge is whitish ; cell-spot fulvous, with a darker centre ; before the anal angle a large diffuse sinuous fulvous patch, which above vein 3 resolves itself into two series of fulvous spots on veins, the inner larger than the outer ; the inner with a spot on vein 6 and none on vein 5, the outer with one on vein 5 and none on vein 6 ; a smaller fulvous patch at anal angle ; a small triangular chestnut patch on hindmargin below apex, which is acute.

*Hindwings* : with all but the costal area suffused with fulvous, containing darker spots and blotches between the veins ; cell-spot small, brown.

Underside pale yellow ; forewing with brown speckles : the fulvous markings dull and blurred, the subapical triangle deeper chestnut ; cell-spot bright brown ; hindwings with sandy brown freckles ; cell-spot linear, brown ; a whitish grey, brown-edged triangle on costa before apex. Head, vertex, and palpi brownish fuscous ; thorax and abdomen yellow, with some scattered fulvous scales ; the base and apex of abdomen suffused with fulvous.

Expanse of wings : 39 mm.

One ♀ from Penang, 1897 (Curtis).

In the subapical patch agreeing with *virginota* Hmps. from the Nilgiris.

150. *Epigynopteryx brunnea* sp. nov.

*Forewings* : uniform brownish fawn-colour, indistinctly dappled with darker ; first line indistinct, smoky brown, at one-fourth, angled on the subcostal ; second line dark brown, distinct, from costa at five-sixths, below which it is twice minutely dentate, to two-thirds of inner margin, straight and oblique, containing on its outer edge pale points on the veins ; submarginal line represented by a brown spot above

and below vein 3: fringe concolorous: an obscure dark cell-spot, through which a fine waved median line can just be traced.

*Hindwings*: with costal area whitish: the oblique brown line central, followed by an obscure lunulate dark grey line.

Underside brown: the inner margin of both wings paler: forewings with the ends of outer and submarginal lines on the costa whitish. Face and palpi dull brown: thorax and abdomen paler: base of antennae and vertex whitish.

Expanse of wings: 38 mm.

One ♂ from Warri, Niger Coast Protectorate, May 1897 (Dr. Roth).

### *Iridoplecta* gen. nov.

*Forewings*: with costa faintly convex: apex rectangular, blunt: hindmargin finely crenulate, vertical to third median, where there is a slight elbow, thence oblique to anal angle.

*Hindwings*: hindmargin strongly crenulate, with five prominent teeth, of which the middle one at end of the third median is longest.

Antennae of ♂ very finely pubescent: palpi very short, not reaching beyond forehead: hindtibiae somewhat dilated, with four spurs.

*Neuration*: forewings, cell half the length of wing: discocellular curved, very fine: first median at three-fourths, second and third together from lower angle: radials normal: last three subcostals stalked from some little way before end of cell, third and fourth forking only just before apex: first and second absent: costal running nearly to apex, close to the stem of the other three subcostals. Hindwings with first subcostal and second median each leaving just before angle of cell. Wings semihyaline, iridescent.

Type: *Iridoplecta ferrifera* Moore (*Trygodes*).

An example of this Indian species has been sent by Doherty from Bali (March—April 1896), differing only in the hindwings being less strongly crenulated.

### 151. *Miantochora incolorata* sp. nov.

*Forewings*: pearl-grey, slightly lustrous, speckled and suffused in parts with darker grey: the costa pale, with coarse fuscous mottlings: the lines somewhat diffuse and inconspicuous, dull ferruginous: the first curved, at one-third, the second, in the middle, nearly vertical: the third from five-sixths of costa to inner margin before anal angle, incurved below the middle, its inner edge marked by dark vein-dots; on the lower radial beyond it is a dark spot: a triangular dull ferruginous patch on hindmargin below apex: marginal area beyond outer line from vein 5 to anal angle, and the inner margin between the middle and outer line occupied by pale patches of the ground-colour: fringe rufous towards apex, pale grey below: cell-spot dark, indistinct: the veins towards hindmargin pale ochreous.

*Hindwings*: paler: an indistinct ferruginous antemedian and more strongly marked postmedian line, the latter, as in forewings, preceded by black spots on veins, and followed by a darker cloud: marginal area darker grey.

Underside whitish, freckled with grey: the outer line only marked by dark spots on veins: costa of forewings ochreous chequered with fuscous: the subapical ferruginous triangle distinct. Head, thorax, and abdomen grey mixed with ochreous.

Expanse of wings: 50 mm.

One ♂ from Warri, Niger Coast Protectorate, June 1897 (Dr. Roth).



This species differs from the type of the genus, *inacquilinea* Warr., in having a much blunter and less prominent projection in the hindmargin of both wings. In the original description of the genus I stated that the fovea was absent, but this must be corrected: in the forewings veins 10 and 11 are stalked.

152. *Omiza lubricata* sp. nov.

*Forewings*: pale olive-yellow, varied with fine leaden grey striae, which are most numerous along costa and in the marginal area; the lines brown-red, first from beyond middle of costa to one-third of inner margin, slightly concave basewards, edged along its upper half with leaden grey scales, which form a spot on costa; second line from about three-fourths of costa to beyond middle of inner margin, bluntly angled outwards between veins 6 and 7, thence slightly concave outwards, edged outwardly with leaden grey scales and striae; at the anal angle rises a large blotch of fuscous and leaden grey scales, expanding upwards to vein 3 and partially across the median area, where the scales become red-brown like the outer line; cell-spot ocelloid, with red-brown ring and pale slightly shining centre; fringe tinged with red; the central area is paler yellow than the basal and marginal areas, except where it is clouded in the middle.

*Hindwings*: with an outer red-brown line, not reaching above vein 7; from the anal angle, parallel with it, runs an elongated blotch of glossy fulvous scales, with some leaden grey spots and striae interspersed.

Underside of forewings dull red-brown, the inner margin broadly white; the costal area to the outer line orange spotted with red; of hindwings orange, with sparse large red spots and the line red. Head, thorax, and abdomen like wings; face dark brown, fillet whitish; antennae dark grey.

Expanse of wings: 38 mm.

Three ♂♂ from S. Flores, November 1896, dry season (Everett).

Evidently related to *O. subaurantiaca* Warr. from Dili, Timor, with which it agrees in the peculiar glassiness of the anal blotches.

The second specimen is dull greenish grey in basal and marginal areas, with the median area flesh-coloured; the anal blotches scarcely darker, but equally shining. In the third the ground-colour is wholly glaucous olive, the lines and ocelloid spot being deep vivid red, and the anal blotch of forewings black.

153. *Stenoromia kashmirica* sp. nov.

*Forewings*: very pale yellow, faintly ochreous along costa, the costal edge ochraceous; no vestige of darker dusting; the lines olive ochreous; the first from below costa before apex to base, before which it is slightly curved as in *ablanata* Guen., the second from apex to above two-thirds of inner margin; both lines obsolete below vein 1; fringe concolorous, with the base rufous towards apex of wing.

*Hindwings*: without any markings whatever; fringe the same.

Underside without markings: the costa of forewings broadly ochraceous throughout. Head, thorax, and abdomen concolorous; palpi and antennae ochraceous or rufous.

Expanse of wings: 45 mm.

Three ♂♂ from the Gourais Valley, Kashmir, 7000 feet, June 1887.

Distinguished from *ablanata* by the immaculate hindwings with pale fringes.

**Trotocraspeda** gen. nov.

*Forewings*: with costa arched from base, then straight, and again strongly convex towards apex, which is deflexed and rounded: hindmargin elbowed at the end of third median, above which it is indented, then straight and oblique to anal angle, which is blunt.

*Hindwings*: with apex rounded: a blunt tooth at end of first subcostal, and a much larger one at end of third median: the margin between the teeth strongly incurved, and containing traces of a minute tooth at the end of the second subcostal: hindmargin from anal angle to middle tooth straight, but faintly waved.

Forehead projecting in front: antennae half as long as wing, with short, regular, gradually decreasing pectinations: palpi porrect, second joint long and stout: third minute, decumbent: tongue present: hindtibiae with four spurs.

*Nervation*: forewings, cell half the wing: discocellular oblique: first median at two-thirds, second just before end of cell, third from end; lower radial from a little above centre of discocellular: upper from the upper angle: last four subcostals stalked, first free: discocellular of hindwing curved, the lower arm oblique: first subcostal just before end of cell: medians as in forewings.

Type: *Trotocraspeda divaricata* Moore (*Agathia*).

154. **Zethenia obscura** sp. nov.

*Forewings*: dull olive-brown, thickly speckled with blackish, and with some rufous scales intermixed: the lines smoky blackish: first at one-fourth, angled in cell, then oblique to inner margin at one-fourth: median shade thick, diffuse, from two-thirds of costa to two-thirds of inner margin, slightly sinuous: outer line fine, dentate-lunulate, from three-fourths of costa, incurved below middle to join the central shade near inner margin, and followed between veins 3 and 1 by two irregularly lunulate white blotches, which are succeeded by a large blackish cloud, obscurely produced to costa as a submarginal shade: fringe dark fuscous: cell-spot obscure, blackish.

*Hindwings*: with only the outer dentate blackish line, preceded and followed by broad smoky fuscous fasciae.

Underside more tinged with rufous, with diffuse broad fuscous postmedian and submarginal fasciae: the cell-spots larger, blackish: inner margin of forewings pale. Head, thorax, and abdomen fuscous brown.

Expanse of wings: 38 mm.

One ♂, one ♀, from North Mountains, Formosa, 500—1500 feet, July 1896 (Jonas).

Hindmargin of forewings strongly curved, but not angled above middle: of hindwings crenulate. The ♀ has the apex of forewings slightly more prominent.

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## SOME NEW EASTERN LEPIDOPTERA.

By THE HON. WALTER ROTHSCILD, Ph.D.

## PAPILIONIDAE.

1. *Troides aeacus formosanus* subsp. nov.

♂. Differs from the Indian form of *aeacus* in the white spots of the fringe of the forewing being much smaller, in the wedge-shaped internervular portions of the black marginal band of the hindwing being longer, in the abdomen being clothed with red hairs beneath at the base and bearing (like *aeacus* from Central and West China) two rows of black spots on each side ventrally.

*Hab.* South Cape, Formosa (received from Monsieur de la Touche), 2 ♂♂.

2. *Papilio nubilus musianus* subsp. nov.

♂. Differs from the Bornean form of *nubilus*, *Iris* VII. p. 314 (1894) (Brunei), in the following points: Forewing above with three postdiscal white patches, the uppermost between  $SC^3$  and  $SC^4$ , the following two longer, between  $SC^5$  and  $R^2$ , all three sinuate externally, an indication of a fourth patch between  $R^2$  and  $R^3$ , 7 mm. from edge of wing: marginal spots nine in number, uppermost between  $SC^3$  and  $SC^4$ , spot between  $SC^4$  and  $SC^5$  extremely small, visible only with a lens. — Hindwing above as in *nubilus nubilus*, no submarginal spots.

*Underside.*—Forewing with four postdiscal patches from  $SC^5$  to  $R^3$ , upper three just beyond apex of cell, fourth smaller, a little closer to cell than to outer margin: in inner angle, between  $M^2$  and  $SM^2$ , a small patch with a small spot in front.—Hindwing: submarginal lunules  $R^2$ — $M^2$  very faintly marked: third discal patch measuring 10 mm. in length, externally obliquely cut off, slightly concave, the fourth more regular,  $9\frac{1}{2}$  mm. long.

*Hab.* Upper Palembang district,  $3^\circ$  s. lat.,  $103^\circ$  long.: 1 ♂, received from Mr. J. Völcker.

## NYMPHALIDAE.

3. *Cynthia obiensis* sp. nov.

♂. Wings above deeper in tint than in *arsinoë* from Amboina.—Forewing: median series of bars heavy, very oblique, upper one close to upper angle of cell, bar  $M^2$ — $SM^2$  6 to 7 mm. from tip of  $SM^2$ : admarginal line of lunules as in *arsinoë*, submarginal lunules very faint, except the last.—Hindwing: median series of bars very heavy, the line broken at veins, upper bar curved like letter S, bar  $R^3$ — $M^1$  more or less longitudinal, being mostly placed along  $D^1$ , bar  $M^2$ —( $SM^1$ ) also marked.

*Underside* from base to median lines of bars rufous red, especially on hindwing.—Forewing: median bars not so heavy as above, but also placed in a very oblique row; apical white spots larger than in *arsinoë*, brown spot in inner angle small.—Hindwing: outer half rather heavily shaded with rufous red: median line of bars somewhat concave.

♀. *Upperside* much darker than in *arsinoë*, hence the cell-bars and the bars in marginal region not very conspicuous, mummy-brown. A broad pure white band across disc,  $9\frac{1}{2}$  to  $10\frac{1}{2}$  mm. wide at  $SC^{1-5}$ , its inner edge oblique (as line of bars in ♂), indented at  $R^1$ ,  $M^1$  and  $M^2$ , very oblique between ( $SM^1$ ) and  $SM^2$ ; the band is limited distally between  $SC^{1-5}$  and  $R^2$  by two blackish brown lunules, the upper lunule nearly entirely fused with the blackish brown marginal area, there being only a very few white scales at its distal side; the second lunule more distinct, separated by a luniform white spot from the band; a third, very indistinct, brown lunule in the white band between  $R^2$  and  $R^3$ ; postdiscal bars appearing as black spots just at the outer edge of the band between  $R^2$  and  $SM^2$ ; two small submarginal white dots between  $SC^1$  and  $R^1$ , the second in one of the two specimens absent.—*Hindwing* mummy-brown up to median line of bars; these bars heavy as in ♂, followed by a russet tawny band, which becomes grey behind C, outer edge of band ill-defined, nearly straight, touching eye-spots; area between this band and submarginal line of bars darker brown; eye-spots with a rather large blue dot.

*Underside* russet, outer half paler.—*Forewing*: white band as above, discal and postdiscal luniform bars feeble, submarginal line indistinct behind, admarginal distinct, but not strongly marked.—*Hindwing*: discal band much paler than above, becoming whitish from  $R^1$  to C.

*Hab.* Laiwui, Obi I., September 1897 (W. Doherty), ♂ ♂ ♂, 2 ♀ ♀.

Easily distinguished from all races of *arsinoë* by the obliquely placed series of median bars of the forewing.

#### 4. *Acraea parce buruensis* subsp. nov.

♂ ♀. Differs from *A. parce parce* Staud., *Iris* IX. p. 193. t. I. f. 8 (1896), from Mangiola, Sula Archipelago, in the following points: The basal half of the forewing from cell to internal margin is much more diaphanous, there being much less black scales on the upperside. On the underside of the hindwing the discal band and the submarginal spots are more ochreous; the partially scaleless patch in and before cell is very variable in extent, but it is always much smaller than in the Mangiola race, the posterior half of the cell remaining always black; the subbasal patch between costal and subcostal nervules is also much smaller, often absent. The submarginal spots are generally somewhat smaller than in *parce parce*; the posterior ones much shaded with black in ♂, sometimes scarcely traceable.

*Hab.* Mount Mada, Buru, September 1898, 3000 feet (Dumas).

### PIERIDAE.

#### 5. *Delias funerea buruana* subsp. nov.

♂. Differs from the Palmahera form of my *funerea*, figured in Smith & Kirby, *Rhop. Exot.* II. *Delias* t. VI. f. 1. 2 (1896), in the apex of the forewing above, the fringe of the forewing (except at inner angle) and of the hindwing, being black; the apical black area is small, extending 7 mm. along lower subcostals, but black colour of cellule before  $R^2$  very restricted.

*Underside*: black apical area of forewing much smaller than in *funerea funerea*, the spots in it yellow, not white. Red markings of hindwing thinner, outer margin shaded with white scales.

*Hab.* Mount Mada, Buru, September 1898, 3000 feet (Dumas).

## SPHINGIDAE.

6. *Cephanodes titan* sp. nov.

This is the largest species of the genus, only being approached by *Cephanodes woolfordi* Butl.

♀. *Upperside*: wings diaphanous, base, costal margin, and apex black, this apex  $1\frac{3}{4}$  mm. wide between lower subcostal nervures, inner margin also black along its basal half. Base and abdominal margin of hindwings black.

*Underside* same as above, but margins brown, and base of both wings orange.

*Head, palpi, thorax, and abdomen* above deep velvety black with iridescent steel-blue lights. Anal tuft orange-tawny in the centre. *Underside*, palpi buff, legs and thorax orange, abdomen as above, sixth and seventh segments strongly intermixed with orange, anal tuft more heavily marked with tawny orange than above, eyes bordered with white beneath.

Length of body 41 mm.

„ „ forewing 38 mm.

*Hab.* Amboina.

7. *Panacra buruensis* sp. nov.

This very distinct species is most nearly allied to *P. mira* Wlk. (= *turneri* Misk.).

Head and thorax above blackish chocolate, both with a stripe on each side fawn-colour, thorax besides with a central stripe of the same colour; abdomen dark brown, with a whitish grey middle line, sides much mixed with red. *Underside* of body deep dragon's-blood red (Ridgway, *Nomencl. of Col. Pl.* VII. S). Palpi above dark fawn-colour, more reddish below.

*Wings above* brown.—Forewing much clouded with deep chocolate, this colour forming a large irregular patch extending from  $R^3$  to costal margin, narrowing in front, connected by a narrow band with a second patch situated at internal margin, both patches ill-defined, a third patch at internal margin near hinder angle of wing: from the inner side of this last patch runs a deep chocolate line to the apex of the wing, the line curved distad between the nervures, 5 mm. distant from outer margin at  $R^1$ , slightly curving outwards from  $M^2$  to  $R^1$ ; disc at proximal side of this line with glossy grey scaling; a band of  $1\frac{1}{2}$  mm. width from apex of wing  $R^3$ , curved, not composed of lunules, continued as an indistinct line to patch at inner edge of wing, 3 mm. distant from postdiscal line at  $M^1$ , touching it in front, interspace faintly tinged with ochreous; a submarginal line, consisting of lunules curved proximad, less distinct than postdiscal line.—Hindwing: Prout's brown (Ridgway, *l.c.* Pl. III. 11), paler towards base, a deeper brown submarginal band, very ill-defined, shading off at both sides into ground-colour; fringe up to middle of outer margin nearly white.

*Underside* dark rufous; interno-basal area of forewing and outer margin of fore- and hindwing dark drab-brown; two parallel lines across disc of both wings of same colour, upper ends somewhat curved proximad, with an indication of a third line between the two.

Length: forewing 34 mm.

„ hindwing 20 mm.

*Hab.* Mount Mada, Buru, 3000 feet, September 1898 (Dumas)

## SATURNIIDAE.

8. *Coscinocera hercules heros* subsp. nov.

♂. Differs from the three known forms of *hercules* (see Nov. Zool., V. p. 59, 1898) especially in the shape of the small eye-spots.

Upperside somewhat darker than in *hercules hercules*, the bands a little more obscure. Eye-spot of forewing  $3\frac{1}{2}$  mm. distant from discal band, oblique, irregularly ovate, costal and basal sides forming almost a semicircle, outwardly as bluntly pointed as in *omphale*, diameters 11 and 7 mm. : hyaline centre 6 mm. long, standing obliquely to veins, triangular, but the angles rounded off, upper edge only  $2\frac{1}{2}$  mm. long (in the direction of veins). Eye-spot of hindwing transverse,  $7\frac{1}{2}$  mm. long, slightly oblique, ovate, pointing backwards, 5 mm. wide, outer side more oblique than inner side, 6 mm. distant from black discal line ; hyaline centre transverse, a mere dash, of barely 1 mm. width.

On underside the hyaline spots are encircled with a dirty ochraceous line upon which follows costally and proximally a purplish black line, the hyaline spot of the hindwing longer than above and wider.

*Hab.* Rossel I., Louisiade Archipelago (A. S. Meek, March 1898), 1 ♂.

I have also received a pair of *Coscinocera hercules* from Sudest Island : the ♂ (which is badly damaged, both tails being wanting) agrees with the type of *hercules heros* almost perfectly, only the eye-spots of the wings being more rounded and slightly smaller. The ♀ has the bands on both wings much more strongly and clearly marked than the ♂, the eye-spots agree in shape with those of the ♂, but are larger : widest distance of black ring of the spot of the forewing from black half-moon of cell  $4\frac{1}{2}$  mm., shortest distance from discal black line  $1\frac{1}{2}$  mm. ; black ring of the spot of the hindwing 9 mm. distant from subbasal black line, 4 mm. from discal black line.

## GEOMETRIDAE.

9. *Milonia pumilio* sp. nov.

♀. Body above and below glossy metallic green-blue : abdomen black beneath.

Wings black. Upperside, forewing without gloss, except at extreme base, faintly blue in sidelight, a short streak at base before  $SM^2$ , and a curved band across disc orange-ochraceous ; the band of nearly even width, 4 mm. broad at  $R^3$ , more distal anteriorly than in *laticitta*, and more distal posteriorly than in *glauca glauca* ; fringe all black as in *glauca*.—Hindwing as in *glauca* from the Southern Moluccas.

*Underside* : band as above, metallic gloss as in *glauca*, more green-blue.

Length of forewing :  $21\frac{1}{2}$  mm.

*Hab.* Sumba, September 1896 : 1 ♀, received from Mr. H. Fruhstorfer. Probably only a small race of *glauca*.

## AGARISTIDAE.

10. *Episteme conspicua sumatrana* subsp. nov.

♀. Body as in Bornean *conspicua*, Nov. Zool., III. p. 29, n. 6. (1896), but spots on mesonotum larger, with a bluish tint.

Forewing: whitish blue basal spots much larger than in *conspicua*, a small pale yellow spot at base of cell, extending a little beyond M; a transverse spot of same colour beyond middle of cell, 3 mm. broad, extending beyond SC', but not reaching edge of wing, followed behind by a large trapeziform patch, that expands between cell and SM<sup>2</sup>, with a few yellow scales behind SM<sup>2</sup>, widest behind, deeply concave proximally; discal band as in *conspicua conspicua*, deeper yellow; a series of eight small white submarginal dots between SC<sup>3</sup> and SM<sup>2</sup>, the last of which before SM<sup>2</sup> in the same place where there stands a larger yellow spot in Bornean *conspicua*, the upper six dots closer to band than in *conspicua*.—Hindwing as in *conspicua*, black discal half-band narrower.

*Underside*: postmedian cell-spot of forewing and patch behind it fused to form a pale yellow band; both this band and the discal one deeper in colour than in *conspicua conspicua*; submarginal spots all white as above (inclusive of posterior one).

*Hab.* Padang Sidempoean, West Sumatra (Eriesson, 1898), 1 ♀.

*E. conspicua* was hitherto known only from Mount Kina Balu, North Borneo.

#### SYNONYMICAL NOTE.

*Ambulyx scrocalata* Grote is not a variety of *A. gammaeus*. The description given by Grote agrees exactly with the beautiful insect figured by Oberthür as *A. depaiseti*, *Et. d'Ent.* VI, p. 31, t. 5, f. 3 (1881). I possess three specimens from Colombia and Merida, Venezuela; the one Colombian example was caught by Professor Bürger in Bogota, in December 1896, at the electric light. The name of *depaiseti* sinks as a synonym of *scrocalata*.

*A. evethon* Boisd. from Peru (?) and *schausi* Rothsch. from Petropolis are the same species as *A. carysthenes* Feld. from Colombia, though they represent most likely geographical forms. Felder's name has priority.

"*Eusemia*" *glossatrix* Westwood (1881), erroneously said to be from South Africa, is a synonym of *Scrobigeru culcanea* Butl. (1875) from Burma.

## FURTHER NOTES ON HUMMING-BIRDS.

BY ERNST HARTERT.

***Spathura underwoodi* (Lesson).**

WHEN examining the series of these birds in Mr. Rothschild's wonderfully growing collection of *Trochilidae*, I was at once struck by a generally very well-marked difference in the coloration of the *females* from the mountains of Venezuela and those from Colombia. From Venezuela we have a fine series, collected in the Andes near Merida, at elevations of from 2100 to 4000 mètres, by Messrs. Salomon Briceño Gabaldón & Sons, and from Colombia a number of Bogotá skins. The latter are to be regarded as typical *underwoodi*. Their undersurface is somewhat equally spotted with green, these spots being larger and closer together along the sides of the neck and body, somewhat less frequent along the middle, and almost or quite absent from the upper part of the throat near the chin. In all the adult *females* from Venezuela, however, the throat and chest are white without spots, or only with a few very minute ones, so that there is a very marked contrast between the throat and abdomen. Young *males* are darker below than *females*. I cannot find any difference between the *males* from the two countries, except that the bills of those from Bogotá are only from 11.5 to 12 mm. long, while they are about 13 mm. long in those from Merida, the exposed part of the culmen only being measured. Small as these differences are, they are worthy of notice, and I propose the name of

***Spathura underwoodi bricenoi* subsp. nov.**

for the Merida form.

There has been some uncertainty about the specific name *underwoodi*, as Lesson, having before him an unartistic drawing only, figured and described the *male* with a white band across the rump. This character, however, does not exist in the types in the Loddiges Collection, and is not to be found in any species of the genus. There is, therefore, no reason to reject the name *underwoodi*.

*Spathura peruana* can only be subspecifically related to *S. solstitialis*, or is not even a subspecies, the only difference apparently being the deep blue-black outer web of the lateral rectrices. The distribution of *S. peruana* and *S. solstitialis*—if they are different forms—is not sufficiently clear.

## GENUS EROCNEMIS.

I cannot see the necessity of splitting this genus up into several ill-defined groups, and I shall therefore accept it in the same sense as Salvin did in the *Catalogue of Birds*.

Baron has discovered that the *female* of *E. russata* differs from the *male*, which has the tibial tufts partly white, partly cinnamon, in having the tibial tufts quite white, the wing shorter, the bill longer. This being an established fact (see *Nov. Zool.* Vol. II. p. 69), there is no longer any reason to regard *E. squamata* and



*E. lugens* as two species, the latter no doubt being the *female*, the former the *male*.

In the *Catalogue of Birds* and elsewhere the *female* of *E. aureliae* has been said to be "similar to the *male*." This is not exactly right. The *female* of *E. aureliae* differs from the *male* in having the tibial tuft less largely developed, and only tinged with brownish cinnamon near the body, not half cinnamon as in the *male*. The wing is also shorter, the tail more distinctly tinged with green towards the base. Young birds resemble more the *female*; the feathers of the underside, however, are dusky black; the base of the mandible is flesh-colour. This last character is found in most or all species of *Eriocnemis* when very young.

#### GENUS METALLURA.

Mr. Baron has collected a fine series of *Metallura smaragdinicollis* in North Peru, at Cajabamba, Cajamarca, Huamachuco, Levanto, and Celendin (cf. *Nov. Zool.* Vol. IV. No. 1). All these differ considerably from specimens of *M. smaragdinicollis* from the more southern parts of Peru and Bolivia (Maraynioc, Cachupata, Tilotilo, S. José, and Araca) in the following characters:—

They are slightly lighter green above. They are much paler below, the tips of the feathers being pale greenish bronze and less large, thus showing more of the buffish subterminal colour of the feathers. They are slightly larger. They require a name, and I name them

#### ***Metallura smaragdinicollis septentrionalis* subsp. nov.**

Boncard's *M. peruviana* (*Gen. Hum. B.* p. 73) seems to belong to typical *smaragdinicollis*. Some of the type-specimens have rather longer wings than other *smaragdinicollis*; but they are not, according to their coloration, my *septentrionalis*.

Boncard's *M. griseocyanea* (*Gen. Hum. B.* p. 75) is a semialbinistic variety of *M. tyrianthina*.

It is hardly possible to believe that the imperfect skin from Santa Marta in the British Museum belongs to *Met. smaragdinicollis*. Adult specimens will no doubt prove to belong to a new form.

Nearly all or all nests of the various species of *Metallura*, of which we have received several from Ecuador (from Baron) and from Venezuela (Briceño), are raised at the back so as to somewhat resemble a short slipper without heel.

#### GENUS CHALCOSTIGMA.

Elliot and Salvin united *Chalcostigma* with *Rhamphomicron*. I cannot agree with them, nor with Salvin's contention that his genus *Rhamphomicron* (including *Chalcostigma*) "might perhaps be separated into three or four genera"; but I follow Simon (*Feuille Jeunes Nat.* 1898. p. 125) and Berlepsch (*in litt.*) in separating *Chalcostigma*, with *heteropogon*, *olivaceum*, *stanleyi*, *culceni*, *herrani*, *ruficeps*, and *purpureicauda*, from *Rhamphomicron*, with *microrhynchum* and *dorsale*. The former genus differs from the latter in having a longer bill (longer than the head or equal to it, while it is shorter than the head in *Rhamphomicron*), broader rectrices, and an elongated bunch of feathers on the throat. If such characters are

not considered sufficient for generic separation in Humming-Birds, we must at once unite about thirty or forty other genera of *Trochilidae*.

*Rhamph. microrhynchum*, hitherto only on record from Colombia and Ecuador, has been also received from Mr. Salomon Briceño from the Andes, near Merida in Venezuela.

*Chalcost. ruficeps* was found by Baron in Southern Ecuador (Loja). The Ecuadorian specimens, however, differ from typical *ruficeps* from Bolivia, which have the glittering gular stripe uniform green, in having the tip of this stripe beautifully golden. I call this subspecies

***Chalcostigma ruficeps aureofastigatum* subsp. nov.**

It occurs also in Northern Peru.

The supposed *female* of *C. herrani* described on p. 346 of Vol. XVI. of the *Cat. B. Brit. Mus.* by Mr. Salvin is a young *male*. The adult *female* is much smaller than the *male*, the feathers of the underside are paler and whitish towards the base, the throat-stripe is golden green, its lower part glittering golden, but the feathers not elongated as in the adult *male*. From my forthcoming account of the *Trochilidae* in the "Tierreich," it will be seen that this is not the only case in which I was able to find that immature *males* have hitherto been considered to be adult *females*; but there are probably other cases in which our material did not enable me to find out the truth.

GENUS PSALIDOPRYMNA.

There is no doubt (cf. Berlepsch and Simon) that *Lesbia* Less. is the proper generic term for the Fire-tails (*Sappho* of Salvin), and that therefore *Psalidoprymna* must be used for the genus called *Lesbia* in the *Catalogue of Birds*.

*Psalidoprymna victoriæ* may be divided into two subspecies:—

1. *P. victoriæ victoriæ*, with beak slightly shorter, tail of adult *male* generally, but not always, about 1 cm. shorter, abdomen generally slightly more buff. *Hab.* Colombia. Frequent in Bogotá collections. The length of the tail differs. It is generally about 180—185 mm. in fully adult Ecuadorian *males*, and 165—170 mm. in such from Bogotá; but in the British Museum I saw two *males* with the tail 180 mm. long.

2. *P. victoriæ æquatorialis* Boncard (1893: in *Humming-Bird* Vol. III. p. 6), with beak slightly larger, tail of adult *males* generally about 1 cm. longer, abdomen generally slightly greener. (The other differences noticed by Boncard are not even borne out by his own specimens.)

Mons. Boncard has further described a *Lesbia boliviana*, which is said to differ from *L. nana* in being more golden: but the more golden colour of the plumage of his type-specimen seems to be an individual character. There is in the British Museum one adult *male*, said to be from Bolivia (ex d'Orbigny), which has the tail 148 mm. in length, while skins from Sorata seem to agree with Peruvian *nana*. The longer tail is not mentioned by Boncard. Possibly North Bolivian birds are like Peruvian ones, while South Bolivian examples differ (?).

Mr. O. T. Baron collected a series of a species of *Psalidoprymna* in Northern Peru, which differs from *P. victoriæ* in the following characters: The bill is considerably shorter, measuring only about 12 mm., the tail much shorter, outer

rectrices only about 112—120 mm. long, the second pair from outside wider than in *P. victorinae*, the greyish buff outer edge of the longest rectrices occupying more than half (about two-thirds) of the length of the feathers. I adopt for this new species the name

***Psalidopymna juliae* (ex Berlepsch and Stolzm.).**

It differs from *P. nana* chiefly in the colour of the middle rectrices, which are not wholly green, but black with green tips only.

Mr. O. T. Baron has also sent a series of skins of a form which is very closely allied to *P. gouldi gracilis*, but has generally a longer tail, a slightly stouter and longer bill, and a constantly more golden tint in its plumage. This is *P. chlorura* (J. Gould). The one skin from Peru in the British Museum agrees with Gould's original description, but it does not seem to be the type.

NOTE ON *CASUARIUS CASUARIUS SCLATERI*.

By THE HON. WALTER ROTHSCHILD, Ph.D.

THIS subspecies has been sunk by the author as a synonym of Selater's *Casuarium casuarium beccarii* from the Aru Islands; but this is not right, though I cannot blame Count Salvadori for his decision, as he had only dead specimens to compare. Any one who saw the two birds alive, and side by side, as I have done, would not hesitate a moment to say they were separate geographical races. *C. casuarium beccarii* is confined to Vokan Island, Aru Islands, while *C. casuarium sclateri* is confined to the south and south-east of the mainland of New Guinea. Through the confounding of these two forms of *C. casuarium*, it has been declared by all authors that *C. casuarium beccarii* was a most variable form; in reality, however, it is most constant, while *C. casuarium sclateri* is variable in size and shape, not only of the bird itself, but also of the casque and the wattles.

As regards the birds themselves, when alive, the shape and contour are totally different. *C. casuarium beccarii* has very long legs, a very small and narrow compressed body, and when walking appears as if going on stilts; while, on the other hand, *C. casuarium sclateri* has stout short legs and a massive large round body. The wattles of *C. c. beccarii* are joined for more than half their length from the base, and so give the idea of a single wattle with a deep central cleft; while the wattles of *C. c. sclateri*, when young, are joined for almost their entire length, only having a small niche in front. In the adult bird the wattles are, when perfect, quite separate and wide apart: and while in *C. c. beccarii* the wattles are small, not bigger than in *C. casuarium casuarium*, in *C. c. sclateri* they are enormous—in some cases as big as, if not bigger than, in *C. c. australis*. Another difference between the two forms is in the colour of the immature plumage. In *C. c. beccarii* it is fulvous brown, with scarcely any admixture of black, just as in *C. c. casuarium*; while in *C. c. sclateri* it is dark brown, with a strong admixture of black, so that some young ones in their first plumage are almost as black as adults. Chicks a few days old show a distinct wattle, while in most other forms of *C. casuarium* the wattle does not appear till the bird is much older.

## ON THE BIRDS COLLECTED BY MR. MEEK ON ROSSEL ISLAND IN THE LOUISIADE ARCHIPELAGO.

By ERNST HARTERT.

IN Vol. V. of this Journal, pp. 521—532, I have given a list of forty-two species from Sudest Island. We knew nothing, so far, of the Birds of Rossel Island, except a few species mentioned, and partly described, by Tristram and De Vis. Macgillivray had apparently not collected on Rossel Island. Rossel Island is the most eastern of the large islands of the Louisiade Archipelago. It is 22 miles long, and  $10\frac{1}{2}$  miles wide in the middle. Mount Rossel is nearly 3000 feet high. Considering the small distance from Sudest Island, it is remarkable how many species and subspecies of birds are different from those which are found on Sudest Island.

Both species of *Pachycephala*, the *Edoliosoma*, the *Zosterops*, *Geoffroyus*, and others evidently represent the forms occurring on Sudest. In the most beautiful *Tanyptera* and the *Pitta*, Rossel Island possesses forms apparently not found elsewhere, while some genera which are common on Sudest Island have not been found on Rossel.

It seems most improbable that the thirty-six species hereafter enumerated are all that occur on Rossel, but they give no doubt a very good idea of the *ornis* of the place; and from the way in which Meek and his party work, we must suppose that very little more will be discovered on Rossel Island.

### 1. *Calornis metallica* (Temm.).

Evidently plentiful on Rossel Island. The adult *female* does not differ from the *male*.

### 2. *Pachycephala rosseliana* Hart.

Descr. origin. in *Bull. B. O. C.* Oct. Meet. 1898. No. LVI. p. 8.

♂ ad. Top of head, sides of head, and complete collar across the crop-region, separating the white throat from the orange-yellow breast and abdomen, about 5—7 mm. wide, pure black. Entire bill pure black. Back, rump, upper tail- and upper wing-coverts olive-green, with a faint orange wash. The black cap separated from the colour of the back by an orange-yellow band of about 5—7 mm. width, slightly interrupted by the colour of the back in the middle. Rectrices black, edged and tipped with greenish olive, narrower on the outer, wider on the middle pairs, and more olive towards the bases. Remiges black, lined with white towards the bases of the inner webs, primaries on the outer webs narrowly edged with pale grey, secondaries with olive-green. Under wing-coverts and axillaries white, with yellow borders. Thigh-feathers orange-yellow, black at base, and with a white spot before the yellow tip. Remainder of underside deep orange-yellow. Feet light bluish slate-colour, iris brown. Wing 64—68 mm., tail 68, exposed portion of culmen 19—20 mm. ♀ ad. Above dark olive-brown, more greenish on the rump and upper tail-coverts. Tail with the outer webs of the lateral rectrices and both

webs of the central pair olive-green. Chin and throat white, with some dusky tips to the feathers. Breast and abdomen yellow, separated from the white throat by an ill-defined brownish band.

This interesting form stands somewhat between *Pachycephala melanura* and *P. collaris* in the colour of the tail. It resembles somewhat *P. littayi* from the Loyalty Islands; but the *male* is brighter orange below, and the tail differs. This Thickhead has only been met with on Rossel Island and St. Aignan. On the former island it is evidently very common. It is difficult at present to decide whether it should be regarded as a "good species," or cast into the limbo of subspecific forms pertaining to the *melanura* group.

### 3. *Pachycephala meeki* Hart.

Descr. origin. in *Bull. B. O. C.* Nov. Meet. 1898. No. LVII. p. 15.

♂ ad. Similar to *P. leucogaster*, but differs in having the black less sharply defined, and almost passing into the slaty grey-colour of the back, which is much darker and somewhat more blackish than in *P. leucogaster*. Tail almost black, tipped and narrowly edged with grey. Upper tail-coverts black in the type-specimen, which is probably the oldest *male* in the collection, greyish slate, or even grey, with hardly a slaty tinge in some of the others. The colour of the back is also not equally dark in all specimens, being not much darker than in *P. leucogaster* in some of the specimens. The sides of the breast and abdomen are grey, not white, as in *P. leucogaster* and *P. arctitorques*. Guttural collar black, about 10 mm. wide. Throat, breast, and abdomen white. Thighs slaty grey, tips whitish. Iris brown, bill and feet black. Wing 81—82 mm., tail 64, culmen from base 17 mm.

♀ ad. Differs from the adult *male* in having the crown uniform with the back, the guttural collar slaty grey instead of black, the abdomen tinged with buff, tail and upper tail-coverts grey, not blackish. Less mature *females* were by a mistake described as the adult *female* in the *Bull. B. O. C. (l.c.)*. They are above mouse-brown, more greyish on the upper tail-coverts; an indistinct line over the eyes and ear-coverts rufous brown. Throat buffy white, remainder of undersurface rusty buff, chest with a few small and narrow blackish lines. Middle of abdomen whitish, sides of chest and flanks washed with brownish grey. Under wing- and under tail-coverts pale buff, almost white. In a still younger age they are above, especially on the edges of the rectrices, slightly tinged with greenish olive, the secondaries and upper wing-coverts are broadly edged with rusty rufous, the undersurface heavily marked with blackish brown shaft-stripes. Bill pale brown.

This most interesting Thickhead is evidently common on Rossel Island.

### 4. *Edoliosoma rostratum* Hart.

Descr. origin. in *Bull. B. O. C.* Dec. Meet. 1898. No. LVIII. p. 20.

♂ ad. Bluish slate-colour, ear-coverts darker, almost black, lores, chin, and line at gape black. Remiges black, inner webs broadly margined with white, this white extending over the basal half of the inner web in the primaries, but gradually increasing, and in the secondaries almost reaching to the tip. Outer webs of the remiges bordered with slaty grey, lighter than the back. Central rectrices slaty grey like the back, black along the shaft, and broadly tipped with black. The other rectrices

black with narrow grey tips, the outermost pair broadly tipped with grey. Iris dark brown, bill and feet black. Bill very large and strongly hooked. Culmen from base 43–44 mm., wing 135, tail 115, bill from nostril to tip 20.5–21 mm. ♀ ad. and ♂ juv. Above greyish brown, crown bluish ash-colour in adult *females*, of the colour of the back in young birds. Narrow superciliary line pale rufous. Broad stripe behind eye and lores blackish grey. Ear-coverts pale rusty brown, with dark greyish stripes. Remiges blackish, outer webs narrowly, inner webs broadly, bordered with pale cinnamon. Central rectrices pale greyish brown, narrowly tipped with pale cinnamon. Remainder of rectrices blackish brown, broadly tipped with cinnamon. Underside pale cinnamon, sides of neck and breast more or less barred with black.

The plumage of the young *male* is illustrated by some very interesting skins in full moult from the rufous cinnamon to the slaty grey coat.

### 5. *Monarcha inornatus* (Garn.).

Evidently not rare.

### 6. *Monarcha melanopterus* Gray.

*Piezorhynchus melanopterus*, Sharpe, *Cat. B. Brit. Mus.* IV, p. 420.

There are of this rare bird, which has been discovered on Round Island in the Louisiade group by Mr. John Macgillivray, three skins which agree perfectly with the type in the British Museum. Two are marked “♂,” one “♀”; but I believe the latter is marked wrongly. There is, however, another specimen marked “♀,” which I consider must be the real *female*. While the adult *male* has the bill of a dark blue slate-colour, this *female* has it black, yellowish brown at base of mandible. The back is greyish brown, the head ashy grey, throat grey, ear-coverts grey, no black ring round the eyes, upper wing-coverts grey with brown edges, the white tips to the lateral rectrices less extended. Otherwise it is marked and coloured like the adult *male*.

### 7. *Rhipidura lousiadensis* sp. nov.

♂ ad. Forehead cinnamon. Feathers in front of eyes and rictal bristles black. Top of head earthy brown, with blackish brown centres to the feathers; hind-neck, upper part of the back, and upper wing-coverts earthy brown. Ear-coverts very dark brown. Lower back, rump, and upper tail-coverts cinnamon. Utmost base of lateral and basal half of central rectrices cinnamon, remainder of rectrices dark ashy grey, tips of lateral pairs dirty white for about 12 mm., central pair only with a fringe of dirty white at the tip for about 1–2 mm. Remiges deep brown, inner webs with rufous buff, outer webs with narrower rusty cinnamon edges. Throat white, across the crop-region a wide black collar, so frequently found in this genus, the edges of the lower feather towards the breast edged with white, thus producing a scaly appearance. Breast and abdomen white in the centre, rusty brown along the sides. Under tail-coverts cinnamon-buff, under wing-coverts white. Wing 77–78, tail 90, tarsus 20, bill from base 14–15 mm. “Iris brown, bill and feet deep slaty brown, mandible pale at base.”

The six skins before me are all alike, and all marked as *males*.

Several nests and a clutch of eggs were found in the latter half of January. The nests are of the usual form of *Rhipidura* nests, riding on a branching stick, forming a tightly woven deep cup, and having a kind of tail hanging down below the twig. They consist of fibres and rotten wood. The cup measures about 45—55 mm. across, and is about 28—35 mm. deep. The two eggs are light yellowish buff, with a ring of pale liver-brown and darker blackish spots and blotches near the broad end. They are glossless, and measure 18 : 14 and 17·5 : 13·7 mm.

### 8. *Myiagra plumbea* Vig. & Horsf.

Evidently not rare. ♂ ad. "Iris brown, feet black, bill slaty blue." The young *male* resembles the adult *female*.

### 9. *Gerygone rosseliana* sp. nov.

♂ ad. Upperside greenish olive, hardly perceptibly brighter on the rump, somewhat duller on the hind-neck. Eyelids whitish yellow. Rectrices olive-grey, edged with greenish olive, inner web with an ill-defined subterminal whitish spot, across the tail a dull black bar, about 3—5 mm. distant from the tip, the width of this blackish bar being about 5—7 mm. Undersurface buffy yellow, sides washed with olive-brown, throat much paler. Iris brown, feet bluish slate-colour, bill black. Wing 51—52, tail 40, tarsus 17, culmen 13 mm. ♀ similar to the *male*, but somewhat duller and slightly more brownish.

There are only three *males* and one *female* from Rossel Island.

### 10. *Myzomela albigula* Hart.

Descr. origin. in *Bull. B. O. C. Dec. Meet.* 1898. No. LVIII. p. 20.

♂ ad. Upperside greyish blackish brown, feathers of the crown, rump, and upper tail-coverts with paler edges. Tail blackish brown. Remiges blackish brown, inner webs with broad pale ashy white borders, outer webs narrowly edged with dusky grey. Throat and chin pale brownish grey, in some specimens almost pure white, with a short, more or less developed dark red line, formed by the red tips to the feathers, on the lower portion of the throat. Chest dark ashy brown, remainder of underparts a little paler ashy brown, most of the feathers with slightly paler edges, thus producing a faintly streaked appearance. Under wing-coverts greyish white or whitish grey. Iris brown, bill black, legs and feet bluish slate-colour. Wing 75, tail 58, culmen from forehead 23·5, tarsus 20 mm. ♀ ad. Smaller, mostly paler on the underside, throat in nearly all the specimens before me whitish, in sharp contrast to the dark chest. Wing 68, tail 53, culmen 21 mm.

This interesting species of *Myzomela* seems to be common on Rossel Island. The name I gave to it is perhaps not very luckily chosen, as only some of the *males* have the throat white; but this is probably (?) the most complete dress of the adult bird.

11. *Zosterops pallidipes* De Vis.

Descr. origin. in *Official Report on New Guinea, Birds*, No. 51. 1889.

♂ ad. Upperside uniform olive-green. Rectrices blackish brown, with olive-green edges. Remiges deep blackish brown, outwardly margined with the colour of the back, inner edges and under wing-coverts yellowish white. Round the eye a broad ring of silvery white scaly feathers, under the eye a blackish patch. Under-surface greenish yellow, chest and sides more olive greenish, throat and middle of abdomen almost pure yellow. "Iris brown, feet dark dirty yellow, bill above dark brown, mandible and lower edge of upper jaw very light brown towards the tip." Wing 67, tail 49, culmen 18.5—19, tarsus 19.5—20 mm. ♀ ad. Like the adult *male*, but a little smaller, wing only 62 mm., tail 45 mm.

This very distinct species is evidently common on Rossel Island.

12. *Dicaeum nitidum* Tristr.

*Ibis*, 1889. p. 555. Nov. Zool. 1898. p. 528.

This species has been described from Sudest; but Meek met with it equally frequent on Rossel Island. The specimens (only *males*) agree with those from Sudest Island; but the wing is in some specimens as long as 60 and 62 mm., others being shorter. The colour of the back varies a good deal, being more bluish in some, probably freshly moulted, specimens, more olive-green in others.

13. *Pitta meeki* Rothsch.

Descr. origin. in *Bull. B. O. C.* No. LVI. Oct. 1898. p. 6.

This fine *Pitta* is a very remarkable discovery. It resembles superficially the well-known *Pitta mackloti* of New Guinea, from which it differs in the absence of the black spot on the throat, which is only indicated by a dusky shade, the paler and more greyish brown chin and upper throat, the pale greyish brown forehead and fore-part of the crown, the light brown (not deep rufous) hind-neck and hinder-part of the crown. Ramiid the eye and on the ear-coverts are some pale bluish grey feathers. The size is considerably less. Wing 98—102 mm., tail 45, tarsus 40. The young bird has the forehead blackish, feathers of throat and chest whitish buff with ashy brown or almost blackish edges, feathers of the abdomen pale brown with darker tips, under tail-coverts rosy white, black olive-brown. The adult bird has the iris brown, bill black, feet light bluish slate-colour.

A nest, unfortunately without eggs, was found, being a huge clump of rootlets, sticks, and dry, mostly half decayed leaves, with a cup of about 12 cm. in depth, and measuring about 23—25 cm. across on the outside.

14. *Eurystomus crassirostris* Sel.

Common enough. Young specimens were found in February.



15. *Alcedo ispida moluccana* Less.

Two specimens. Cf. Nov. Zool. 1891. p. 529.

16. *Halcyon sordidus colonus* Hart.

Nov. Zool. 1896. p. 244.

The specimen from Rossel Island is darker than the type from Egum, because it is in fresher plumage. The wing measures 86 mm., bill from nostril 36, tail 61 mm.

It is remarkable that we have not received *Halcyon salomonis* Rams., which according to Sharpe, *Cat. B. Brit. Mus.* XVII. p. 289, occurs on the "Louisiade Islands." Perhaps the locality of the specimen in the British Museum is wrong.

17. *Halcyon sancta* Vig. & Horsf.

Three specimens. Cf. Nov. Zool. 1898. p. 529.

18. *Tangsiptera rosseliana* Tristr.

Cf. *Ibis*, 1889. p. 557, and *Cat. B. Brit. Mus.* XVII. p. 309.

This beautiful Kingfisher, described from Rossel Island, and apparently not found anywhere else, is not rare there. Mr. Meek sent a beautiful series. The adult *male* is well described, *l.c.* I do not, however, find the central rectrices longer than 9.6 inches. The adult *female* does not differ from the *male* in colour: but the tail is much shorter, being only about 7—7.5 inches in length, and the wing is 6—8 mm. shorter. The young bird has the bill blackish, wing-coverts and scapulars edged with brown, rump and upper tail-coverts streaked with black and blue, the breast tinged with rusty buff, rectrices mostly blue, but the inner webs of all and both webs of the central pair patched with white. I suppose this is the second plumage.

The adult bird has the "iris dark brown, the feet yellowish green, the bill chinese red."

19. *Geoffroyus aruensis cyanicarpus* subsp. nov.

The *males* of the *Geoffroyus* from Rossel Island agree with *Geoffroyus aruensis sudestiensis* Vis in the absence of the reddish brown patch on the wing-coverts; but they differ from both *Geoffroyus aruensis aruensis* and *G. aruensis sudestiensis* in having the whole edge of the wing from the bend to the beginning of the outmost primary blue like the under wing-coverts, instead of light green. The under wing-coverts are of a somewhat darker blue, the sides of the head are distinctly washed with lilac-blue. The green-colour of mantle and underside is darker and less yellowish. The lesser upper wing-coverts are darker, the wing about 5—10 mm. longer. The adult *female* differs from the *male* in having the whole head brown, the crown strongly washed with bluish green. The wing is about 1 cm. shorter than

the *male*. The young bird in its first plumage has the crown green like the back; the young *male* passes through a plumage with a brown head like that of the *female*. The iris in both sexes is pale yellow, the feet greenish slate-colour, the upper jaw of the adult *male* crimson.

#### 20. *Cacatua triton trobriandi* Finsch.

Four specimens from Rossel Island agree perfectly with those from Fergusson and Sudest Island. Cf. Nov. Zool. III. p. 246 (1896), and Nov. Zool. V. p. 531 (1898).

#### 21. *Ninox goldiei rosseliana* Tristr.

One evidently immature *female* from Rossel agrees with those from Sudest Island. The iris is bright yellow, feet dirty yellow, bill pale yellow with stone-grey patches. Cf. Nov. Zool. V. p. 531 (1898).

#### 22. *Accipiter* spec. inc.

A young *male* of a Sparrow-hawk from Rossel Island may belong to an unnamed species; but without adult specimens I cannot form a definite idea about it. The thigh-feathers are cinnamon-rufous, barred with whitish. The iris has been yellow. This bird has nothing whatever to do with *Astur atorques*, which we have received from several other islands of the Louisiade group.

#### 23. *Ptilinopus strophium* Gould.

One adult *male* from Rossel Island has a purple patch of about an inch in length on the upper abdomen, formed by the broad purple tips to the feathers. There is also a very distinct purplish blue line bordering the yellowish white chest-band. This purple patch on the abdomen is more or less indicated in several other *males*. Salvadori (*Cat. B. Brit. Mus.* XXI. p. 135) mentions a skin from S.E. New Guinea as having a few small purple spots along the middle of the abdomen. Specimens from St. Aignan and other places show partly traces of the purple patch, partly not. Probably the purple patch is only found in very old *males*. "The iris is reddish yellow, feet purple-red, bill pale greenish yellow."

#### 24. *Carpophaga salvadorii* Tristr.

This beautiful large Pigeon is evidently common on Rossel Island, as it is on Fergusson Island. The specimens from the two islands are alike. "The iris is bright red, feet dark purple, bill bluish slate-colour."

#### 25. *Myristicivora spilorrhoea* (G. R. Gray).

One *male*. Cf. Nov. Zool. V. p. 532.

26. *Macropygia* ? spec. nov.

Several *Macropygiae*, unfortunately most immature, from Rossel, are not easy to determine. They seem to differ from the bird of Fergusson which has been named *M. cinereiceps*, and which I called (Nov. Zool. III. p. 249) *M. dorca cinereiceps*, in having the breast more distinctly barred with blackish slaty narrow bars, and the wing longer. They differ from *M. carteretia* of New Britain in having a barred breast, shorter wing, and ashy grey forehead and crown. The abdomen is also darker. It is to this form, and not to *M. carteretia*, that the Sudest Island specimen, which is mentioned in Nov. Zool. V. p. 532, belongs. See also my note about the New Hanover *Macropygia* in the Appendix to Webster's *Through New Guinea*, p. 373.

The Louisiade form is apparently nearer to *M. cinereiceps* than to *M. carteretia*.

27. *Chalcophaps chrysochlora* Gould.

Two nestlings found in February.

28. *Caloenas nicobarica* (L.).

Three skins.

29. *Megapodius macgillivrayi* Gray.

There are three skins from Rossel Island of this Megapode, which has first been described from the Louisiade group. The iris is dark brown, the feet chrome-yellow, or "lemon-chrome," the bill brown. The expression in the *Cat. B. Brit. Mus.* XXII. p. 447, in the "Key to the Species" of the genus *Megapodius*, that the flanks are blackish grey, is not correct, for they are really of a very deep chestnut-brown. The species is a very good one.

30. *Charadrius dominicus fulvus* Gm.

Common in February.

31. *Ochthodromus geoffroyi* (Wagl.).

Common from the end of January to the beginning of March.

32. *Ochthodromus mongolus* (Pall.).

Common during the whole of February.

33. **Heteractitis incanus brevipes** (Vieill).

Two *females* shot on February 12th, 1898.

34. **Tringoides hypoleucus** (L.).

From end of January to end of February.

35. **Limosa lapponica novaezealandiae** Gray.

One *male*, March 3rd, 1898.

36. **Numenius phaeopus variegatus** (Scop.).

Common in February.



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## A REVIEW OF THE ORNITHOLOGY OF THE GALAPAGOS ISLANDS.

WITH NOTES ON THE WEBSTER-HARRIS EXPEDITION.

By THE HON. WALTER ROTHSCHILD Ph.D., AND ERNST HARTERT.

(Plates V. and VI.)

### I.

#### INTRODUCTORY NOTES.

TOWARDS the end of 1896 one of us—Mr. Rothschild—suggested to Mr. Frank B. Webster, of Hyde Park, Massachusetts, that he should send out an expedition to the Galapagos Islands, to collect natural history specimens. The great interest attached to the fauna of the Galapagos Islands since Darwin's explorations became still more intense through the most successful recent explorations of Messrs. Baur & Adams. The bulk of the collections made by these two gentlemen was purchased from the late Dr. Baur, and is now in the Tring Museum. Their study made the desire for more material more ardent.

Mr. Webster was much interested in the proposed scheme, and he arranged an expedition in March 1897, under the command of Mr. Charles Miller Harris as chief naturalist and Mr. S. A. Robinson as sailing master, Messrs. James Cornell, O. E. Bullock, and George Nelson as collectors. The party went to Colon, where they intended to charter a suitable vessel. Here poor Robinson, Cornell, and Bullock contracted yellow fever and died, partly at Colon, partly on their voyage home; and Nelson, on reaching San Francisco, refused to go on and returned home. Mr. Harris, however, did not despair. He was able, after some delay, to charter the two-masted schooner *Lila and Mattie*, and left San Francisco, accompanied by Messrs. R. H. Beck, F. P. Drown, and C. D. Hull as collectors. The gross tonnage of the vessel was 195.76, the length 93 feet. The crew, including the captain, consisted of five persons. Besides a yawl-boat with sail belonging to the vessel, an 18-foot-long, flat-bottomed, high-nosed skiff, was taken for landing in surf.

The unfortunate delay caused by the deplorable fate of Messrs. Robinson, Bullock, and Cornell, was much to be regretted in several ways. The original intention to make extensive collections on Guadalupe, several islands of the Revilla Gigedo group, on Cocos and Malpelo Islands opposite the coast of Colombia, and to visit the unknown and doubtful islands of Duncan and Gallego, between the Revilla Gigedo group and the Galapagos Islands, had to be abandoned, and only a short stay could be made on Clarion Island, the most western island of the Revilla Gigedo group, while Cocos Island, the exploration of which was considered specially

important, could not be visited at all, on account of the equatorial calms approaching, which would have made impossible the return of the vessel for a considerable time. It is also, probably, due to this delay that no nests and eggs of any of the land-birds were found; several of the islands could not be visited as long as had originally been intended, and the desired research for remains of dead tortoises could not be made to the extent which would have been useful.

Notwithstanding, however, these shortcomings, Mr. Harris' party, which returned to San Francisco in February 1898, collected on the whole very successfully. The material of birdskins and land tortoises is evidently by far the largest and best ever amassed on the Galapagos Islands. The following article will show the result of our study of the birds. In the arrangement of the species we have followed the most important article of Mr. Ridgway, for the convenience of those who may wish to compare our notes with his. We have not given detailed descriptions of all the species, this having been done by Ridgway; and of synonyms and of literature we have only quoted those referring to species or occurrences on the Galapagos Islands, and a few more important quotations.

Before our article we have printed the two separate diaries of Messrs. Harris and Drowne, and have incorporated some interesting and characteristic reproductions of original photographs and pen-and-ink drawings by Drowne.

## II.

### DIARY OF CHARLES MILLER HARRIS.

*June 21, 1897.*—We left San Francisco. A southerly wind took us out to the Farallones. At about 4 p.m. the wind died out, and at dark we were drifting about north of the Islands. Four big California whales were seen sporting about the vessel.

*June 22.*—Laid by the islands all night, as there has been no wind. Murre, western gull and albatross very plentiful. I have been unpacking and arranging workshop all day. This afternoon we have been getting down the coast three or four knots per hour.

*June 23.*—Breeze freshened during the night, and to-day we are off Pigeon Point. Worked unpacking and cleaning guns. Saw a large hump-back whale covered with barnacles. At 4 p.m. we were off Point Sur, one hundred miles south of San Francisco. Nine-knot breeze at bedtime.

*June 24.*—Fresh breeze this morning. Found out that condensed milk had been left out of order. At 5 p.m. log registered 316 knots. Hull and Beck helping out on watch.

*June 25.*—Fair winds still. Spoke American three-mast schooner *Challenger*, bound for San Francisco, and asked her to report us. Saw some small petrels, probably "Least Petrels." At 7 p.m. log 529 knots.

*June 26.*—Coming on deck at 6.30 found that we were in sight of Guadalupe Island. During the night a flying fish came aboard, 16 in. length, 13 in. spread. At noon log 656 knots.

*June 27.*—Still fair wind. At noon log 872 knots. Albatross and petrels still with us. Saw several birds, either terns or jaegers. At noon passed through quantities of Spanish sail fish.

*June 28.*—This morning small bunches of barnacles floated by; the water was full of them. At noon 1045 knots. Wind dying out.

June 29.—Calm this morning. No wind. No birds. At noon 1127 knots. Making plans to work Clarion Island.

June 30.—Still light winds. Making 2 or 3 knots an hour. At noon 1187 knots. Saw tropic bird, flying fish, Spanish mackerel.

July 1.—This morning Beck killed two tropic birds (*Phaethon rubricauda*) and two shearwaters.\* At noon 1258 knots. Towards evening Hull shot a tropic bird and I shot two red-footed boobies.

July 2.—To-day we killed several red-footed and blue-faced boobies,† and frigate birds, and one tropic bird. Noon 1344 knots. Breeze freshened towards night. Sighted Clarion Island at 3 p.m. At dusk laid to about fifteen miles to the windward of the island, preparing to land in the morning.

July 3 and 4.—Owing to strong current and some wind we drifted to leeward of the island. About 10.30 we anchored in Sulphur Bay, and landed at once. As we approached the island the boobies and frigate birds began to come and alight on the vessel, sometimes fifteen or twenty at a time; while at times five hundred or so would circle around. In all the trip we did not find birds so fearless! We could see on the sides of the island great patches of the birds (colonies). Found blue-faced boobies breeding in numbers. They make a small hollow in ground, laying one and two eggs, generally two—in no case were more than two found. Red-footed boobies we found breeding by thousands.‡ They make a shallow nest of sticks, occasionally a little grass and a few feathers; the **nest is placed in the bushes** from 3 to 15 feet from the ground. Number of eggs in **no case exceeding one!** There were young birds in all sizes, from just hatched to fully developed, and eggs from fresh to advanced.

On this island we only saw two red-footed boobies in a grey plumage, which we got; all the others, old and young, were white. (Later it will be noted that at Tower Island the **majority were in grey plumage.**) On this island the birds built their nests in compact colonies, while on Tower Island they were spread all over the island. Several species of butterflies, grasshoppers, and a sphinx moth were observed. Some eighteen or twenty snakes were captured. When taken they appeared to vary much in colour, some being brownish, some blackish, and some greenish. Small wren § abundant; some old nests found. Oval, entrance on side, near top, sort of roofed over; nest placed in crotch or on limb.

Ravens were fairly abundant, but very shy. Some were shot, but the plumage was so poor that we did not save them. They evidently were breeding, as young birds were shot. Ground owl were abundant. Doves were also plentiful.

Observed two kinds of lizards: one a light grass-green—one of the most lively and pretty lizards I ever saw; the other a light brown with stripes; both kinds collected. Several red land crabs were taken on the tops of the hills. Salt-water crabs were abundant along the shores. Saw a small Octopus, arms about 20 in. It went under a big rock; we poked a pole at it, and it took hold and held on with great strength.

Small sharks were abundant in the shallow water of bay. The mate harpooned a 150-lb. green turtle, which was very good eating. There is a small tree-like bush on this island, that when wounded bleeds a milk-like matter very freely. The cactus, like the prickly pear-cactus of California, very abundant. It is very

\* *Puffinus auricularis* and *Asstelata heraldica*.

† *Sula cyanops*.

‡ This is *Sula piscatrix websteri* Rothsch. See p. 177.

§ *Troglodytes tanneri*.

|| *Spotyto conicularia rostrata*.

• *Zenaidura clarionensis*.

difficult to get through these plants. A wild morning-glory is abundant on island. Along the beach are coral rocks, and many pieces of coral washed up and worn.

The bushes on which the boobies build have thorns say 2 in. All through them are the remains of boobies that have been caught and perished. We killed all the boobies required with sticks.

Completed, and returned to vessel at noon of 4th. Had a special dinner for the occasion. Hoisted anchor about 3 p.m., and stood south. Had some fireworks in the evening.

We did not work the island completely, only the section of Sulphur Bay. Would have liked to complete it, but did not feel justified in delaying.

*July 5.*—Fair breeze last night, calm at evening. All hands attended to specimens.

*July 6.*—Calm. All working. Sharp showers in afternoon and evening. Sailor captured a red-footed booby on bowsprit at dusk.

*July 7.*—Still calm. Finished the skimming of the boobies.

*July 8.*—Blew booby eggs.

Red-footed : Small eggs  $1.42 \times 1.16$  to  $2.10 \times 1.50$  inches.

Average size,  $2.50 \times 1.55$  to  $2.45 \times 1.60$  inches.

Large,  $2.60 \times 1.56$  inches.

Blue-faced booby eggs :

Average,  $2.70 \times 1.75$  ;  $2.50 \times 1.75$  ;  $2.60 \times 1.70$ .

*July 9.*—Sailing south slowly, none of us feeling well on account of hot weather.

*July 10.*—Calm nearly all day. Rain squall in afternoon.

*July 11.*—Heavy swell and showers.

*July 12.*—Fresh S.W. wind all day. Making from 4 to 7 knots. Saw a booby with blue neck.

*July 13.*—About 4-knot breeze all day. Saw albatross first with white colour ; all others seen were grey, to date.

*July 14.*—Fair breeze all day.

*July 15.*—Showers and S.W. wind. Filling empty barrels with rain-water. Saw schools of porpoise.

*July 16.*—Showers in morning, in afternoon ran into S.E. wind and heavy sea. At 9 p.m. a squall carried away mainsail halyard, and mainsail had to be bent for night. Vessel making 4 knots per hour under foresail and jib.

*July 17.*—Rigging repaired, and at 9 a.m. main sail reefed and set to the wind. Large school of porpoise under our bows.

*July 18.*—Wind fresh and course favourable. Have struck the S.E. trade winds.

*July 19.*—Fine wind; making about 145 knots per day now.

*July 20.*—Saw a large turtle this morning, also three porpoises. Saw three petrels ; they looked large and black, showing no white. If wind holds shall be at Culpepper Island on Sunday.

*July 21.*—Made a good run, 167 knots in twenty-four hours. Saw a very dark booby.

*July 22.*—Still fair wind. Weather cool and everything lovely. All feeling well. Struck with harpoon two porpoise, but failed to land them.

*July 23.*—Wind and weather still good. Packed the Clarion Island birds. Painting boxes inside with carbolic acid.



July 24.—Quite cool this morning ; birds becoming quite abundant, indicating approach to Culpepper Island. Should be off the island to-night.

July 25.—Cloudy this morning, and no island in sight. Quantities of birds indicate our nearness to island. Birds seen : Gulls, terns, petrels, shearwaters, turnstone, man o' war, booby. A flycatcher came aboard, and I caught it with a net (*Myciarchus magnirostris*). The island was sighted by Captain Lenbridge at 3.35 p.m., fifteen miles N.E. After supper we drew near very rapidly. Found it very abrupt. The north side looks like an immense wall of masonry, each layer of rock six feet thick ; on west side is a peculiar dome-shaped rock ; on east side is a reef terminating with an arched rock of considerable height. There are apparently bushes and cactus on top of island.

Thousands of above-mentioned birds are circling about the island ; their cries are literally deafening ! The rocks are whitened and streaked with the excrements of the birds. We will lay by the island all night if there is no anchorage. Birds are very tame. Every one is well, and impatient to begin work.

July 26.—Last night drifted to the southward of Wenman Island, and at daylight the Captain headed for it, thinking it was Culpepper.

We reached **Culpepper** at 8.30.

Hull and myself went ashore. Found marine iguanas abundant. Frigate-birds breeding (one egg collected). *Puffinus sabalaris* was breeding (eggs collected). This bird lays one white egg, and nests in little holes under rocks and in the cliffs ; and it also seems to take pains to seclude. The birds are very tame, allowing one to take them from the nest with one's hands. The *Anous galapagoensis* lays a very prettily spotted egg, and nests in similar places, but more openly. Occasional sticks and feathers in the nest. *Crocygus furcatus* was breeding. We found no nest, but took a misplaced egg. No doubt plenty were on the top of the island.

Killed one *Procellaria*. Red-footed \* and blue-faced † boobies both breeding. Ground doves very abundant and excessively tame. Mocking birds (*Nesomimus*) and *Dendroica* abundant. Two or three species of *Geospiza* observed and taken. Shot a turnstone. Hull shot a cub fur seal. More seen. Two species of crabs seen. Put up twenty-five skins after returning to vessel at 2 o'clock.

July 27.—This morning all hands at work ; put up twenty-seven skins and the cub seal. In the afternoon all went ashore and worked on the east edge of the island. It is the only part of the island that can be worked. I killed a large brown hair seal, but from lack of time did not save it. Beck and Drowne killed a number of birds, among them two beautiful tropic birds (*Phaethon aethereus*). Took eggs of frigate bird, tern and shearwater. The black-capped tern ‡ is extremely abundant at this island. There are thousands of them, and they appear to be breeding on the top of the island. We did not observe them outside of thirty miles from the island. No chance whatever of reaching the top of the island. The frigate birds are very bold, one swooping down and pulling off Beck's cap.

July 28.—All hands put up fifty skins to-day.

July 29.—All ashore collecting to-day, returning about 3.30. Put up twelve skins. Intend to leave for Wenman with first wind. Calm now.

The formation of Culpepper Island is volcanic rock and sandstone. Vegetation, several species of vines, bushes, and cactus. Fur seal ; 2 taken. Hair seal ; 2 shot, not saved. Reptiles, iguanas ; 2 taken, put in alcohol. Of insects we saw flies like the common house fly. There were several beetles taken from stomach of dove, but

\* *Sula piscatrix websteri*.

† *Sula variegata*.

‡ *Sterna fuliginosa*.

unfortunately they were lost. Two species of crab; 5 taken and put in alcohol. Fish very abundant about the island. One very *bright gold fish, like gold leaf*, say 8 to 12 lb. in weight. It was cool and comfortable during all our stay. There seemed to be a number of fur seals about the reef and arched rock. (We only observed fur seal at Culpepper and Wenman—more plentiful at Wenman.)

*July 30.*—Worked putting up skins and blowing eggs.

*July 31.*—The morning found us close to **Wenman** Island.

After breakfast we went ashore. The island is a portion of a crater—with one side gone. Most of the middle and large island is a high sharp ridge, inaccessible; but one end flattens out in two directions, having a flat top, over which we collected. There is a big rock on one end of the main island, and off the other is a small round flat island. We returned to the vessel about 3, and put up 58 skins by 8 o'clock. Beck secured a heron and several *Creagrus* eggs. The black-capped tern—so plentiful at Culpepper—is only a straggler here. The male frigate bird sits on the edge of nest and distends its pouch like a child's toy rubber balloon: if you frighten it off it goes with pouch distended. We could see them from the vessel sailing around, with the bright scarlet pouches showing to advantage. The frigate birds we found to lay only one egg, breeding both on ground and on bushes, seeming to prefer the latter; nest 2 to 8 feet from ground.

*Aug. 1.*—To-day I took the mate and one sailor, and went after fur seal, securing several. They were found lying in caves among the rocks, and were shot or clubbed on being aroused. We caught one small one. This appeared to be say 3 or 4 weeks old.

*Aug. 2.*—Expected to work the island to-day, but we are five miles off and drifting away. Calm.

*Aug. 3.*—Still calm, and cannot get to the island in the afternoon. Put out boat, and boys picked up petrels and tern.

*Aug. 4.*—All hands worked the island to-day, securing sixty birds, eggs, shells, etc., also one centipede. We returned to the vessel about 3 p.m., and put up our stuff. Vessel headed for Abingdon with a passable wind. We took one specimen of large *Geospiza*—possibly *maguirostris*.\* This was the only one seen on the island. Presumably the *Certhidea* and *Geospiza* are new species, and the black-capped tern is new to the islands. This refers to both Culpepper and Wenman.

Wenman Island consists principally of volcanic rock and some sandstone. The island consists properly of three islands. These are a steep inaccessible rock; the large main island, part of which can be worked; and a low, flat island, which has been gone over. Vegetation: cactus bushes, vines, and a white morning glory. Mammals: fur seal, brown hair seal: a cub seen was cream colour, with blackish spots. Iguanias, turtles, centipedes, and house flies. Three or four kinds of water crabs. Shells and nautilus abundant. Many species of bright fish. One specimen of frigate bird, thirty-six of which were taken here, was very peculiarly coloured. Feet madder red; gular sac, eyelids and bare space indigo; bill horn: iris dark brown: this colouring being entirely different from any others.

The *Creagrus* makes its nest by gathering chips of lava and piling them around, leaving a hollow. I noticed the feet of the blue-faced booby have a more greenish or bluish cast than those from Clarion Island.† Face and gular sac darker. In other words, the flesh parts are a darker colour than on those from Clarion. I secured one

\* *G. strepera*. See p. 155.

† Those from Clarion Island were true *Sula cyanops*, those here *Sula variegata*.

young *Butorides*; no adults seen. A few black-capped tern taken off the island—not resident. Bird life not as abundant on Wenman as on Culpepper. I noticed that the *Geospiza* are carrion-feeding birds, eating from dead carcasses of seal; also observed them feeding on vermin on the boobies, standing on the feet and backs of the boobies for that purpose. Many old nests of *Geospiza* and mocking birds were seen, but none found breeding.

Aug. 5.—Worked all day on skins, eggs, turtle. Abingdon Island not sighted. Have been heading S.E., but current drifting us N.

Aug. 6.—Calm all day. Have drifted N.W. to a position E. of N. of Culpepper at noon.

Aug. 7.—Foggy all day. No observation. Probably S.W. of Culpepper, as we have been heading that way.

Aug. 8.—Still calm and foggy. We are somewhat N.W. of N. Albemarle, in long. 93 or 94.

Aug. 9.—Made some S. and E. to-day. Saw some flocks of turnstone.

Aug. 10.—A good wind from 12 m. to 5 p.m. brings us in sight of N. Albemarle. It is very high land. Wind dies out about 11, and we drift N. again.

Aug. 11.—Calm during the morning. Albemarle in sight part of the time. A light wind during afternoon and night; if it continues bids fair to bring us to Abingdon by morning. Saw a large bird, dark, with spread of 4 or 5 feet, flight like an albatross. (Note.—We saw nothing like it afterwards.)

Aug. 12.—**Abingdon** in sight on getting up in the morning, 12 to 15 miles away. Arrived off the west side of the island about 11.30. As soon as dinner was over, the mate took a boat and made soundings, and at 4 p.m. we anchored in 8 fathoms, 1½ mile north of Cape Chalmers. Bottom coarse sand and rock. Hair seal very tame. Several turtle seen. I shot a pelican with a rifle as it flew by.

Aug. 13.—Abingdon Island. All hands started at 6.30 in the small boat, and landed north of vessel. I instructed each man to collect about twenty birds, and be back at the boat at 11. Drowne failed to show up. Search was instituted, and at about 3 p.m. he was found by me on opposite side of island. He was well exhausted and scratched. He had got lost, and lost his head.

Aug. 14.—Drowne's escapade yesterday knocked us out a whole day. We had to put up yesterday's birds, saving about seventy.

Aug. 15.—In the morning all went ashore. Hull and Drowne gathered urchins and shells, while I collected about fifteen birds. In the afternoon took care of the birds.

Aug. 16.—Beek, Hull, and myself collected on south end of the island, landing at Cape Chalmers. Very rough climbing about, and birds not as plentiful as on the north end. Drowne cleaned shells, etc., while we were going. Put up birds in the afternoon. Deserted nests of small birds very plentiful on south end. I note a number of trees have been cut down on the south end, probably by people from vessels.

Aug. 17.—Again collected on the north end, and in the afternoon put up our birds.

Aug. 18.—In morning collected the north end. At 2 p.m. hoisted anchor and sailed for Bindloe. Good wind. Put up sixty-five birds in the afternoon.

The north end of Abingdon is bare lava, the south end covered with vegetation as follows: A wild cotton bush, bearing a beautiful yellow flower; a tree cactus, with smooth trunk, some 2 ft. through, some 15 ft. high. The *Geospiza* pick holes

in the leaves while feeding, and the sap and dew which fall at night accumulate and evidently furnish water for them. A white-barked tree, often 20 ft. high, resembling an apple tree, exuding a yellow pitch; thorn bushes; grass and vines. Hair seal, reptiles, iguanas, turtles, and two species of lizards. Insects: house flies, grasshoppers, and several butterflies.\* Perhaps a dozen butterflies seen on the wing; many brilliant fish; three species of sea crabs. *Bateo*, common and breeding; one nest found in cactus, 10 ft. from ground; nest of sticks lined with grass very substantial, containing one fresh egg, white with slight greenish tint. *Geospiza*, about five species taken. The number of each *Geospiza* collected fairly representing their relative numbers on the island.

No water found. Do not think tortoise exist here; we could find no signs. **Black** males of *Geospiza strenua* fairly common. More birds exist on southern slope than on northern parts.

Aug. 19.—Worked on birds, etc. Arrived off Bindloe at 4 p.m., but wind died out and could not anchor. The island seems to be mostly bare lava. Gloomy and forbidding. Patches of brush and trees show up in places.

Aug. 20.—Good wind all night, and this morning early we were off the north end of the island. Spent the day cruising about looking for an anchorage. One day lost by the hesitancy of the captain. About 4.30 dropped anchor in about 11 fathoms at place marked 15 fathoms on chart (farther in). We landed for a few minutes in the evening.

Aug. 21.—**Bindloe.** All hands went ashore early collecting; got a fair lot of birds. Beck went to the interior of the island, but got nothing different from what we got on the coast.

Aug. 22.—Hull and I took a long tramp to-day, wrapping our feet and legs in canvas for crossing lava. We went to the top of the island, and visited a number of patches of brush looking for birds. I secured one male *Pyrocephalus*. One young male taken, but no female. The bird is here certainly very rare, as the two noted were the only ones seen by the party. *Geospiza crassirostris* are very rare. The island is an immense lava bed, crowned with a few hills covered with vegetation, and a few small patches of brush on some side hills. Bird life is not plentiful on Bindloe Island.

Aug. 23.—All went ashore early and collected till 10 a.m., when we came aboard and weighed anchor, sailing for Tower Island with a strong southerly wind. I have been sick all day, not working after getting aboard.

Aug. 24.—I have been feeling unwell all day. At 2 p.m. we tacked ship within 10 miles of Bindloe, having been sailing 26 hours with a strong wind, and not gained an inch. Steering E. by S. and S.S.E.; current and sea setting us to N.E.

Aug. 25.—At noon to-day our position was about 50 miles N.E. of Tower, with no immediate prospects of getting there.

Aug. 26.—At noon to-day 46 miles N.E. of Tower, and everybody "out of sorts."

Aug. 27.—At 12 noon, lat. 51, long. 88. No cactus was observed on Bindloe, but on a beach was found a vine growing, bearing a pod like a pea, and with a flower like a purple sweet pea. Hair seal and iguanas were plentiful. We also saw dragon-flies and grasshoppers. Several species of bunch-grass grow on the island.

Aug. 28.—At noon we found our location to be 25 miles S.E. of Tower, having had a southerly wind during the night and morning. We decided to skip

\* *None spec.*

Tower for the present and make *Indefatigable*, having a favourable wind to proceed south. In the evening light from a volcano showed very brightly from the direction of James Island.

*Aug. 29.*—This morning, on getting up at 6.30, found that we were becalmed in the passage between James and *Indefatigable*, just off Daphne Islands, about 10 miles from Conway Bay. During the day we managed to beat up to the bay, and dropped anchor in 5 fathoms under the Lea of Eden Island. *Indefatigable* Island slopes gently to the summit, and is thickly covered with vegetation. We can see from the vessel what looks like mangrove trees along the shore: also very tall cactus. The volcano on James is very active, and this evening made a grand sight to watch.\* Conway Bay is a fine harbour.

*Aug. 30.*—This morning all hands went ashore on ***Indefatigable***, and collected, 69 birds being the result. Birds very plentiful and tame.

*Aug. 31.*—All hands collected to-day: saved 54 birds. Beek secured two large turtle. Drowne reports seeing a **cuckoo**. Shot at it, but failed to secure it. I secured a small wood rat. Saw two more, but could not get them. Got eight or ten very large crawfish, making a nice supper.

*Sept. 1.*—All hands collected this morning. Beek got two more rats; Drowne another turtle. I got three ducks and two rails. Saw and shot at a cuckoo. The cuckoos were very shy. Bills of ducks are **plumbeous blue**, not black, as Ridgway states in his book. Saved 54 birds. Beek killed twenty odd birds with stones. I secured a *Geospiza* with a few white feathers on the head.

*Sept. 2.*—All hands collected to-day. Yesterday Hull secured an egg of the *Buteo*: it was well incubated, which would seem to indicate that the hawks lay but one egg. The mate found a nest of the blue heron with three fresh eggs, but broke one in getting them.

*Sept. 3.*—To-day we took the yawl-boat, and sailed north along the coast of *Indefatigable*, about nine miles, making a landing at 11 a.m., and staying till 2 p.m. Took a set of pelican eggs: nest in mangroves. If we had a naphtha launch we could have collected all this locality and several islands, and vessel remained at Conway Bay, saving hours daily and severe labour. One of the sailors reports seeing a small snake. Grasshoppers, iguanas, lizards, and a few small butterflies seen.

*Sept. 4.*—Weighed anchor this morning, and sailed for **Duncan**, arriving at noon, but could find no anchorage. I took a short trip on the island, and could find no suitable camping place, so have got to lay to.

*Sept. 5.*—Hull, Drowne and I landed about 7.30 this morning, intending to shoot birds. About 11 we got into an immense crater, about half a mile across, full of vegetation. I had not been in this long before I discovered a tortoise. Calling the other boys, we secured it, and searched for more. We found seven in the course of the afternoon, turning them on their backs and weighting them with heavy rocks, as we thought sufficiently. Got back to vessel after dark very tired, leaving tortoise to be got on Tuesday. The captain against my wish ran back to Conway Bay.

*Sept. 6.*—Put up about seventy birds to-day: loaded cartridges, made turtle skins, etc. Heavy swell from south. We are going to bring down the tortoise to-morrow. It will be almost killing work, but it must be done.

*Sept. 7.*—All hands landed on the east side of the island, leaving our lunch at the boat, expecting to be back at noon with three tortoise. On getting to the

\* See line 3 above, and pp. 95 and 114. The volcanoes are supposed to be inactive!—ED.

crater we found one big tortoise dead, one of the big rocks that we had weighted it with having fallen on its head and shut its wind off. Several of the others had got loose, but all were found; also a smaller one. At noon we had just got the tortoise secured, and were two miles from lunch, and our water was short. Knowing that we should be obliged to take our tortoise down to the west coast of the island, we decided to let dinner go. Two men each took a tortoise lashed to a pole, and started for the coast. It was the hardest work that I ever did for my part, and I guess that the rest thought the same. At 4 we got to shore above a high bluff. We tied them here for the night, and started for the boat, two miles across the island. This was very rough work. No dinner! No water! The sailor Charles was completely exhausted after reaching the boat. Got to the vessel at dark. Beck secured a rat.

Sept. 8.—To-day we landed on the west side of the island, leaving the sailor Herman to watch the boat. Got to the crater fairly easy. Found the tortoises all right, except the smallest one, which was practically dead. Rats had gnawed a piece out of one hind foot. They had also gnawed the eye of the large dead tortoise. The mate brought down one tortoise alone; the rest of us two more. Got to shore about 2.30. Lowered tortoise over the cliff with ropes, 60 to 75 ft., reaching the vessel about 6.30 with six live tortoises. Got two penguins. Rats appear numerous.

Sept. 9.—Wind light this morning. Had a hard pull to the island. Drowne, the mate, and a sailor detailed to bring down two dead tortoise. Hull, Beck, and myself were to collect. I found a tortoise which I sent down by the mate in place of a dead one. Sent Beck to explore a little valley at and above the head of the crater. He returned with a small tortoise, and said that he had seen five more big ones. Taking one live and one dead tortoise, and a bag of remains, we started for the boat, getting there about 4.15. Got about 75 birds. I decided, since we were all very tired and had considerable work to do, to go to Conway Bay and anchor till Monday morning, when we would return and secure the balance of the tortoises.

Sept. 10.—Put up about 75 birds.

Sept. 11.—Prepared tortoise and turtle.

Sept. 12.—This has been a day of rest. Rowed over to Duncan Island and Eden Island in the morning. Some of the tortoise have eaten and drunk. Black *males* of small *Geospiza* quite common on Duncan.

Sept. 13.—Landed on the weather side of Duncan about 9.30 a.m. The mate, a sailor and Drowne brought out one live tortoise and bag of remains. Hull, Beck, and I found and tied up six more. They are in an extremely hard place to get at. Worth 25 fr. a day to get them out, for each man—what all the party say each night. Will anchor in Conway Bay to-night.

Sept. 14.—Landed on lee side of the island quite early. Have decided to let Hull and Beck camp ashore for a few days, so we packed camp outfit to the top of the island, pitching tent, etc.; found six more tortoise; carried two large ones part way to the shore. Will anchor at Conway Bay to-night. I am going to let the mate and Drowne go ashore and camp and help work out tortoise. Do not feel well myself, and shall stay with vessel. Mate taking my place.

Sept. 15.—Made up the camp duffel and landed the mate and Drowne on Duncan about 9.30. The wind was light this morning, and we were a long time sailing over from Conway Bay. Will call for them Saturday afternoon, returning with the vessel to Conway Bay.

Sept. 16.—Laid about the vessel all day. The captain has been scraping

barnacle from the bottom of the vessel. This evening the volcano on James has been very active.

*Sept. 17.*—This morning went ashore in the yawl boat. Got some cactus for the tortoise to eat. Shot two ducks for dinner. Captain finished his job of cleaning the vessel.

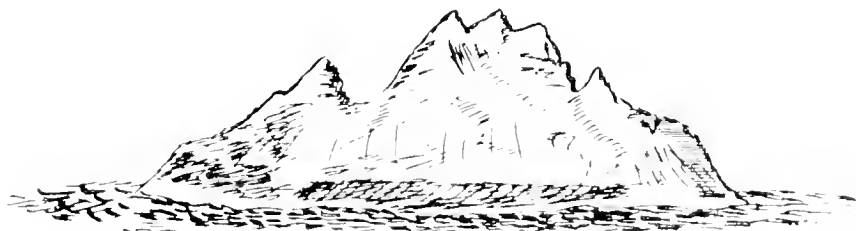
*Sept. 18.*—After dinner hoisted anchor and stood over to Duncan. The boys came off to the vessel about 3.30, bringing seven tortoise. They have eleven more tied up on the island. It will take them till Thursday night to get them aboard. Beck brought three rats, which he caught in traps. The boys say that owls kept them awake in the night with their screeching about camp.

*Sept. 19.*—Sunday: resting up.

*Sept. 20.*—This morning at 5.30 were under way for Duncan. Landed the boys about 8. They will camp on shore this time. Have been fixing tortoise pens to-day. The volcano is on a rampage to-night. (See pp. 93 and 114.)

*Sept. 21 and 22.*—Have rested. Tortoise eating and drinking well.

*Sept. 23.*—Weighed anchor after breakfast and sailed over to Duncan. We found on Duncan Island the trails of the tortoise from cactus to cactus—which they had travelled in their trips for food and water. In places where they had climbed



JERVIS ISLAND.

up on the rocks to get at water that had collected they had worn the rock smooth in places, cutting it several inches deep by continued wear, in the centre of crater where at times the water had settled and killed vegetation. It could be seen where the tortoise had gone in and wallowed about, the same as the American bison do. The tortoise were seen eating cactus, leaves from trees, grass, vines, and lichens on the brush. The boat came out with six tortoise about one o'clock, returning after the other five. On return of boat to the vessel headed for Jervis Island. Boys brought some crabs, bats, iguanas, lizards, and one centipede. Anchored in fifteen fathoms off Sand Beach, 5.45 p.m., at **Jervis Island**.

*Sept. 24.*—All hands collected on **Jervis Island**. We went over it thoroughly. Jervis is far the easiest to get about on. There is a small salt lagoon at the back.

*Sept. 25.*—Put up 105 birds to-day. Will sail for James Bay in the morning. Crew have been changing things over in hold, making room for the tortoise. Saw a large whale close to the vessel.

*Sept. 26.*—Began getting under way after breakfast. Had a hard pull getting in anchor. Arrived at James Bay 1.30. Anchored in seven fathoms. About 2.30 put out a boat and went to a place marked on the chart "a small run of fresh water." Found streams all dried up except a little place where a pint of water could be got a day. Found the skeleton of a man in a little cave on the side of a hill

Not finding water here will oblige us to slight James Island somewhat, I am afraid.

*Sept. 27.*—All hands landed early and collected till 11 a.m. I got a fine flamingo in lagoon. First seen. One of the lagoons is full of salt, and is evidently used by Mr. Cobos and vessels for obtaining salt. Signs of donkeys and pigs are abundant, but they must be in the high interior, where they can get water. Worked all the afternoon putting up birds.

*Sept. 28.*—All hands collected this morning and put up birds in afternoon. Got a load of cactus for tortoise. Trees larger here than any that we have seen thus far. The black *males* of *Camarhynchus* were more common here than on other islands visited. Beck and I shall be going into the centre of the island to-morrow.

*Sept. 29.*—This morning at five Beck and myself started for the interior of the island, leaving Hull and Drowne to collect and put up what birds they could. After a very hard walk, at noon we found ourselves on the top of the island. The vegetation is tropical in appearance, and if it were not for striking a pig-trail we could not have got in at all. We saw a number of hogs, and Beck shot a small pig. We also saw two very fine donkeys. Dark *Geospiza strenua* and *Pyrocephalus*, very common, and well up the mountains. *Pyrocephalus* very tame, allowing themselves to be knocked down with a gun-barrel. Secured a small mouse. At 1.40 we started for vessel (it was so wet that we could not camp for the night), arriving at beach at 6.20. I was very tired, and shall remember this as a very hard trip. Found the boys had put up about thirty skins.

*Sept. 30.*—Hoisted anchor after breakfast and started for Sullivan Bay; but the wind died out entirely, and at bed-time we had made no progress. Put in the day packing birds. To-day it has been very hot.

*Oct. 1.*—Still calm till about 3, when it breezed up, and in the night we arrived off Sullivan Bay. Laying-to till morning.

*Oct. 2.*—This morning at 8 we landed on the beach in Sullivan Bay. All this end of the island is principally lava. A few bushes and cactus are scattered about. Obtained about forty odd birds. They are in much poorer plumage than those at James Bay, being much worn. This is evidently entirely due to the rough, harsh nature of the surroundings. This afternoon we have been sailing towards Indefatigable Island. We are in hopes of striking water.

*Oct. 3.*—Spent the day beating up from off Seymour Island to Gordon Rocks, looking for water, as Pilot book says there is water on N.E. side of Indefatigable. Presume this is a typographical error, as there **is no water here**. They undoubtedly allude to a place called Puerte de la Agnada, twelve miles from N.E. end. About 4 we dropped anchor in 15 fathoms in the passage between rocks and mainland. Just as we were anchoring sighted a small boat in the passage with several people in it. Hoisted a flag and pulled over to the boat. Found an Englishman, T. Levick, with a Portuguese and an Indian from Charles Island. Invited them on board. They had supper and will sleep on the vessel. Levick says that Charles Island now has fifty people there. It is being colonised by a man by name of Gill, from Guayaquil. He says that it is almost impossible to get to the top of Indefatigable. He says there are donkeys, dogs and fruit away on the top of the island, and goats on Barrington. He gave us much information, which will be of use, in return for a little flour and tobacco.

*Oct. 4.* This morning early we bade our Charles Island friends good-bye. Landing about 7, we secured a few birds—mostly in worn plumage. Came on board



at noon, hoisting anchor after dinner and heading for Barrington. Took care of our birds in the afternoon.

Oct. 5.—Anchored at N.E. end of **Barrington Island** in 10 fathoms at 10 a.m. After dinner all hands went on shore to kill some goats. Beek, Hull, and I each killed one out of a dozen. We also secured a large land iguana and saw several more. This iguana lives in holes. Is a dirty-white in colour, with indistinct blackish patches, and has red eyes. This is the first island that we have observed land iguanas on. We saw a swallow with white belly, but were unfortunate in not getting it.

Oct. 6.—All hands collected this morning, getting about 55 birds. Beek got into a "village" of iguanas, and killed about 25. I saw, for the first time, to be reasonably sure of it, the *Progne modesta*. The swallow that I saw yesterday was probably the one seen by Baur at Indefatigable. Black moles of *Geospiza barringtoni* of Ridgway (= *G. scandens fatigata*) were quite common. Beek shot an owl on board vessel this evening.

Oct. 7.—We put up about 45 birds and secured a bat, also the first snake here—35 in. long, greyish ground colour, brown spots, gray gold eyes; also a large centipede. Took a picture of and afterwards killed with a stick a *Batorides plumbeus*, which came and stood on point of the vessel this morning. Last night Beek killed an owl on the vessel with a stick.

Oct. 8.—All four of us, with the mate and a sailor, went after iguanas, capturing ten alive, and getting a dozen which we skinned. The iguanas must be about ready to lay their eggs, as most of the *females* have nine to fifteen large eggs in them. Hoisted anchor at 4 p.m., and set sail for Chatham. (300 gal. of water left; no chance to obtain any to-day; have been looking for it, and must now go to Chatham.)

Oct. 9 and 10.—Arrived in Wreck Bay on **Chatham Island** yesterday, 1.30 p.m., dropping anchor in five fathoms off the Cobos Storehouse. Soon after we were boarded by Captain Barnhoff, master of a schooner which lays in the bay, belongs to Guayaquil, and is chartered by Cobos to carry sugar. Also the Ecuadorian Government representative on the island, and two other Spaniards, bringing a package of mails and a letter from Señor Cobos, inviting us to come up to the Hacienda, saying that there were horses at our disposal. After reading letters went ashore. The two captains, Hull, and I mounted horses and rode up the road towards the hacienda, about five miles from the bay. The road is a nice one, and about a mile below the settlement you come to a gateway with the words "El Progreso" above it. From here to the settlement there are large sugar-cane fields on both sides. Lemon, orange and fig trees line the roadside. On arriving at Señor Cobos' house we were met by him, and were entertained at supper and through the evening. Cobos is a typical Spaniard. His house is the only one of any pretensions; the others are all cane huts. He has a sugar refinery, and sells his sugar in Guayaquil. He has 800 acres of sugar cane, 1500 coffee trees; raises oranges, lemons, figs, yucca, cabbage, bananas, and some other tropical fruit. He has 500 tame cattle, and 1000 wild ones run over the island. Wild dogs abound on the island. We saw *Progne modesta*, also the other swallow, which is our American barn swallow. We saw a number of cuckoos (*Coryzus*). Señor Cobos has got a fine place here, and he is practically king. The rest of the population are entirely dependent on him. There is also an Ecuadorian Government official and some soldiers.

Mr. Cobos' engineer is a German. The hacienda looks much like a Californian ranche. Yesterday was a feast day, being the seventy-seventh anniversary of

Ecuadorian independence; and in the evening the peons were cutting up "high jinks," dancing in the "salon," and drinking native brandy. The four of us slept in one room, returning to the vessel about noon to-day.

Beck, Drowne, and the mate came up to the ranche early with cameras, and returned with us at noon. I contracted with Cobos for water, fruit, etc. Hope to get some shoes here, as we need them badly. The population consists of Ecuadorians, Peruvians, Mexicans, Negroes, Crosses, and a German.

Oct. 12.—This morning Beck, Hull, and Drowne collected about forty birds. Cobos and Superintendent took dinner with us at 1.30, Hull and I returning to the ranche with them. After we got up there Hull shot five ducks, which we presented to Cobos. I shot two swallows. They were flying about the sugar house. It is undoubtedly the same bird that I saw at Barrington, and that Baur saw at Indefatigable. Stayed all night at Cobos' house. During the evening he entertained us with guitar and song. After coffee Hull and I collected about the building and to the port. I shot two *Progne modesta* and three encoos, the first of the trip. *Geospiza* are not abundant on this part of the island. During the afternoon we put up nearly sixty birds. Have seen several *crickets*. Am quite sure last evening that I saw *Strix* fly by me!

Oct. 13.—This morning Hull and Beck collected about fifty birds. I was busy about other things myself all day. This afternoon the captain and mate went up to the farm, and will probably stay all night. Cobos sent down nails and box of lemons.

Oct. 15.—Yesterday morning all of us started at 6.50, and walked up to Cobos Farm. Collected till noon, a Señor Seri showing us about. Seri says that there are humming-birds on the island, flying around the coffee trees (? !). In the afternoon explored the top of the island on horseback. In the evening walked to the vessel. A hard, long day's work in the tropics: 20 miles walk, 15 on horseback. Curlew and turnstone were in the fields at the summit of the island. Ducks in a lagoon at the top. Cobos has been sending down water, vegetables, etc., as ordered.

Oct. 16.—This morning Hull, Beck and Drowne collected. Beck got a specimen of our bobolink (*Dolichonyx oryzivorus*). It was feeding with a flock of *Geospiza* on the beach near the storehouse. Cobos failed to send down the balance of water to-day; this will delay our getting away. We put up about sixty birds. I gave Captain Barnhoff a package of letters to be posted in Guayaquil. He sails to-morrow.

Oct. 17.—This morning I walked up to the hacienda to try and hurry the water down. Found it being loaded. Paid Cobos his bill and took breakfast with him. Both schooners hoisted anchors together, and Barnhoff beat us to north end of island. We hope to land on Chatham to-morrow.

Oct. 18.—Last night we drifted away and got to leeward of north end, and are spending all day in beating up. Such losses of time are very disgusting.

Oct. 19.—This morning we were able to land on the north of Chatham Island about 8 o'clock, and collected about 75 birds. The *Pyrocephalus*, *Butco* and *Nesopelia* were entirely absent from this part of the island. Started for Hood at 4 p.m.

Oct. 20.—Have been trying all day to beat by N.E. end of island, and have gained nothing. Put up our birds. One of the large tortoise died. None of the boys have been feeling well to-day.

Oct. 21.—Have been making fair headway towards Hood.

Oct. 22.—At 11 o'clock the vessel dropped anchor in 7 fathoms at Gardner Bay

on **Hood Island**. In the afternoon all went ashore to prospect and get a little goat meat if possible. Beck killed two. Four snakes were seen, two taken—brownish back, cream below, three yellowish white stripes. Got centipede and four owls. Very hard walking.

*Oct. 23.*—Beck, Hull, and I collected this morning on Hood Island. Got a nice lot of birds and lizards, and one snake. Put up about 70 birds to-day. We got a *Larus* not yet recorded on this island.

*Oct. 24.*—Did part of forenoon's work, then cleaned up.

*Oct. 25.*—Collected about 75 birds and put them up. Saw a *Progne modesta*. This afternoon the mate went after goats. Did not get any, but brought back three albatross' eggs, and reports a large colony breeding on the other side of the island. Will go there to-morrow. Hull secured a dove with a considerable amount of white on it.

*Oct. 26.*—All hands started for the interior of the island at 7; the mate after goats, the rest of us after the albatross. We found large colonies of them from the centre of the island, south and west. These albatross have evidently used this island as breeding grounds for many years, the out-cropping rocks being worn smooth by the feet of the birds. The birds are not breeding now, as the eggs which we secured had all been deserted. There are numbers of young albatross, about the size of a "grown" goose; feathers appearing much like those of an ostrich.\* There must be thousands of birds on the island. We brought back sixteen of them. They have a manner of fencing with their bills that is ludicrous and remarkable (see illustrations in Drowne's notes). We found on the south end of the island a colony of frigate birds breeding. Tropic birds quite plentiful. Secured eggs of *Sala variegata* and *nebouxii*. Marine iguanas very abundant and brightly coloured, black with greenish-yellow and reddish yellow blotches (see Plate V).

*Oct. 27.*—Worked all day putting up birds.

*Oct. 28.*—Seven of us made a trip across the island to-day, bringing back 20 tropic and 25 other birds, also eggs of the former, of *Creagrus*, *Albatross* and *Fregata*, *Sala variegata* and *S. nebouxii*. Had a very hard day's work.

*Oct. 29.*—Put up to-day over forty large birds. Have been wrapping birds in tissue paper, and find it excellent.

*Oct. 30.*—At 4 p.m. hoisted anchor and set sail for Charles Island. Will stop a couple of hours at Gardner Island, near Charles Island, on the way.

*Oct. 31.*—Arrived off Gardner Island at noon. Went ashore and stayed till 4 p.m. Got about thirty *Nesomimus*. *Sala nebouxii* and *Cyanops* were both breeding, also frigate birds. Tropic birds were common, probably breeding. One of the iguanas died to-day; they are not eating at all.

*Nov. 1.*—This morning found us off Black Beach Roads. At 10 a.m. we dropped anchor. Put up yesterday's birds during the morning. **Charles Island**. After anchoring Mr. Levick came aboard, and the captain and I went to breakfast with Mr. Gill. After breakfast Mr. Gill with several Señors and Señoritas came aboard, when we treated them to wine and bread. There are several tame flamingoes at the settlement. Mr. Hull also has some tortoise from Albemarle.

*Nov. 2.*—All hands, with Levick for guide, went to Upper Springs, six miles. Got over sixty birds, which we put up this afternoon. Got four species of *Camarhynchus*, *Pyrocephalus* and *Geospiza*, cuckoo, curlew, and plover. Saw one small butterfly. **No lizards seen on Charles Island!**

\* Unfortunately no young albatrosses were preserved!—Ed.

Nov. 3.—Hull, Beck, and Drowne collected in the morning till 9.30. Secured two swallows, the same as taken on Chatham. At 4 p.m. gave a dinner on deck for Mr. Gill and a half-dozen others. In the evening sent up some rockets, and Drowne favoured us with flute music.

Nov. 4.—The three boys collected to-day and put up birds. Mr. Gill sailed for Chatham to-day. I sent a letter to Cobos.

Nov. 5.—Collected all day, going to Plantation and Upper Springs. Hull and Beck got eleven *Certhidea*. **Certhidea are not recorded for this Island.\*** Nine have ebony-black bill, tarsus, and feet. I secured a bobolink which was very wild, and a swallow, and five martins. Beck found a nest of *Pyrocephalus*. One egg just hatching, one bird in down. Nest of moss, resembling Californian bush tit's nest. Egg ground-colour cream white, lilac and brown spots, ring about large end. Beck secured some live snail shells: first found.

Nov. 6.—Got four barrels of water, all that we can get. Saw a dozen penguins.

Nov. 7.—About ten went ashore and bade people good-bye. After dinner hoisted anchor for Post Office Bay, Captain Leviek going with us.

Nov. 8.—Went ashore early, hoping to secure a lot of flamingo, but found only one at lagoon, which we did not get. A hundred or more ducks were in the lagoon. We shot ten or more. Birds are scarce here, so I have decided to start for Albemarle without delay. The mate took Leviek back to the settlement in a boat this afternoon.

Nov. 9.—Last evening Otto returned from taking Leviek home. The captain wanted to know if I would get one of Mr. Hill's sloops for several weeks to go to Albemarle with us: he was afraid to go with his vessel, he claiming there was no suitable anchorage on the east side. I told him No! that I had hired his vessel for the trip, and I meant to go where I wanted to in her: that I was not unreasonable, and that I would not ask him to anchor in a place that was unsafe. . . . We left Post Office Bay before breakfast, and at 3 p.m. we were at anchor between Brattle and Albemarle. **Brattle** is too steep to get up on, so we shall have to skip it. It is scarcely more than a rock, and probably has not much on it, but sea birds breed on it.

Nov. 10.—**Albemarle Island.** All hands collected. We got seven flamingoes, and killed three more, which we could not get out of the lagoon. I found one tortoise, which we got aboard. Saw some large white herons. It is terrible getting about here.

Nov. 11.—Drowne stayed on board this morning to skin birds: the rest of us collected. Beck got a fine white heron.

Nov. 12.—Started back towards the interior of the Island; got back about seven miles. I secured an Albino *Geospiza*. We found a dozen or more tortoise, but it is very hard getting them out. A number of places where the tortoise had laid eggs were found, but dogs had dug out and eaten the eggs. Trails were observed here similar to those of Duncan Island. Beck and Drowne got entangled in a mangrove swamp, and it was long after dark before we got them out. We found birds very scarce. Beck shot a dove, which he lost in the mangrove swamp. Beck and Drowne also secured eggs of tortoise.

Nov. 13.—Took care of our birds to-day.

Nov. 14.—Sunday, and a quiet day.

Nov. 15.—Took the yawl-boat and made a trip to La Posa. Got flamingo, penguin, and *Sala*.

\* This is *Certhidea olivacea ridgwayi*, subsp. nov.

*Nov. 16.*—The boys skinned birds, and I went in yawl-boat to locate Tortugas Port. We found the place all right. There is a shanty and a few plantain trees. This is the place where Cobos' men secured the few tortoise which we purchased of Mr. Gill.

*Nov. 17.*—Worked putting up specimens in the morning; after dinner hoisted the large anchor, and then started to pull in kedge, which was out with 120 fathoms 5-in. rope cable. Found it caught in the rocks, and lost it with 12 fathoms of cable. After two hours' work got about a mile, and then the captain anchored again.

*Nov. 18.*—This morning pulled down to shanty, and collected all day. I shot at some cattle, but failed to get them. We tried to get back towards the mountain, but found it useless, so decided to leave for Iguana Cove. The wind is getting very light, and we must hasten things to get away before the calms set in for good.

*Nov. 19.*—This morning at 5 we started to get under way. There was a fair breeze blowing. We had no sooner got the anchor up than the wind died out and we had to drop it again. During the morning the captain made kedge and pulled the vessel ahead, and about noon caught a light wind and got shored, the tide taking us towards Iguana Cove. During the afternoon we saw an Albino *Anous*. Put out the boat and worked hard to get it, but were not successful.

*Nov. 20.*—Light wind and current took us off Essex Point during the night, but we were ten or twelve miles off the shore at dawn. A good breeze got us up to Iguana Cove about 10 a.m. The captain stood in four times to within  $\frac{3}{4}$  to 1 mile of the shore, and declared it was not a safe place, and would not anchor. I requested him to put out the boat, but he refused. I have lost much time in this manner. He now proposes to lay-to.

*Nov. 21.*—This morning it is calm, and has been all day. At breakfast we were ten or more miles off the island.

*Nov. 22.*—Calm again to-day, and we are a long way from the island. In the night the captain won't get nearer than 6 to 8 miles of the island; and before he can get to the place in the morning the wind is gone. He proposes to-day to leave the islands, as they don't want to get caught in calms. Had the boat out to-day, and collected 25 petrels.

*Nov. 23.*—Last night at 11 got a breeze, and at 12 headed for Iguana Cove. At 2 p.m. were below Christopher Point, and began tacking in hopes of getting to windward of the Cove by morning, so as to make a landing. We are not going to be able to do a great deal here. Hope that the wind will hold for 24 hours longer.

*Nov. 24.*—Wind very light last night; at dawn vessel was 15 miles off. The captain simply won't keep near land at night. The wind freshened during the morning, and we tried to make Iguana Cove, but we found it useless; so I told the captain to head for Webb Cove. We just about got to the Cove at 4 p.m.; the wind failed us, and we had to get away the best we could. The captain says he won't go to Elizabeth Bay, and almost refuses to go to Tagus Cove. I can't force him to go where he says he won't, and I am sure I don't know what to do. The only thing I can do is, to try and make him hold his ground here till we get a wind that will give him courage to try and go on. I told the captain that he would have to make Tagus Cove if it took a month to get there.

*Nov. 25.*—During the night sailed for Tagus Cove, around Narborough Island, and this morning were half-way there. We were favoured by wind and current till 4 p.m, when the wind died out; but we still made headway, getting within one mile

of Cove, when we had to lay-to on account of the darkness. Narborough is almost destitute of vegetation, and it will be almost impossible to do anything about exploring it.

*Nov. 26.*—This morning we were out at the mouth of Black Bight; it took us till noon to get up to Tagus Cove; got anchored in 10 fathoms at 2.30; took boat and hunted up watering-place, and prospected around a little.

*Nov. 27.*—Collected this morning till 10. I shot at and wounded a small falcon, about the size between sharp-shinned hawk and duck hawk.

*Nov. 28.*—We all went up the mountains to-day, and got forty birds. Saw signs of tortoises; but they must be very scarce, as we did not see any.

*Nov. 29.* Put up birds in the morning; collected a lot of sea-birds in the afternoon.

*Nov. 30.*—Put up birds; collected penguins and sea-nrchins.

*Dec. 1.*—To-day ushered in by severe S.E. squall. Worked on penguins; they are very fat.

*Dec. 2.*—Collected land birds. Hull shot a cuckoo, but it was too bad to save. Beck saw another, but could not get it.

*Dec. 3.*—Packed birds, loaded ammunition, etc. In afternoon went to Turtle Mount, got five turtles, iguanas, birds, and a mess of ducks for dinner.

*Dec. 4.*—Put up birds, and in the afternoon the boys got some iguanas.

*Dec. 5.*—Sunday. Rested.

*Dec. 6.*—Went to Narborough in yawl-boat to-day; got about thirty land iguanas. Iris a yellowish white spangled with gold, as in some fish. Much more shy than Barrington iguana.\* Shot four **Cormorants** (*Phalacrocorax harrisi*). The birds were in the surf, and very hard to get; a dozen or more seen. I noted that they appeared to be able to remain under water when they dive longer than any birds I have seen. In diving they jump out of water like a porpoise.

*Dec. 7.*—Put up birds in the morning, and in the afternoon worked on iguanas. After supper a bat flew about the vessel, and was wounded by Beck; but we failed to get it. This is the only bat that we have seen on the trip.

*Dec. 8.*—Worked on iguanas all day. About 5 p.m. the English cruiser *Leander* and torpedo destroyer *Virago*, steamed into the Cove, and anchored close to us.

*Dec. 9.*—In the morning the boys collected iguanas and star-fish, and got cactus for tortoise. In the afternoon the officers came aboard and looked at curios, and invited me to dinner; also offered to take letters to San Diego. Passed a very pleasant evening aboard the cruiser.

*Dec. 10.*—English vessels steamed out about 9 this morning. One of the lieutenants came aboard just before leaving, bringing the commander's compliments, with some novels and papers.

*Dec. 11.*—Tried all day to get away, but the wind was too light.

*Dec. 12.*—Not wind enough to get away to-day.

*Dec. 13.*—Tacked out on a S.E. wind about 10 a.m. Wind N.W., and tacking to go round north head.

*Dec. 14.*—Have not made any headway to-day. Wind mostly S.W., and light. Drifting N.W. During the afternoon we sighted a square rigger between us and Redondo Rocks, heading towards Black Bight.

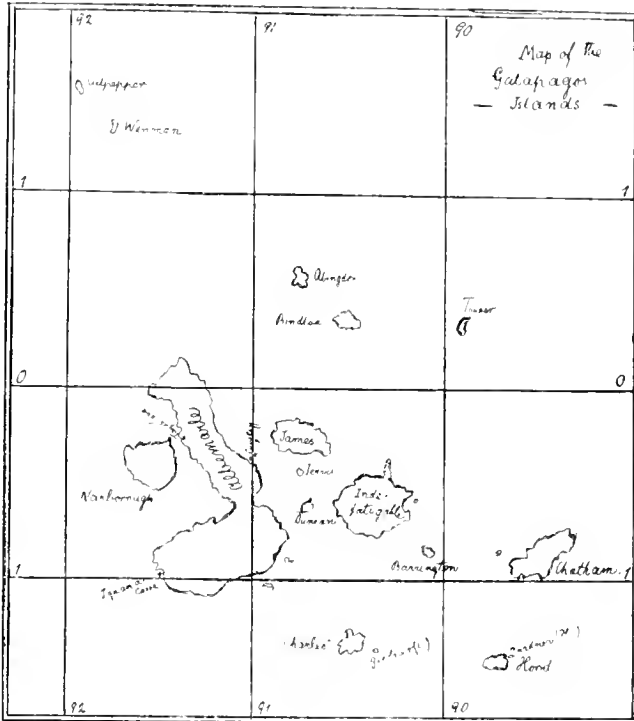
\* These are very remarkably coloured, and belong to a distinct local form, which we propose to name *Crotaphus scheristatus pictus* subsp. nov. (see p. 133).

*Dec. 15.*—Don't gain anything. Winds light, and drifting N.W. In the afternoon Beck shot from the vessel an unrecorded gull. Feet and legs black; bill bluish, none back of tip; eyes medium brown. ♀.

*Dec. 16.*—Same old story. Head S.E., drift N.W.

*Dec. 17.*—Some wind all day. At noon Redundo Rocks bore S. instead of S.E., as it has several days.

*Dec. 18.* This morning I found an egg in Tortoise Pen. 4 p.m. finds us 6 or 8 miles due N. of Abingdon Island. At supper the Captain said we had better get out of this. He fears being becalmed. I told him there was a month yet to reach Tower. Saw three Culpepper terns last night, evidently bound for that island.



*Dec. 19.*—Strong head wind all day. At 5.30 p.m. about 10 miles N.E. of S.E. point of Abingdon.

*Dec. 20.*—Wind S.E., sailing E. Drifts N.E., sailing S.W., and drift N.W.

*Dec. 21.*—Same thing.

*Dec. 22.*—Same.

*Dec. 23.*—Found at noon that we had made some progress to the southward, and were just east of Tower in long. 89° W. Wind has been pretty steadily S.E. since the 20th. This afternoon southerly.

*Dec. 24.*—At noon, long. 88° 51'; lat. 1° 28'.

*Dec. 25.*—At 8 a.m. sighted **Tower Island**, 15 miles N.W. Anchored off the north end at 3 p.m. Got cactus for tortoise. They were pretty hungry.

*Dec. 26.*—Collected over ninety birds. Put up some thirty in the afternoon. Boobies, gulls and frigate birds are breeding here.

*Dec. 27.*—Collected about 150 birds. Got a lot of caetus for tortoise. Have decided that there is too much risk in trying to reach Coeos Island. Main reason, if becalmed for a while we should lose the tortoises, run short of food, and have trouble with captain and crew; so in the morning will set sail for California.

*Dec. 28.*—After considerable delay got under way at 8 a.m. Worked all day putting up birds. The distance sailed from Tagus Cove to Tower Island by log registered 1400 miles; true distance 110 miles; the difference lost by drifting! Reached San Francisco on February 8th, 1898.

### III.

#### NOTES FROM THE DIARY OF MR. F. P. DROWNE.

(Although the diary of Mr. Drowne is very often a repetition of Mr. Harris' notes, we preferred to publish it—with some omissions—nevertheless, as it contains many interesting notes. The sketches are all from photographs, the albatrosses drawn from life.)

*June 21, 1897.*—Left port of San Francisco. Saw many cormorants, gulls, Californian murrets, etc., around the boat. Began to feel sick soon after starting.

*June 22.*—Quite sick. Beating around in the neighbourhood of the Farallones.

*June 23.*—Much sicker.

*June 24.*—Quite sick in the morning, but began to feel better in the afternoon. Passed Santa Barbara and Santa Cruz Islands.

*June 25.*—Felt better. Quite a stiff breeze, and out of sight of land.

*June 26.*—Passed Guadalupe Island, a high, rocky land, and apparently barren, with the exception of a few trees at one end.

*June 27.*—Out of sight of land. Saw specimens of the "Spanish man-of-war" floating on the surface.

*June 28.*—Hull caught a large bundle of goose barnacles resembling *Lepas fascicularis*, larger than I ever saw on the New England coast. The water was full of these bunches, and there were many "men-of-war" passing by.

*June 29.*—Felt quite sick in the morning, but took a bath after dinner, and felt much better. Ate a good supper—my first meal since we left San Francisco. In the evening felt well enough to play the flute for a while. The "Spanish men-of-war" covered the water, and were visible in the moonlight for a long distance.

*June 30.*—Felt like myself again. Saw a red-billed tropic bird, which circled around the vessel a few times. Not much wind.

*July 1.*—Beck shot a pair of red-billed tropic birds (*Phaethon rubricauda*), and two shearwaters; also found a small crab attached to log-line, an adult female with eggs. Each of the party made up one skin. Later Hull shot another tropic bird (eye very dark brown, feet a greenish white and black). Harris shot two red-footed boobies (*Sula piscatrix websteri*), (eye hazel-brown, feet salmon, around eye violet blue, naked pouch nearly all black, around base of bill a light pink, bill very pale horny green).



July 2.—Birds very numerous ; several boobies were shot, also three frigate birds. The latter were so poor in plumage that they were abandoned. Came in sight of **Clarion Island** at about 3 p.m., and at 5 the island showed up quite plain. Boobies and frigate birds were very tame. Towards dark the vessel was “hove-to,” it not being thought safe to anchor.

July 3.—Had drifted during the night a considerable distance from the island, and it took till noon to come to an anchorage. **Clarion Island**, lat. 18° 20' N., long. 114° 44' W., belonging to Mexico. Beck took a photograph of the island from N.E. to S.W. We came to anchor off the west shore, where there was a sandy beach. The boobies came off in numbers and lighted on the higher parts of the rigging. One could see many thousands of them on the island in different “rookeries.” On the N.E. edge of the island was a remarkable monument rock, and near it an arch surmounted by several spires. The skiff was got out immediately after coming to anchor, and Harris and myself embarked, I getting on the island first. Almost immediately I saw a small lizard, about 6 in. long, of a greenish blue colour, sunning himself on a rock ; and Harris found several blue-faced boobies (*Sula cyanops*) sitting on their nests. Upon the arrival of Hull and Beck we set out, following a winding trail in order to avoid the cactus with which the island is about half covered (2 or 3 ft. high). Ate luncheon near a colony of the blue-faced boobies. The birds were sitting on their nests, some containing young nearly fledged, others very young, and still other eggs. They showed their dislike of any very near approach by a continuous whistle, or else a cry resembling “krack” made in their throats. A small wren (*Troglodytes tanneri*), extent 7.51 in., length 5.51 in., was shot soon after landing, and a snake 4 to 5 ft. in length was taken. After luncheon work commenced in earnest, and many birds, snakes, etc., were collected. The birds, so far as noted, were red-footed and blue-faced boobies, frigate and tropic birds, ravens, doves, wrens, and burrowing owls, of each of which a good series were secured. The red-footed and blue-faced boobies were the only birds found nesting, and they as aforesaid had all grades of young. The red-footed species was found nesting in large heavy bushes ; the nests, which were composed of pieces of dried twigs loosely placed together, from 3 to 6 ft. from the ground ; only a single egg was found in a nest. The old birds were induced to leave their nests with great difficulty, and then only flittered to the ground, and in most cases disgorged their last meal. The naked parts around the eye in the young birds, together with the bill, were black. The blue-faced boobies nested on the ground ; several sets of two eggs were taken. There were many frigate birds flying over the island, and occasionally one would chase a booby, tormenting it until it disgorged. The ravens were quite numerous, and several specimens were secured, although they were more wary than the other birds. Those secured were in very poor plumage.\* The doves were very numerous and tame, all of them being secured with the auxiliary barrel. They were found all over the parts of the island that were visited. It is the *Zenaidura clarionensis*. The wrens were also very abundant. They had a pleasant song, and were also very tame. Several nests supposed to belong to this species were found in the bushes about 3 ft. from the ground. The burrowing owls† were found abundant, and a good number of specimens were secured. Their burrows extended down several feet in the light sandy soil of the island. The blue-faced booby builds no nest ; eggs laid on the ground in a slight depression. Two species of snakes were found. They

\* Unfortunately none were preserved!—Ed.

† *Speotyto cunicularia rostrata*.

appeared to be quite common. Two species of lizards were also secured: these little fellows, measuring about 6 in. in length, were very numerous among the rocks, where they jumped or ran actively about when approached. Large turtles and fish were plentiful about the island, and one large turtle was harpooned: some turtle soup and curry made from it proved to be very good. [Green sea turtle.]

*July 4.*—Repeated the same operations as on the previous day. Secured an addition of many of the boobies' eggs and specimens of the birds, which we knocked off their nests with sticks. One species of spider, black, and spread legs, all about 1 in. Three species of butterflies,\* several grasshoppers, bees and wasps. Left Clarion at 3.30 p.m.

*July 5.*—Commenced to skin the birds that had been secured. Weather very hot.

*July 6.*—Skinned boobies. In the evening one of the sailors crawled out to the end of the flying jib-boom and caught a red-footed booby which had been resting there most of the afternoon.

*July 7.*—Finished putting up Clarion Island material. It rained yesterday for the first time since we set out.

*July 8.*—Weather very hot with a little wind. All worked on the boobies' eggs. The eggs varied a great deal in size and shape, and presented all stages of incubation. A few tropic birds flew around the vessel.

*July 9.*—Weather very hot.

*July 10.*—Weather very hot. 6 a.m., temperature 80° in cabin, 84° on deck. Had a shower at noon, but it cleared off and became as hot as before in 30 minutes. Saw two petrels, which approached nearer to the vessel than any seen before. The flight resembled very closely that of a bat. Noticed many flying fish. They flew from 50 to 150 ft. at a time. They usually flew against the wind, or quartering to it. They frequently strike the water in their flight, resembling a shell skipping on the water.

*July 11.*—Rainy—a little breeze.

*July 12.*—Rain. A good breeze started in at 9 a.m., and continued all day and night. The temperature of the water at 4 a.m. was 80°.

*July 13.*—Saw a pair of albatross in white plumage. Breeze continued all day.

*July 14.*—Rained most of the time between 8 and 12, and then wind died out.

*July 15.*—Calm prevailed most of the morning, and rain at intervals. Breeze freshened in the afternoon.

*July 16.*—Large school of porpoise passed the vessel at about 4.30 a.m. Considerable rain.

*July 17.*—Quite a big sea on in the morning, and the decks were kept drenched by the spray and the water that came through the scuppers. Breeze continued very steady all day.

*July 18.*—Fine steady breeze all day.

*July 19.*—Fine breeze. A frigate bird came around during the morning watch, and spent about five minutes in trying to eat the truck on top of the main mast.

*July 20.*—Early in the morning a flying fish came aboard. A school of porpoise passed under the bow. A fine breeze all day. Weather very chilly in the evening. Saw a large turtle.

*July 21.*—Weather about the same. Saw another turtle.

*July 22.*—Breezless. The mate struck a couple of porpoises, but failed to secure them.

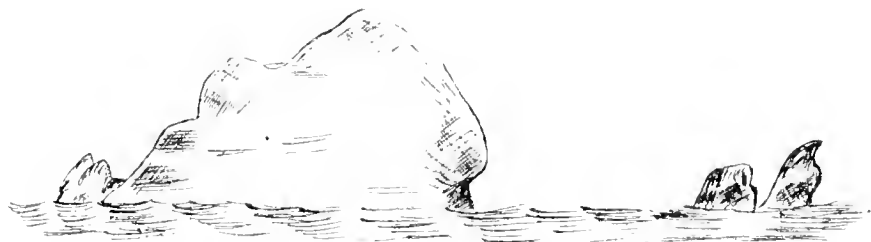
\* One *Papilio troilus* (1 subsp.) and two *Lycaenidae*

July 23.—Fair breeze all day. At noon we were exactly two hundred miles from Culpepper Island, Galapagos group.

July 24.—Made very good progress. Came within fifty miles of the island. Birds were numerous.

July 25.—Found that the vessel had drifted during the night, and that we were sixty-five miles from the island. Made very slow progress, there being very little wind. Birds were numerous. Two species of tern observed (*Anous stolidus galapagensis* and *Sterna fuliginosa*)—one very abundant—and large flocks of them flew around the vessel, uttering their harsh cries. The black-headed gull, peculiar to the islands (*Creagrus furcatus*), was also out in numbers, and frigate birds, tropic birds, petrels, shearwaters, and sandpipers were noted. In the afternoon a flycatcher (*Myiarchus*) came aboard and lighted on the rigging, where he was caught in a net by Harris. The bird seemed very tired, and had evidently come a long way.

We came in sight of **Culpepper** at about 3.45 p.m., it being then about fifteen miles distant. The island was very bold and rocky in outline. As the distance diminished, cactus could be distinguished on the top and sides, and the white guano of the birds. The sides were almost perpendicular, nearly everywhere. On the top small bushes were seen. There were several caves in the lower parts of the



CULPEPPER ISLAND AS IT APPEARED FIFTEEN MILES OFF.

sides. Thousands of sea birds were flying over the top of the island, the air being fairly black with them. After running in close to the island, the vessel was put about, and we stood off for the night.

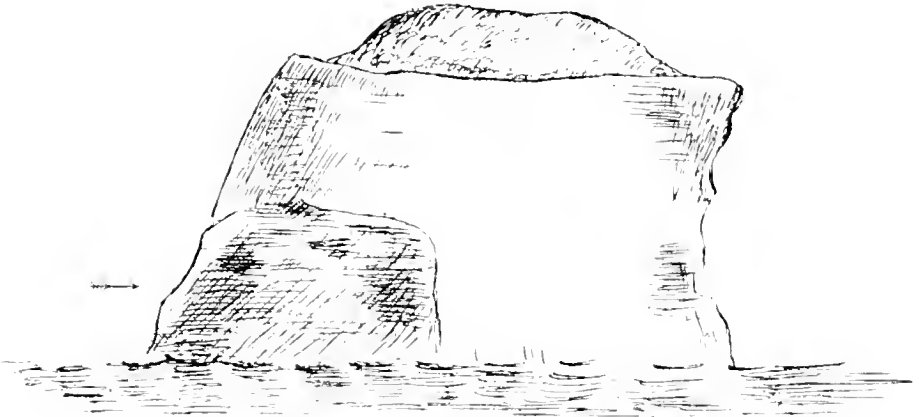
July 26.—From there we had drifted off a long distance with the current. **Wenman Island** was the next land sighted, and it resembled Culpepper in general outline. We steered for **Culpepper**, and arrived there about 8.30 a.m., where Harris and Hull were put off in the skiff, while Beck and myself remained on the schooner, which stood off and on near the island, it not being possible to anchor. Saw several seal (probably the fur seal), which swam around the vessel several times, coming up every few seconds to breathe. Saw one small turtle, 2 ft. long, and a shark. Saw a very few adult male frigate birds (entirely black), the proportion being 1 to 50 of the grey or younger plumage.

The little petrels were much tamer than those observed farther out, some of them approaching within five or six feet of the vessel.

Harris and party returned with a seal, some shearwaters, petrels, boobies, black and white terns, frigate birds, gulls; and also some land birds—loves, several species of finches, a sandpiper, mocking bird, and one warbler. Birds of several species were breeding. Frigate birds had their nests on the ground between the rocks, there being only one egg. The black tern were nesting in the rocks along the shore.

Iguanas of all sizes were abundant. The seal was the only one secured out of six or eight seen. No insects were seen except a small fly.

July 27.—Skinned birds all the morning. Immediately after dinner we got ready to go ashore, Beck and myself taking our guns. After a long and hard pull against current, wind, and tide, we were landed at the same point as yesterday's party. Harris shot two seals, one of which managed to get into the water, even with two bullet-holes through him. Doves (*Nesopelia galapagensis casul*) were very numerous, and could be killed with stones. The finches were also very abundant, and seemed to like equally well the bare rocks along the shore and the vegetation higher up. Two or three specimens of the warbler were obtained. A slate-coloured fern (*Anous stolidus galapagensis*) was as thick as could be in some places, nearly covering the tops of the rocks. The nests of the frigate birds, composed of twigs, were placed among the rocks everywhere, while the young boobies kept up a continual squeaking from their nests in the bushes. Several shearwaters' eggs were taken. The one nest that I found was under a rock, almost



N.E. SIDE OF CULPEPPER ISLAND.  
(All the collecting was done on the slope to which the arrow points.)

concealed by a pea vine. The cliff all the way up was covered with terns, gulls, and frigate birds. Some smaller crabs were feeding on young birds that had met with an untimely end. Shot a couple of red-billed tropic birds (*Phaethon aethereus*), which were in much better plumage than those secured some time back, the bills being redder and the tail feathers longer.\* Many sharks were observed. The gulls were very numerous. The island is composed of sandstone and lava. It is rather dangerous in getting about in parts, on account of the softness of the stone, which sinks beneath one's weight. Shot twenty more birds—doves, finches, warblers, and one frigate bird. Left the island about 5.45, and reached the vessel at dark.

July 28.—Skinned birds all day.

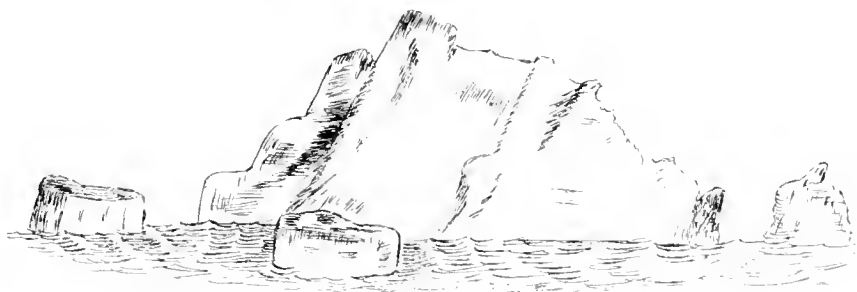
July 29.—All of us started to Culpepper before 9 a.m. Hull and myself were landed with instructions to get some frigate birds, boobies, gulls, etc. Harris and Beck kept around the shore awhile, and picked up three tropic birds, some terns and petrels. Immediately after we landed Hull and myself saw a large seal. When

\*Those found near Clarion Island were *P. rubricauda*.—ED.

first seen he was asleep, but our footsteps awakened him, and he straightened up and looked at us rather curiously, and then began to move towards us. I got a little on one side and put a charge of No. 4 shot through his head, which made him bellow loudly. Hull finished him with another shot. Iguanas crawled around the rocks with an awkward movement; all that I saw moved slowly. At lunch we all met again. The other party brought in a fur seal. After lunch I caught a few crabs, which were numerous.

Later on I went with the mate of the vessel on a dove hunt, on one of the side hills. We managed to kill a dozen with stones. Beek saw an owl, resembling our American short-eared owl. We left the island shortly after, and skinned a few birds before supper. It was quite interesting to watch the frigate birds chase the boobies and shearwaters, trying to make them disgorge their last meal. The frigate birds frequently kept up their chase five minutes or more, pursuing their victim closely wherever it turned. Gulls numerous. We collected quite a number. They had a peculiar way of commencing their cry: first making a sound resembling greatly the chirp of a cricket, the note then resembling that of other gulls. The tropic birds kept up a continual screaming.

July 30.—Skinned birds all day.



WENMAN ISLAND.

July 31.—Sailed to **Wenman** during the night. Early in the morning started out in a skiff. The water around the island was very smooth, and near the shore was full of brightly-coloured fish—some blue, green and yellow, and others striped with various colours. Large sharks followed the boat everywhere, and at times as many as ten could be seen (sizes 8 to 10 ft.). At the first landing-place a fur seal appeared, and upon being shot fell down near the water, where he was secured later, after a few blows with a club. The first shot started several more seal out from the rocks. Iguanas of all sizes were sunning themselves. Gulls (*C. furcatus*), terns (*A. galapagensis*), and frigate birds were **very** abundant. The boobies were also fairly numerous. After pulling along the shore and starting out some fifteen or twenty seal, we landed, and after a short climb reached the top of the island. Cactus was very abundant. The top of the island was covered with bushes about 6 ft. high, in which were nesting boobies and frigate birds. Some of the frigate birds had the gular pouch swelled up as large as a two-quart measure, looking exactly like a blown-up bladder, bright red in colour. Finches were very abundant, there being about as many as were seen on Culpepper. Mocking birds (*Nesomimus*) were more abundant than on the latter island. Doves were evidently quite scarce, only ten or so being seen. Several specimens of *Certhidea*.

A heron resembling the green heron was obtained, and several tattlers observed. In one spot on the top of the island we found about a dozen trees, 20 ft. or so high, resembling somewhat our wild apple. No insects were noticed on Wenman, with the exception of one grasshopper. The little shearwater found on Culpepper was found here also. The island consisted of three parts—viz., a small high rock, a low bare rock of considerable size covered with vegetation, and the main island (the only one visited to-day). This was much the same in appearance as Culpepper; one end was covered with vegetation, cactus bushes, grass, and a few dried dead trees; the rest, as far as observed, was merely a narrow rocky ridge. We saw here a couple of doves on the side of the cliff, evidently getting water. Probably enough rain-water is caught in the hollows of the rocks to sustain what birds live on the island. Shot altogether about sixty birds, which we skinned after getting back to the vessel.

*Aug. 1.*—Harris, with the mate and a sailor, went to the island after seal, while the rest loaded cartridges and attended to other matters. They brought back several seal.

*Aug. 2.*—Owing to lack of wind we were not able to land. There being no anchorage, the vessel has to lay off and on, standing off for safety several miles at night, and the wind dying out could not sail back.

*Aug. 3.*—Not much wind; we were unable to get to Wenman. In the afternoon Hull and Beck went out in the skiff. Harris and myself remained on the schooner. Together we got over twenty birds—petrels, shearwaters, and terns. They secured also a large green turtle, which they found asleep and shot.

*Aug. 4.*—All got into the skiff and went to Wenman. At first Harris and Beck climbed up the side of the island—the low flat one—and on the top, which is level, found birds (land) very plentiful—the same species as found on the main island. We saw quite a number of fur seal around the sides of the island; then proceeded to the main island, but were unable to land where we wished, on account of the very heavy swell. At the same place where we landed the previous time there was a better chance, although the surf was very heavy there. After eating luncheon we went ashore. Hull and myself climbed to the top, and collected a dozen birds each. Stayed there a little over an hour, and then put back to the schooner, securing a turtle on the way. There were many iguanas of all sizes. Among the rocks two species of sea urchins were found, and quite a number of shells. Harris found a centipede about 4 in. long. I noticed several small sea anemones in a small pool among the rocks. Fish were very plentiful, especially one species, averaging 10 to 15 lb., which were so abundant that a skiff-load could be caught in 10 to 15 minutes (looked something like a cod). They were an excellent fish for eating. Noticed some of the finches climbing on a booby's back and pecking in the feathers—probably in search of parasites. **Saw three finches on one booby at a time.** Red-footed tropics, tattlers, and black tern quite abundant on Wenman. Saw no tracks or indications of tortoise. Upon reaching the vessel we headed for our next port—Abingdon.

*Aug. 5.*—Skinned a few large birds that were left over—one that fell to my share being a frigate bird. Length, 4 ft.; extent, 8 ft. No wind during the day.

*Aug. 6.*—No wind. Had drifted farther north than Culpepper. Vessel headed S.E. made several miles directly N.W., owing to strong current.

*Aug. 7.*—Drifted about generally; not able to take observations, as there was a thick fog.

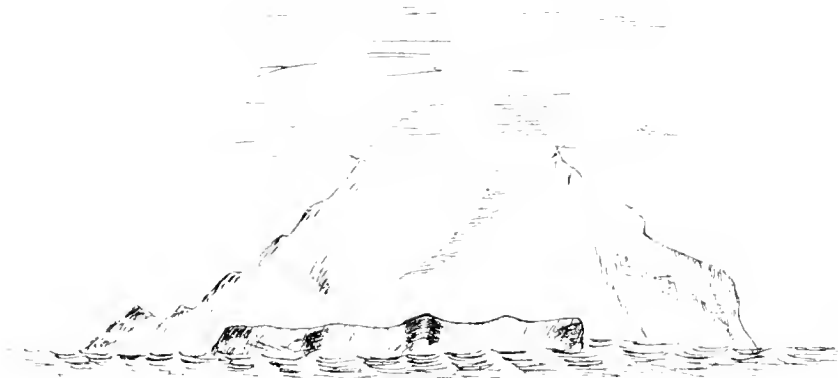
Aug. 8.—The morning was very cloudy, and the sun when rising looked very much like a fire opal. First one half appeared, then the other, but one half being visible at a time. It arose from the water, and disappeared in 3 or 4 minutes. A little wind, but made slow progress.

Aug. 9.—Calm prevailed during the morning, but in the afternoon a good breeze sprang up, which lasted until 12 at midnight. Passed through the largest school of porpoise since starting—a thousand might be a fair estimate.

Aug. 10.—A little wind early in the afternoon, which gradually freshened to a six-knot breeze. Saw a sperm whale at 5.15 p.m. The man at the wheel sighted land—probably the northern end of Albemarle.

Aug. 11.—Drifted around all the morning, the wind having died out during the night. Albemarle was still visible. In the evening sighted **Abingdon Island**.

Aug. 12.—The wind, which had continued all night, nearly died out in the morning. At dawn Abingdon came into view, but the morning was misty, and it did not show up plainly. The breeze freshened again a little later, and at 9.30 a.m.



ABINGDON ISLAND

the island was plainly seen. At 12.30 the mate and one sailor took the skiff and started to sound. They found an anchorage about 300 yards off shore. Many seals, large turtles, and sharks could be seen from the vessel, together with several species of birds new to us, including the gull (*Larus fuliginosus*), and one pelican, which Harris shot with the rifle. In its pouch were found about twenty-eight small fish ("sardines"). At 3.25 p.m. the anchor was dropped, and sails furled. It then being about supper time, we postponed going to the island till next day. On a small sand beach to the left of the anchorage a number of seals were playing, now wandering up the beach, moving their heads from side to side at each step, and then rushing into the breakers head first. In the water they swam on one side or on the back equally well, coming up every few seconds with a puff to take breath. Frequently they jumped out of the water from underneath the swells, exactly like the porpoise. Their cry while playing on the beach resembled at different times the bark of a dog, bleat of a calf and of a goat. Some land birds were heard, and a hawk was noted sailing over the island. The side of the island visible from our anchorage was well covered with vegetation, bushes, etc. While sounding a shark took the lead from the end of the line. There were several little sand beaches at

the foot of the low cliffs, and a rocky beach all the way along. A song resembling that of the cricket was noticed during the evening coming from the sides of the cliff.

Aug. 13.—Went ashore at a landing place about  $1\frac{1}{2}$  mile above the anchorage, at 7.30. The island was covered with several kinds of cactus, some tall, with thick trunks. There were also trees of good size, which were either entirely bare, or covered in part with long moss [orchilla]. Bushes averaging 4 ft. in height. Finches of several kinds were very abundant, and the dove (*Nesopelia galapagensis*) was everywhere. Hull counted thirty-five in one tree. Several *Pyrocephalus* were seen, and some *Miarchus*, also a few *Camarhynchus*. Hawks were quite abundant, and quite tame. Two species of lizard were obtained, both of which were quite common. The entire northern end of the island is bare land. I lost myself, but I got aboard the schooner at 5.30 p.m.

Aug. 14.—Skinned birds all day. Mate went ashore in skiff, and brought back some shells and urchins.

Aug. 15.—Went ashore a little after 9 a.m., at the beach opposite our anchorage. Secured a lot of shells, clubbed spine urchin, and one small green-spined urchin, and black-spined urchins, the clubbed spine urchin being very abundant. Chitons were also very abundant, and three species of star-fish were secured, one of which was common. Sea-anemones were abundant on the rocks, and several species of pretty coloured fish hid in the little rock pools. Iguanas of several sizes, including many large ones, fairly covered the tops of the rocks, and now and then a seal pushed its way in through the surf. Harris shot several birds, including three of the little heron, and a sandpiper. Towards 5 o'clock the lines were dropped over the side, and fish bit lively; several heavy ones were landed.

Aug. 16.—Prepared the urchins, star-fish, etc., in the morning, while the rest went to the south end of the island. On their return began to skin birds, I working at it till supper time. The weather was very pleasant.

Aug. 17.—Started to Friday's landing, and began collecting. Secured a heron (*Butorides*), gull (*Larus*), tattler, and ten or more finches. Noticed the finches feeding on cactus leaves, which had fallen to the ground. These must be almost moist enough to take the place of water. Also noticed ten or fifteen black iguanas (*Amblyrhynchus cristatus*) in the water swimming towards a rock (which was 100 to 150 ft. from shore). They were about 25 ft. from it. The rock was covered on the top with the iguanas. The mate caught some very pretty "bottom" fish.

Aug. 18.—Went to "Drowne's Landing" (as the boys named it, in remembrance of my misfortune), secured about twenty birds each, and left the island a little after 10.30, reaching the vessel in time for dinner. In the afternoon pulled up the anchor, and about 3 set sail for **Bindloe**, which was to be seen plainly. General conclusions regarding Abingdon are as follows: Abingdon is an irregular rocky island covered with more or less vegetation, except on the northern end, which is a barren lava bed. The vegetation consists of trees varying in size from 8 to 40 ft. in height, bushes of several kinds, and several varieties of cactus. Iguanas and two species of small lizards were very abundant; hair seal, fish, and turtle are also abundant. Noticed a lurid reflection in the sky last night, which was thought to be a fire of some kind on James Island.

Aug. 19.—Nearly got out of sight of land. Fixed up a few birds that were left over. Loaded ammunition, cleaned guns, etc., all the morning. Came in sight of Bindloe again at 2 p.m., and sailed right up to it, the wind dying down when we



were a short distance off the north end. The island is like Abingdon, the north end covered with lava.

Aug. 20.—Tacked around the island all the morning and the first part of the afternoon, there being a fine breeze. Came to an anchorage at 4.30 p.m., on the north side of the island, in 11 fathoms. There were several sand beaches along the shore, on which hair seal were playing in numbers. *Procellaria*, *Aestrelata*, and *Puffinus*, two species of boobies, frigate birds, tattlers, black terns, gulls (*Larus*) were seen around the vessel. In the evening, soon after supper, Harris, with a couple of sailors, went ashore in the skiff after a large hair seal, which we saw waddling up the beach; but it managed to escape.

Aug. 21.—Went ashore at 6.30 a.m. collecting. Found *Certhidea*, *Nesomimus*, and two species of *Geospiza* quite abundant. One other *Geospiza* and *Camarhynchus* also occurred, but were more scarce. Specimens of the warbler and *Myiarchus* were taken. I got a pair of oyster-catchers, and noticed "wandering tattler," curlew, heron (small), and turnstone, all of which, except the heron, were shy. The dark gull (*Larus*) was quite common. Numbers of the hair seal, together with big iguanas, lay on the rocks, sunning themselves. A long vine, covered with bean pods of large size, was very abundant. No shells or other marine animals were found on the rock or anywhere near the landing; but on the sand, from 25 to 40 yards back



BINDLOE ISLAND.

from the water's edge, the tests of a green spur urchin were abundant, about two hundred being picked up. I saw no insects except grasshoppers. Two species of crabs were quite common. Turtles seemed quite plentiful along the water's edge.

Aug. 22.—Went ashore at 6.30. Harris and Hull set out to cross the lava, while we went down to the beach. Found the sea urchin tests abundant in spots, together with crawfish shells, also dead shells of several species. Saw turnstones and yellow crowned night heron. Mate picked up a cocoanut on the beach, and bamboo poles (?) were quite frequently seen (on beach). Went aboard quite early. Other party returned at 3 p.m., bringing two specimens of another *Camarhynchus*, one new sparrow, and one flycatcher (*Pyrocephalus*).

Aug. 23.—Went on shore early and picked up a few birds. I got eight mocking-birds and another oyster-catcher. Came on board quite early. Hauled the anchor and set sail. Just before dinner weather very rough, and all our party felt rather bad, but Beck, Hull, and myself skinned part of the birds.

In general character Bindloe Island is a barren lava field, covered in patches with vegetation, thorn bushes, trees, and grass, but no cactus—this being true of north and south end. The two small finches were numerous, also the *Certhidea* and *Nesomimus*, but the rest of the land birds were rather scarce.

Aug. 24.—Weather very rough. The vessel had been heading east by south all night with a good breeze, in spite of which fact it made fairly good time east by

north. Same weather continued all day, and the main deck was kept continually wet. Bindloe was in sight all the afternoon. Rather chilly.

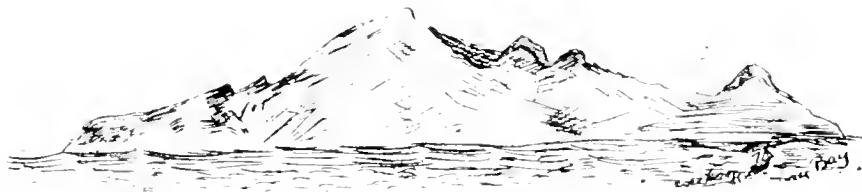
Aug. 25.—Fairly strong wind blowing, but sailed all day without seeing land.

Aug. 26.—Condition of affairs about the same.

Aug. 27.—Still sailing without any result. Our position at noon was 82 miles from Tower Island, the island bearing south-west. Temperature at 5 p.m., 69°. Witnessed a most beautiful sunset: the sun a clear ball of fire, descending rapidly into the ocean, the sky all around being a beautiful shade of red. Saw whales spouting near the horizon.

Aug. 28. Fine day. Came in sight of **Indefatigable Island** about noon, and towards night the outlines showed up quite distinctly. Tower Island also in sight. In the evening a light, without doubt a live volcano on James Island, was plainly seen near the horizon, making a beautiful sight, the sky all around being a lurid red with a large blaze in the centre.

Aug. 29.—I awoke to find the vessel surrounded by land; James, Indefatigable, Duncan, Jervis, Daphne, Guy Fawkes, Albemarle, Seymour, and Crossman (?) islands being visible. Our destination was Conway Bay, on Indefatigable Island. A little wind most of the morning, which gradually strengthened. Indefatigable Island appeared to be well wooded. The volcano could be plainly seen smoking on



INDEFATIGABLE ISLAND.

James Island. The Guy Fawkes and Daphne islands were merely good-sized rocks, with some vegetation. Came to anchor in Conway Bay ( $4\frac{1}{2}$  fathoms of water) about 5 p.m. The water was very clear, objects on the bottom being easily distinguished. Saw several seals around the vessel. Noticed pelicans, frigate birds, shearwaters (*Astelata*), boobies, and an owl (*Asio*).

Aug. 30.—Went ashore on Indefatigable early in the morning. Good beaches all along the shore. Found birds very abundant, several kinds of *Geospiza*, *Nesomimus*, doves, warblers, flycatchers, *Certhidea*, and several species of *Camarrhynchus*. Water birds were quite numerous. Saw a number of pelicans, little herons, boobies, curlews, tattlers, and oyster-catchers. Hawks were very abundant, and a pair of oyster-catchers that Harris had shot attracted a flock of half a dozen. They soon ruined the pair. The island was thickly covered with tall cactus, trees, vines, and bushes, but was passable in some places. A fine little lagoon near the landing was bordered on two sides with mangroves. The rocks along the shore sheltered many sea-slugs and club-spined urchins. Weather rather warm. Came on board about 11 a.m. Skinned birds all the afternoon. An owl flew around the vessel in the evening.

Aug. 31.—Went ashore early, and got many birds. A small rat was taken, one of the three seen. Beck and Hull pulled two hawk-billed turtles out of the water and landed them high and dry on the beach. When the boat came after us about

noon we got them aboard, together with a sack of crawfish which we caught about the rocks. Had the crawfish for supper : they tasted like our lobsters.

*Sept. 1.*—Went ashore early. I got *Pyrocephalus* and *Certhidea*, and found a hawk-billed turtle on the beach, which I turned over and dragged up high. Beck got two rats like the one secured yesterday. Several ducks and a couple of rail were taken in the salt-water lake near the shore. There was quite a flock of ducks (teal), which were very tame. Beck brought in about twenty-five doves, which he had killed with stones.

*Sept. 2.*—Went ashore early. Harris and Beck went down the beach to some salt-water lagoons after ducks and waders, while Hull and myself ranged along the beach in the other direction. I had very poor luck, getting one ♂ *Pyrocephalus* and a couple of the little green herons, which I knocked over with stones. Harris and Beck brought back two stilts, two curlews, two tattlers, a turnstone, and some ducks. Several rail were also taken in the afternoon. The captain, mate, and sailors started off, and the mate brought back two eggs of the great blue heron, the remains of a set of three which he took from a nest 8 ft. up in a small tree.

*Sept. 3.*—Started out at 7 a.m. in the yawl-boat, the captain, mate, one sailor, and the four collectors making the party. Leaving the vessel, we sailed along the N.W. shore of the island. The shore presented quite a contrast of sand-beach and rock, with the bright green of the mangrove trees, many patches of which were seen. After sailing a couple of miles, we entered a little slue, which resembled very much a New England stream, except for the different character of the vegetation which lined its sides. There were mangrove trees, with their branching roots; cactus, some resembling huge cucumbers joined together, and others tree-shaped, 8 and 10 ft. high. Several great blue herons peered at us from their nests in the tops of the mangroves, while the dignified-looking pelicans swam around us in small bunches. A sail of a few more miles, and we reached a long sand-beach, where we stopped to lunch. A group of seals, the largest seen thus far, furnished a good scene for a picture. Soon after landing one of the sailors and myself went into the interior on a dove hunt, and managed to secure fourteen : they were not very plentiful at this end of the island. On our return the mate cooked the doves, the rest of the luncheon was got out, and dinner began, every one enjoying it immensely. At about 3 p.m. the boat was shoved off again, and we set sail for home. It was cold and wet work getting back, this disagreeable part lasting nearly four hours ; but arriving at last, a fine hot supper completed the day.

*Sept. 4.*—Left Conway Bay at 9 a.m., and started over to **Duncan**. Harris went ashore on Duncan in the afternoon. Reported birds quite scarce. They could find no anchorage.

*Sept. 5.*—A very busy Sunday. Immediately after breakfast Harris, Hull, and myself set out to visit a crater on (or near) the top of Duncan. On landing we proceeded in different directions, so as to cover as much ground as possible. Sparrows were plentiful—I shot a good many ; also two species of *Camarhynchus* and a *Certhidea*. After a long walk I arrived at the edge of the crater at about 11 a.m. Harris was already inside. We climbed down the side, I should say 250 feet, and reached the bottom, which was level and covered all around with thick bushes on the border. Grass, 2 feet high or more, covered the entire centre. *Geospiza*, *Certhidea*, and *Camarhynchus* were abundant, and occasionally *Pyrocephalus* and *Myiarchus* were seen. Soon after reaching the bottom I heard Harris calling out that he had caught a tortoise. Hull and myself got there as soon as

possible, and we tied the tortoise up. The grass was full of tortoise trails, and we set out in search of others. Harris found two more, and Hull and myself each two. We turned them all over, and weighted them down with heavy rocks. After fixing the last one, we revisited the first and found it loose. This made it necessary to revisit the others, which we did, finding that they had all got loose. We weighted them down again with more and heavier rocks, and returned to the starting-place. Some of the tortoise which we found feeding were eating the blossoms from a creeping vine, rising upon their forelegs and stretching their necks out to full extent. The odour from them reminded me very much of that from an elephant. After tramping about so much and lifting so many heavy rocks, we were very tired, but had to brace up and climb out of the crater, and walk to the shore over a long distance of broken rock. The crater was quite  $\frac{3}{4}$  mile in diameter, with a very flat bottom, surrounded by a high wall or embankment, making it resemble greatly pictures of the old Roman amphitheatres. Arrived on board at 6.30, very tired and very thirsty.

*Sept. 6.*—Sailed back to our anchorage in Conway Bay last night and laid here all day. Skinned birds and fixed things up.



DUNCAN ISLAND. SHOWING WHERE THE TORTOISES WERE FOUND.

*Sept. 7.*—Another hard day's work. Got up at 4.45 a.m. and started to heave up anchor. Sailed over to Duncan Island. Had breakfast at 6.30, and went ashore soon after, starting immediately up to the crater, with poles, ropes, etc., to get the tortoise out. Managed to recover our tortoises of last Sunday, some of which had got away. Found one dead, a rock having fallen on his neck during his struggles and shut off his wind. Found one more, making a total of eight. The work of making them fast lasted till about 2 o'clock, when we started for the shore with a tortoise strung on a pole between each two men, one of the sailors and myself taking one. It was very hard getting them up the side of the crater, walking being so rough and thorns so plentiful. But this was nothing to be compared with going down on the other side, which was very steep and **terrible** walking. The sailor had on a pair of wooden clogs, which soon began to chafe his feet. After a long time spent in tumbling over lava blocks, tearing through thorn bushes and other such pleasantries, we reached a point as near the shore as we could, tied the creatures up securely, and left them. Now came a long walk before we could get to the skiff. We were all so tired, having had nothing to eat since breakfast, that the distance seemed terribly long. It was a rough road, up and down, over broken lava and through thorns. Reached the skiff about 6 p.m., every one being well tired out. A good drink of wine and water was served with the lunch that was in the boat. We

got aboard the schooner a little later. This was the hardest day's work thus far, with the possible exception of last Sunday's. The trip was very hard on the tortoise also, and they acted as if "played out." Two of them being set down close together got their poles somewhat tangled up, and by the way they opened their mouths at each other it looked as if they were going to have a fight.

*Sept. 8.*—We went ashore quite early, and started immediately for the crater, after looking in vain for more tortoise for a short time. The mate took a small one on his back. Harris and myself, Hull and Beck carried one swung on a pole between us, and we started for the boat by a much easier route than yesterday, and got two of them right aboard the skiff. The other one and the three brought down yesterday were tied up in a sack, one at a time, and then lowered down to the skiff from the top of a bluff 75 ft. high. Getting them into the skiff, at 4 p.m. we were aboard the schooner with six live tortoises. The small one which was found yesterday appeared to be nearly dead when visited to-day. The soil at the bottom of the crater is full of cracks in places, showing that probably during the wet season there is water there. There were several rocks with depressions in their tops, and the prints of tortoise feet near them showed that the animals probably relied on these places for their supply of water during the dry season. It rained last Sunday while we were in the crater, and in one of these holes quite a little water had collected. Beck knocked over a penguin with the boathook, and we got the bird on board in a lively condition. He could walk finely, standing up on his feet, sometimes using his tail as a brace, more often not—waddling along at times quite rapidly; he kept his wings well away from his body, and pointed down a little in advance of it.

*Sept. 9.*—Went ashore at about 8 a.m., or rather started at that time, it being a long pull to the island. Harris, Hull, and Beck carried the guns, while the mate and a sailor (Herman Jahnke) and myself were to bring down the two tortoises. We got into the crater at about 11 a.m.; picked up the bones of a tortoise that had been found some time before. We saw a snake that was about 1½ ft. long, slender and blackish, with white rings. The mate noticed it first and called me, but I only arrived in time to see it disappearing under the grass, from which we were unable to dislodge it. The mate was afraid of snakes. We ate lunch in the crater. Just as we were commencing, Harris brought in a small tortoise which had escaped last Sunday, the one first caught. The mate claimed that this one bit him while he was tying it up. After lunch we started out of the crater, a sailor and myself carrying the large dead one on a pole, and the mate the live one in a pack on his back. We got down to the bluff in good time, when we lowered them down, and then climbed down ourselves. At a little after 4 p.m. the rest of the party appeared, bringing in another dead tortoise and the small live one, the sack of bones, and some birds. Beck carried a big tortoise from the other side of the island, and reported seeing five others in a gulch on the other side of the crater, three of them being larger than any secured thus far. He said that one of the big ones was feeding on an old dead cactus. We got on board after a long pull, and started over to Conway Bay, where we anchored at 7 p.m.

*Sept. 10.*—Skinned birds all day; worked on penguin in the afternoon, and think it by far the greasiest bird that I ever handled. A short-eared owl (*Asio galapagensis*) was taken in the evening. The bird came aboard and sat on the guy rope, which held the end of the foreboom, evidently prospecting for turtle meat.

*Sept. 11.*—Skinned the two tortoise and a hawk-billed turtle—a long and tedious job.

*Sept. 12* (Sunday).—A general clearing up. Beck and Harris went over to Eden Island in the skiff: brought back a few flowers and a couple of crabs. The two sailors killed six hawks (*Buteo galapagensis*) with pieces of rock.

*Sept. 13*.—Got up at 4.30, and, after having coffee, hoisted anchor and set the sails. Weather very foggy, and fine rain. We sailed over to Duncan, went ashore rather late, and all hands started at once for the crater, the idea being to work over the other side of it, and look for the tortoise that Beck had seen as well as others. We found in one of the craters (a section so thickly covered with bushes that it had not been so carefully examined) a good-sized tortoise. This find altered the plans somewhat. The mate and the sailor took the tortoise on a pole, 1 a sack of bones and their surplus baggage, and after eating lunch started back, the others having gone on. We reached the skiff after a long walk, the others arriving at about the same time. They reported six tortoises tied up, and the remains of another found. We got aboard the vessel about 6 p.m., and sailed for Conway Bay, coming to anchor at 7.30.

*Sept. 14*.—Got up at 4.30, and, after having coffee, hoisted the anchor and set sail for Duncan. We got ashore quite early, and started for the top of the island, carrying tent outfit and provisions for Beck and Hull, who were to camp in a little valley on the other side of the top. We got to their camping place after a long climb, partly through thick brush. We put up the tent and lunched. Just as we began to descend into the valley we found four tortoise, and Beck and the mate, who had separated from us a little, found three more, making thirteen in all tied up in the valley. Leaving Hull and Beck in their camp, we took the two big tortoise which the mate and Beck had found, these being the nearest to the skiff. It was terrible work carrying them. We had no shoulder pads, the carrying poles were too short, and the tortoises grew terribly heavy. We got them half-way down, and had to leave them, tying them fast. We then made the rest of the descent quite easily, and got to the vessel in time for supper. We headed for Conway Bay, anchoring shortly after 6 p.m. It was decided that the only way to get the tortoise out would be for the mate and myself to take a tent outfit and plenty of provisions and water, and join Hull and Beck on the island, the rest of the party remaining to care for the vessel at Conway Bay.

*Sept. 15*.—Hoisted anchor and sailed to Duncan. The mate and myself left the vessel and pulled ashore, with tent and supplies. We anchored the skiff in a splendid little bay, where hair seals, pelicans, and boobies abounded. We stored the water and surplus provisions in a cave near the shore, and made up two packs of the remainder. The sun was out in full force when we commenced the long climb to the camp, but we pressed on and reached it about 2 p.m. After a short rest we pitched the tent, and then went out and brought a good-sized tortoise to the camp. The mate prepared supper—doves, fruit, bread, butter, and coffee. It was dark very soon, and we retired early. Short-eared owls hooted about us continually during the night.

*Sept. 16*.—Arose at 5 a.m. and had breakfast: then both parties started for the first station with a big tortoise. Reaching there, the mate and myself started down for the beach after water and provisions, there being only half a canteen of water to leave the others for their morning's work. We got to shore in 50 minutes, and started immediately to pack up. The mate took the five-gallon breaker of water, and I the knapsack, well loaded with canned fruit, meat, sardines, bread, sugar, butter, coffee, rice, etc., and three canteens of water. We started back

right in the heat of the day, and the mate's load soon exhausted him. We decided that I should go ahead and get to the boys with the water in the canteens, while he came on by short stages. I reached the camp about 1 p.m., very tired by the long walk in the sun. Beck and Hull had carried out three tortoises to the first station. We lunched, and later the mate reached the camp. Hull and myself got a good-sized tortoise into the camp in the afternoon (the farthest away), while Beck brought in a little one on his shoulder. A little later Beck and myself took one of the big ones around the trail to the first station, while Hull brought another little one into the camp, and the mate got several. We sat around the camp-fire awhile after supper, and then retired.

*Sept. 17.*—Both parties started immediately after breakfast to the first station with a big tortoise. Hull and Beck then started to work some half-way down to the shore, leaving the mate and myself to carry the remainder of those about the camp to the first station. We brought out another big one on the pole, and then each of us took a small one on our shoulders. After dinner the mate took another small one, and I the knapsack, with some extra provisions, empty jugs, etc., and went from the camp half-way down to the shore, leaving them there, as we barely had time to get back before dark.

*Sept. 18.*—Arose about 5 a.m., it being then quite rainy. After breakfast we got the tents, blankets, etc., packed up, and started for the shore, Beck and the mate each taking a little tortoise, while Hull and myself carried the tents, etc., all on a pole. Arrived at the shore, after quite a short rest we started up again to bring down some more tortoise. Beck and the mate went up again after dinner, bringing down two more. Meantime Hull and myself got the stuff packed up, the tortoises in the boat, and things arranged for leaving. We then took the skiff, leaving the camp outfit ashore, as we were to return on Monday. The schooner had left Conway Bay some time before, and was quite close by the island; and in a short time we were all on board with our seven tortoise. The weather at the camp on the top of the island was damp during the evening and the first part of the night. It usually started to rain at 2 to 3 a.m., and at 5, when we awoke, the whole top of the island would be covered with fog. In the middle of the day the sun made work very uncomfortable, so that we tried to do most of our work in the morning and evening. Numbers of *Geospiza* and *Nesopelia* came about the camp feeding, and occasionally a hawk appeared. Owls (*Lasio*) in numbers came around during the night. Rats were quite numerous, and Beck caught several in traps.

*Sept. 19 (Sunday).*—Rested.

*Sept. 20.*—Went ashore quite early. We pitched tents and went up to the first station; brought down two tortoises half-way, ate a little lunch we had taken up with us, and took a short rest. We went up to the first station again and brought the tortoise down to the shore. The mate cooked a good supper of rice, collee, meat (canned corn beef), and bread and butter, canned fruit for dessert. We sat around the camp fire till 8 o'clock. The seals kept up a continual noise all night.

*Sept. 21.*—Had an early breakfast, and all went to the first station. The mate and myself brought a tortoise down to the camp (moved down to shore). While Hull and Beck brought one half-way and returned for another, mate and myself ate lunch, then went to half-way station and brought another one down to the shore. Meantime Beck and Hull got theirs down. It was getting late in the afternoon, so we lay off for the remainder of the day.

*Sept. 22.*—Got up early. After breakfast we went up to the half-way station

and brought down two tortoises; went up again immediately and brought down two more. Had dinner and took a rest. At about 3 p.m. we went up again and brought down two more, which made the last of the twenty-nine tortoises from Duncan Island.

*Sept. 23.*—Did not get up quite as early. After breakfast I worked a little around the beach, turning over rocks for marine animals; then secured several lizards. We got the eleven tortoises down on the beach. We then put six in the skiff together with the outfit. Beck steering, the mate and myself pulled to the vessel, which had come over from Conway Bay. We got aboard all right, and shortly after the rest of the tortoise and Hull were taken aboard. Then we headed off for Jervis, and anchored at the north side of the island at 5 p.m. We are doubtful if more than two or three tortoises are left on Duncan Island, because our party covered practically all the part of the island where they would be found.

*Sept. 24.*—Went ashore on **Jervis Island**. Fine beach, with a little lagoon right behind it, around the edge of which we found tracks of a tortoise, but were unable to find it after thoroughly searching the island. There is more soil on this island than on any visited thus far. We secured about 115 birds in all.

*Sept. 25.*—Skinned birds all day.

*Sept. 26.* Heaving anchor in 45 fathoms of rope and chain, and setting sails. We got through before 10 o'clock, and sailed over to James Bay, **James Island**, where anchor was dropped at 1.30 p.m. Harris, the captain and mate went ashore to look for fresh water, which was marked on the chart. They returned in a couple of hours, being unable to locate any. Harris brought back a skull, a cross, knife, and pair of sandals—part of the remains of a man which he found in a cave. The skeleton was lying in a cleft in the rocks, with some brush piled up near by. A cloth was rigged up, evidently to keep the sun and wind off. The knife was stuck in the ground near by. Several walking-sticks, remains of boobies, tortoise, etc., were lying around.

*Sept. 27.*—Went ashore quite early. Landed at a fine sand beach. Immediately behind it was a salt-water lagoon, partly crusted with salt. Harris shot a flamingo here. Saw tracks of hogs and donkeys, also evidences of human beings having been on the island within a short time. The travelling was very fair, but a good deal of dry brush made it difficult in many places. Fair-sized trees were numerous. Found *Certhidea* and doves. Several species of *Geospiza* (quite numerous) and several species of *Camarhynchus*.

*Sept. 28.*—Went ashore same time as yesterday. Collected till 10.30. We saw a species of crab on the beach which roam about in large bands, evidently gathering food from the breakers as they roll up on the beach.

*Sept. 29.*—Beck and Harris started as soon as it was light for the interior of the island, carrying provisions, blankets, etc., thinking that they might remain over-night on shore. Hull and myself went ashore at the usual time, and collected about 15 birds each. In the afternoon the captain, mate, and steward went around the point of the island, where they found the remains of a huge camp—large enough to accommodate 30 to 40 men—evidently the camping site of some Government surveying party. They found broken crockery, an inkstand, spoon, iron hoops, etc. The tent stakes—couches—were also lying around. There was one grave marked with a good-sized cross, bearing initials which could not be deciphered by them. Harris and Beck returned to the beach just at dark, and were at once brought aboard. They had penetrated six or seven miles into the interior, which they pronounced a



**thick tropical jungle.** They saw a couple of fine donkeys and about a dozen pigs ; the latter being very common. The trees at first were large and covered entirely with moss. Farther on they were umbrella-shape, covered with moss and orchids, and so interlaced with vines, etc., that it was impossible to force a passage through them. They proceeded here along a donkey and pig trail, which led to fresh water. They found several muddy pools where the pigs came to wallow, and the whole country was so damp that they could not light a fire. Beck killed a small pig and brought back the hind quarters.

*Sept. 30.*—Skinned a few birds that Beck and Harris had brought along, then got up anchor and headed for Sullivan Bay (James) : wind being very light.

*Oct. 1.*—Vessel in about the same position as yesterday, there being no wind. In the evening quite a breeze sprang up, and we sailed along nicely.

*Oct. 2.*—Arrived at Sullivan Bay early in the morning. A more **barren place could scarcely be imagined.** Hardly anything was to be seen except rough bare lava. The vessel lay-to while we went ashore. We got into a little green patch and collected about forty birds, which were in very poor plumage, due to moulting in part.

*Oct. 3.*—There was a good breeze in the morning, and we beat along the N.E. end of **Indefatigable Island,** making short tacks ; looking for the Puerta-de-l'Agnada, which was put down as being somewhere on this end. We came to anchor on the Gordon Rocks, on the east end of the island, in 15 fathoms of water, about 3 p.m. While coming to this anchorage we sighted a small boat with men in it near the shore, and it caused considerable excitement—they being the first we had seen in **four months.** As soon as things were fixed on board the skiff was got out, and Harris, Hull and myself went over to find the little craft, which had disappeared behind a small island near the mainland. It soon reappeared, and we saw it contained three men. We got alongside in a few minutes, and in response to our query, "Speak English?" one replied, "I used to": and we saw that he was an Englishman. He said that his name was Thomas Levick ; that he had lived on the islands for **29 years,** and now belonged to a small colony which had been started two months since on Charles, or, as **he called it, Florianna Island.** He was now on a short trip among the islands : had been out 17 days, and was to start back for Charles almost immediately. With him were two men : one an old Portuguese, who could speak some English, and the other a South American. We invited them aboard. It was readily accepted, and we all had supper during the evening. Mr. Levick gave us the following information. "Terrapin or tortoise were **extremely** common on the southern end of Albemarle, and there had been some on Indefatigable, James, Abingdon, and Duncan ; but they had been about exterminated on all these islands. That dogs, fierce and large, were abundant on James, Chatham and Indefatigable. That there was a large fresh-water lake, and that limes, plantain and other fruit grew on the high mountains in the centre of Indefatigable. That Barrington was infested with goats. That Charles Island, the finest of the group, had for a long time been uninhabited, on account of a certain old Spaniard having been killed there by convicts. It possessed fresh water, pigs, cattle, donkeys, fruit, etc., and was going to be rapidly colonised. That Chatham had a large plantation of sugar cane and refineries for its manufacture. That the population of Chatham consisted mostly of convicts, but that the soldiers there kept them in check. That the watering-place was on the S.E. end instead of the N.E. end of Indefatigable." (We tasted some of the water that came from there, and it

was quite brackish). He also said that the absence of iguanas on Indefatigable and James Islands was due to the wild dogs, which came down to the shores to eat them, as they also do the turtle and young tortoise. Their boat was made fast to our stern, and after 8 o'clock we turned in.

Oct. 4.—Had breakfast quite early, at which our visitors joined us; and then each party got into their boat and left the schooner, sailing in different directions. We landed at a point quite near, and then collected. The country was very rocky; a great deal of brush quite green. Birds were numerous, but poor in plumage. Altogether there were taken 35 that could be saved. In the afternoon we got under way for **Barrington Island**.

Oct. 5.—Came to an anchorage on the N.E. side of Barrington. After dinner we went ashore on a goat hunt. Found a good trail and fair walking. Went about three miles inland, finding a number of goats, and killed three. Cut off their hind quarters and brought them down. Noticed for the first time the large land iguanas (*Crotophaga suberistatus*) which live in holes. Killed one large one, which was a dirty white colour. Birds **not** numerous; noticed small sandpipers, turnstones, swallows, *Certhidea*, mocking birds, and two species of *Geospiza*. There were the remains of quite a large camp on the beach, around which were scattered the remains of iguanas, goats, and seals.

Oct. 6.—Went ashore quite early after birds. Found *Certhidea* quite plentiful. Beek brought in several iguanas, and said that he had 24 more up in the hills, a short way off. After dinner we skinned birds, while Beek, the mate, and a sailor brought down the rest of the iguanas. The iguanas run as long as 4 ft., and some weigh about 10 lb. He found these specimens all in one colony, two and sometimes three in one hole. The holes varied considerably in depth and character—some 1 or 2 feet deep, others running underground 10 feet or so, and then slanting down, say, 5 feet. Several of the *females* contained eggs, which were larger than hens' eggs in size. The burrows were in a sandy soil. I examined two stomachs: they contained vegetable matter. They tried to bite when caught. The usual method of collecting was to take hold of the tail, pull them out of the hole, and knock them on the head quickly with a stick.

Oct. 7.—Breakfast at 6. Soon after, Harris, Hull and Beek started for the shore, leaving me to fix alcohol and skin some 30 iguanas taken yesterday. Finished, say, a dozen or more when the party returned with a snipe, rat, several lizards, and some birds. After dinner resumed work on the iguanas, finishing by 4 p.m. **Out of the 30 only 5 are males.** Of the remainder one-half contained eggs, varying in number from 8 to 15: white in colour. Examined most stomachs, finding vegetable matter, principally **cactus**.

We had some iguanas and the eggs for supper. They were rather tough, but tasted good. The eggs were all yolk, and like the hen's in taste.

Oct. 8.—Went ashore early, and started immediately for the "iguana village." Caught 10, which we kept alive, and brought down some dead ones. They opened their jaws savagely when seized by the tail, but were unable to bend their bodies sufficiently to bite the holder's hand. We went on board for dinner, after which we skinned the iguanas, and also some gulls and a booby. At about 4 p.m. hove anchor, and got under way for Chatham Island by supper time. Out of the last lot of iguanas **only 2 were males**, making only 7 *males* in all.

Oct. 9.—Reached an anchorage in Wreck Bay, **Chatham Island**, about noon. Near to us lay another vessel, a Columbian, whose captain was accompanied by

several island officials. The police commissioner and the lighthouse keeper soon boarded us. The former brought a package of letters. The guests were entertained in our little cabin. The Ecnadorian captain could speak English, and he gave us quite a lot of information about the island. It seems that the past week was a holiday time for them, and that they are going to have a big time to-night. Harris, Hull, and the captain went up with these people to Señor Cobos' place. The mate and myself went ashore. The lighthouse keeper, a young Spaniard, and his comrade, had a house built of bamboo mats and tin combined. They had a couple of old-fashioned rifles and some "machetes." They could not speak English (nor we Spanish), but we managed to talk all the same—by sign language! The keeper showed us round. There was a graveyard near the beach: all graves were marked by crosses. There were a couple of good-sized warehouses, and that was about all. We saw several natives, one a woman, who was quite good-looking. We noticed a good many empty shells of *Chiton*, and found out that they eat the animal.

Oct. 10.—Sunday. Dressed up in our best and went ashore. The mate, Beck, and myself walked up to Progreso over a very good road. Birds were numerous, especially *Geospizæ*. We noticed martins, cuckoos, *Pyrocephalus*, and *Camarhynchus*. As we neared the settlement we came to vast fields of sugar-cane. Later on we learned that Cobos had over 1000 acres planted. Vegetation tropical. Large cacti, lemon, orange, and banana trees. The tropical fruit which they call "papaïos" \* and castor oil beans were also common. There are some other tropical fruits here. One they call y-yava consists of a large pod, with eight or nine beans or seeds in it, surrounded by a pleasant-tasting pulp. Coffee and a tropical substitute for potatoes grow here. We soon reached the settlement, which consisted of a number of low thatched huts, which were filled with natives. It being a holiday—having nothing to do—they came around us in crowds. They were a general mixture of Columbians, Ecnadorians, Peruvians, Spaniards, etc., and crosses between the entire lot. A few of the women were fair-looking, also the Spanish boys, but the rest were a hard-looking crowd. As near as we could find out, the population was 225 men and 40 women, all of them virtually subjects of Señor Manuel I. Cobos. Saw a pen with several *Galapagos* (tortoises) in it alive. Bananas, 20 cents a bunch; lemons, 10 cents per 100; "yucas" (potato substitutes), 1 cent per lb: water, 5 dollars per 500 gallons. There was quite a large sugar refinery here, and huge vats of sugar and juice standing around. One man said they turned out 3 tons a day. There were a good many hens in the village, and I saw one turkey. Donkeys were plentiful, and out in the green fields were a large number of cattle. We returned at noon to the ship.

Oct. 11.—Went ashore early, and shot about a dozen birds each. Cobos came to dinner, an hour late, accompanied by a bodyguard of one soldier. He left shortly after dinner, Harris and Hull going back with him. Beck and myself finished the rest of the birds.

Oct. 12.—Beck and myself went ashore quite early, shooting about a dozen birds each. Just as we got through, Harris and Hull came down the road. They had collected quite a number of nice birds, swallows (our barn swallow), cuckoos, martins (*Progne modesta*), sandpipers, and some *Pyrocephalus*. Worked on birds the rest of the day.

Oct. 13.—Hull and Beck went collecting; I worked on alcoholic stuff. On their

\* *Carica papaya*.

return we all worked, and put up about 50 birds—mocking birds, finches, and several *Camarhynchus*, *Pyrocephalus*, and *Certhidea*.

Oct. 14.—Breakfast early, and then all four started for the ranche of Señor Cobos on foot. There was some misunderstanding about horses, and we found that we could not get away till noon, so we accepted his earnest invitation to breakfast, and then set out to see his coffee plantation. Our trip took us through long groves of banana trees and other tropical fruits. The scenery was beautiful: large green trees, tropical vines and plants, little pools of water—all of which, combined, fulfilled my idea of a tropical paradise. Black *Camarhynchus* and *Pyrocephalus* were abundant here: *Certhidea* also quite common. There were big flocks of turnstone on the pasture lands. We got back in time for the 11-o'clock breakfast. Had a very good meal, with the best chocolate that I ever tasted. We noticed them making rope of the threads of a kind of cactus which grew about the place. *Progne* were numerous about the house. After breakfast we got the horses, and in company with a nephew of Cobos and his book-keeper we started for the top of the island. The land was all open, and looked like good soil. It was a rather up-and-down ride, but we reached the big **fresh-water lake**, in the bottom of an old crater. It was so foggy that we could not see over 50 yards. They said it was half a mile in diameter. There was a flock of teal on it. We heard a curlew and a plover on the way up. We rode around the lake, and on our return had supper with Cobos, returning to the vessel after dark. It was very dark, but we found the shore and then the vessel, and were soon aboard.

Oct. 15.—Awoke very sore, the result of yesterday's riding! Hull, Beck, and myself made up 40 birds secured yesterday. Water, "yuccas," and bananas were brought aboard.

Oct. 16.—Hull, Beck, and myself went ashore early, and got 20 birds each. Beck got a dove and a *female* bobolink (*Dolichonyx oryzivorus*). The dove was the only one seen on this island by us, and the first bobolink recorded for the group since Darwin's visit. We went on board before dinner, and had the birds put up by supper-time. We gave our mail to Captain Barnhoff to post in Guyaquil.

Oct. 17.—Harris started up to the hacienda of Señor Cobos about 5 a.m., to see about water, and returned shortly after dinner in company with Cobos, his nephew, and another gentleman. They remained a short time, and then all but Cobos were put aboard the other vessel bound for Guyaquil. They immediately weighed anchor and sailed. After putting Cobos ashore we did the same.

Oct. 18.—There had been no wind during the night, and the strong current had taken us off the island so far that all day was spent in getting back.

Oct. 19.—Vessel lay to on the north side of the island. We went ashore at 7.30, and started collecting. Birds not numerous, and mostly *Geospizae*. Two species of *Camarhynchus* were taken. Beck and myself each got a *Certhidea*. A few *Nesomimus* were taken at a little pool near the shore. Five or six martins were taken. Boobies were very plentiful. We noticed some nesting. One nest contained two eggs badly incubated. I saw nest, but there was no nest, the two chalky eggs being laid on the bare ground. Very hot in the middle of the day.

Oct. 20.—At sea: the weather about the same. Up to noon we made very little progress, but came in sight of Hood Island at supper-time.

Oct. 22.—Got up early. The vessel was within 5 or 6 miles of Hood Island. We got to work on the tortoise, and had it finished before dinner. The vessel came to anchor in Gardiner Bay, **Hood Island**, at 10.30 a.m. After dinner we went up to

the top of the island on an inspection tour. The country nearly all rocks, covered with dry vegetation—quite thick in places. Huge lizards were abundant, and a number were taken. We got two snakes, the largest about 3 ft. long. Birds not numerous, and many in very worn plumage. I saw *Certhidea*, mocking-birds, and three species of *Geospiza*. One hawk was seen. Doves very numerous. We collected several black tern, and the sailors killed a yellow-crowned night heron (*Nyctanassa*). Beck brought back two goats from a flock of twenty that he saw.

Oct. 23.—Went ashore early after birds. Returned at 11 a.m. with about 50 small birds, two hawks, several oyster-catchers, a booby, sanderling, gull, and a lot of lizards; also several black ignanas. We skinned all the birds before supper, with the exception of the two hawks, it getting too dark to work. In the evening several short-eared owls came out to see us, and I knocked one down with the spreader of the yawl-boat.



Fig. 1.

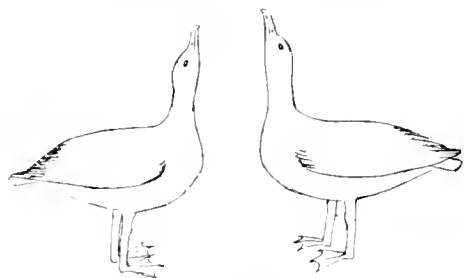


Fig. 2.

Oct. 24 (Sunday).—Skinned a hawk before breakfast, after which Hull finished the other. I skinned the owl, spent another hour in fixing up things, and took a vacation the rest of the day. I fed one of the tortoises with banana peel, which it took from my hands.

Oct. 25.—Shot 20 birds each, and returned at 9.30 a.m. We skinned birds all the rest of the day. In the afternoon the mate and sailors went

off on a goat hunt, but found no goats. They reported, however, a big albatross' rookery, and brought in several eggs of the albatross.

Oct. 26.—Up early and started for the rookery. We separated after going inland for some distance, the mate and a sailor after a goat, and the rest of us for albatross. We reached the first lot soon. They were a mile or more inland, on a smooth patch of ground. Some of the groups contained a dozen or more indi-

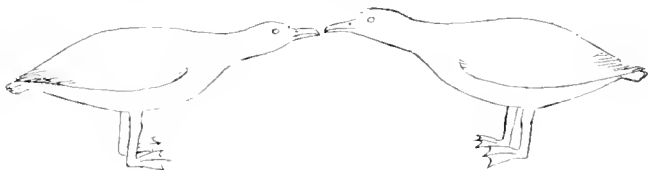


Fig. 3.

viduals. They were very tame, like the boobies, but some attacked us in a savage manner. We noticed a very curious and interesting habit which seemed to be a pastime of theirs, and resembled fencing as near as birds could imitate it—their beaks being the foils (Figs. 1 to 6). In every direction birds were fencing in pairs.

They would stand opposite each other, and throw their heads up in the air (Fig. 2); then make two or three preliminary bows and parries, and after fencing a minute or less, one would throw up its head and utter a note with his bill wide open (Fig. 1), and then assume the first position again. The other would follow the example, and



Fig. 4.

the same performance would thus be gone through with many times. The eyebrows are very prominent on these birds, also their breasts. Their walk is a peculiar waddle, like the "swagger" of a "bowery tough." We found the rookeries scattered all around—some near the shore, others well inland.

Before flying they had to run some 30 yards to get a start. We found quite a number of eggs during the day, all of which were added. Harris, Beck and myself left Hull and a sailor soon after finding the first albatross, and started for the S.E. end of the island. Albatross were scattered all along the route, there evidently being several thousands of them on the island.

On reaching the S.E. end we found sea-birds very abundant: gulls (*Creagrus*) were "thick"; frigate birds extremely abundant and breeding; boobies; yellow-crowned night herons, and the little blue herons (*Batorides*); black terns; and tropic birds which were nesting in the rocks. We noticed that the young *Sula nebouxi*



Fig. 5.

had dark brown eyes instead of the yellow eye of the adult. The black ignanas (*Amblyrhynchus cristatus*) were very abundant in some places, there being a hundred in a square yard (see Plate V., right-hand lower corner). We ate lunch here,

and then started back along the shore for the vessel.

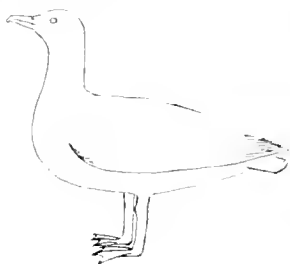


Fig. 6.

Oct. 27.—Skinned birds all day, putting up 16 albatross, 4 tropics, and an owl; also blew a few of the albatross' eggs. The albatrosses were very fat.

Oct. 28.—All hands except the captain and cook took the skiff and went towards the E. end of the island, bound on a big bird hunt; landed at a point about two miles up shore, and dragged the boat out high and dry. Then we started across to the S.E. shore, and there commenced to collect. Shot several oyster-catchers and yellow-crowned night heron. Beck caught a number of red-billed tropic birds among the

rocks, some of which had eggs. After lunch started back along the shore, taking in tropic birds all the time, and at one point laying in a number of *Creagrus*. By the time that the skiff was reached we had some 50 birds and a lot of eggs—the eggs being two species of booby, albatross, tropic birds and gulls. There was a big surf running on the S.E. side, which looked magnificent. The heavy rollers would dash against the rocks, sending the spray 50 or more feet into the air. Had quite a time

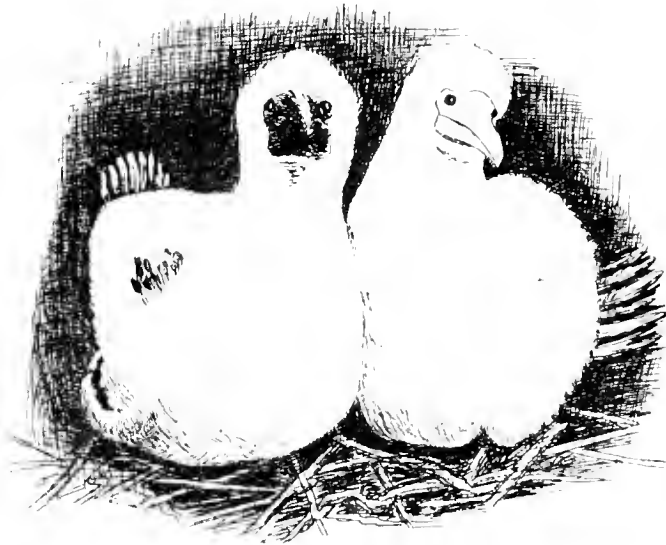


SEALS ON HOOD ISLAND.

getting the boat launched, but got back to the vessel by supper time. Had some quarrels with the sailors, but the mate subdued them quickly.

*Oct. 29.*—Skinned birds all day, putting up all the large ones secured yesterday.

*Oct. 30.*—Blew eggs most of the day, and at 4 p.m. we hoisted anchor and left Hood Island; headed for Gardner Bay.

YOUNG OF *SULA PISCATRIX WEBSTERI*.

*Oct. 31 (Sunday).*—No wind during the night, and we were ten miles off Charles. There was a little wind in the morning, and Harris, Hull and myself went ashore on **Gardner's Island, near Charles Island**, after dinner. The island is quite small—about two miles in circumference: it is high, and for the most part its sides are steep, perpendicular cliffs. We found one place where we could get up, and this was none too easy—quite a steep climb over slippery glazed rocks. On top the soil was a coarse gravel, and covered thickly with bushes and cactus. Birds were not plentiful, but we obtained about 50. Several *Geospiza*, *Myiarchus*, *Dendroica*,

*Nesopelia*, *Camarhynchus* and *Nesomimus trifasciatus*! The latter were quite plentiful. Sea birds were abundant, some of them breeding. Saw frigate birds, black tern, boobies, tropic birds, *Puffinus*, *Aestrelata*, and petrels.

Nov. 1.—Made anchorage at **Charles Island** about 10 a.m. Harris and the captain went ashore at once, returning at dinner time, bringing quite a boat-load of people, including McGill, who has charge of the colony, two overseers, and four señoritas. Soon after McGill's son, Antonio, came out in a little "dug-out." The women were very kind, but naturally very inquisitive. Our bread was a novelty to them. It seems that to-day is "All Saints' Day," a holiday with them, and no one working. The visitors remained till about 2 p.m., when we all went ashore. In the first boat the mate and myself took the ladies. I remained ashore while the mate went back for the rest. I accepted an invitation from the ladies to visit the principal house—a square affair with tin roof and plain board sides. There I met several men. All hands joined in trying to entertain me, and, considering my ignorance of Spanish and theirs of English, they succeeded well. Soon after the other boat-load was landed, and we were entertained in fine style by McGill. There were several "shanties" in this settlement, all of the same character, "square affairs with tin roofs." There was much dried beef and fish stored away. Had some oranges, the first seen since leaving San Francisco. Here was a pen with some 40 tortoises, a number of them in good condition. They had some young flamingoes, caught the previous night, and already tame. Donkeys and dogs were plentiful. We spent the afternoon ashore, returning in time for supper with Captain Levick, our old acquaintance of Indefatigable Island.

Nov. 3.—Up early, and loaded ammunition before breakfast. Went ashore, and started immediately for the interior with Levick for guide. Went about six miles inland. A very fair road, which narrowed in some places to a mere path. There was much vegetation, mostly large green thorn trees. Higher up there were a good many lime and orange trees. We picked some fruit from both. At the first watering place, about a mile inland, was a little garden with several kinds of vegetables. Here also was a place where they were "jerking beef." There were about a dozen men cutting up the beef and drying it. The second watering place was much higher up. Water at both places very good. At the second place there was a cave where an old Yankee had passed the life of a hermit. It was nicely fitted up, seats, shelves, and fireplace chiselled out of solid rock. *Petrocephalus* were very abundant about this second watering place: *Camarhynchus* also quite plentiful, and *Geospiza* abundant all the way up. Around the second watering place water birds were plentiful—curlew, ringed plover, and turnstone. On the way back saw some wild cattle and a few wild donkeys.

Nov. 3.—Went ashore and collected about 60 birds. Harris was attending to arrangements for entertaining some of the islanders whom we had invited to take supper with us. Arranged a table on the main deck with a tarpaulin spread overhead, with flags of America and Ecuador for drapery. The guests arrived at 4 p.m. McGill and son, Captain Levick, and several other gentlemen and ladies. We sat down to supper at once, and in spite of our limited means for conversation, had a very pleasant time. After supper the band (consisting of myself and my flute!) played several dirges, and I then went into the cook's galley and played for them dance music. The music and the dance did not seem to hit well, but they all enjoyed it. At 7:30, after many "buenas noches," our guests left us, inviting us to coffee with them in the morning.



Nov. 4.—Collected about 45 birds. Had them up by 2.30 p.m. Then we blew some eggs collected some time previous.

Nov. 5.—Started for the top of the island, taking lunch, intending to remain all day. Reached the summit in good time, and separated. All hands returned by 4 p.m. Hull and Beck obtained some *Certhidea*,\* probably a new species. Harris secured a bobolink. I took one of the swallows that resemble the barn swallow, the third taken on this island; also four specimens of the *Camarhynchus*—the only ones taken here thus far. Beck found a nest of *Pyrocephalus* containing one egg and one young bird.

Nov. 6.—Skinned yesterday's birds and cleaned guns. Loaded cartridges, etc.

Nov. 7 (Sunday).—Went ashore after breakfast. Remained on land a couple of hours, said "adios," and went on board. Captain Levick came with us. After dinner hoisted anchor and sailed around to "Post Office Bay," and dropped anchor there, taking only an hour or so to make this change.

Nov. 8.—Went on shore early, collecting. Visited a lagoon near the shore, where it was said flamingoes could be found, but saw only one. There were a hundred or more teal in the place, also stilts, sanderlings, black-bellied plover, turnstone, yellow-crowned night heron and curlew. Captain Levick was carried back in the yawl boat.

Nov. 9.—Got up at 3.15 a.m., hoisted anchor, and sailed for **Albemarle Island**. Weather a little rough. Got over to Albemarle and anchored on the S.E. side at 2 p.m. Saw *Larus fuliginosus* flying around the vessel.

Nov. 10.—Got up at 5.30 a.m. and went ashore. Landed in a little cove where a fresh-water stream entered into the ocean. The *Larus fuliginosus* were very numerous about this place. The banks of the stream were lined with a thick growth of mangroves. Among these trees were a large number of yellow-crowned night herons (*Nyctanassa violacea*). Saw several of the great blue herons (*Ardea herodias*), one of which we shot. It was very difficult travelling through the brush, and we did not get very far inland. The brush was thick, and so interlaced with vines and thorns as to be almost impenetrable. Secured *Myiarchus magisteris*, *Nesomimus parvulus*, *Certhidea olivacea*, and several species of *Camarhynchus* and *Geospiza*. Harris and Beck killed several flamingoes. Beck secured a *Gallinula*.

Nov. 11.—Hull, Harris, and Beck went on shore collecting. I remained on board, and skinned three flamingoes and some herons left over from yesterday. At noon the party returned with two flamingoes, a white egret, herons, gulls, etc., which we skinned in the afternoon. They also brought in an immense black iguana, measuring 49.50 in. from tip to tip.

Nov. 12.—Started early to penetrate into the interior, hoping to go as far as the growth of green vegetation. Beck and myself went together; he carried a gun and I the machete. We landed a little to the west of our usual place, and started out N.W. We got into such a thick growth of brush near the shore that we were unable to get through it, and had to back out and go to the west, where it was better. All the way, as far as we went, the character of the ground was about the same for the most part—rocky, with little ridges and valleys. Occasionally we met little patches of a few hundred yards where the walking would be very fair. We found tortoise and cattle trails quite numerous, and by means of these and the machete we made good progress. The vegetation changed gradually the higher up we advanced; taller trees and more green bushes appeared. We got several miles inland (estimate

\* It is a new form, *Certhidea olivacea ridgwayi* novus.

5 to 7), and ate lunch on the top of the only hill near. Around the base of this hill the vegetation was quite tropical—green and thick brush, trees covered with long hanging moss, and long creepers hanging down from their tops and interlacing the whole. After lunch we went over the hill on the north side to the edge of some green trees. There were two kinds of trees, one with a long narrow pointed leaf, the other with a leaf smaller and broader. The former was very dark green in colour, and the other a light green. There was considerable soil here, and a cattle trail going through. We saw but one bunch of cattle, which ran by us on our way up. We were delayed a great deal by our tortoise investigations, and it was quite late when we started back. Beck carried the gun, machete, and a bag of tortoise eggs. I had a live tortoise (perhaps 15 lb.) in one hand and a basket of tortoise eggs and birds in the other, and a lot of tortoise eggs tied up in my undershirt over my shoulder. We started back at a lively pace, and by the time that we got within a mile or less of the shore it became necessary to increase it still more in order to reach the shore before dark. The ground was covered with long creeping vines, which every step would catch about the feet and trip us. In spite of this we reached a point within a few hundred yards of the shore in fair time. There our trouble commenced. We got into a thick patch of green vegetation, which in our tired condition it was almost impossible to get through; but we finally reached the edge of the mangroves, where we expected to find a path, but we were sadly mistaken: when at the very edge of the mangroves, we were walking ten feet above the ground, supported by the matted brush. By this time we could hear the rest of the party in the skill not far off, and we tried to go through the mangroves to meet them. We finally did so, by wading through the water up to our hips, and by climbing over the mangrove roots ten feet high—a very ticklish travelling after dark! Once more aboard, a change of clothes made life more comfortable. To-day some information was obtained in regard to the breeding of the tortoise. The interest of R. H. Beck and myself was first aroused by finding considerable quantities of broken eggshells scattered around about a small hole in the ground, as if they had been dug up and the contents eaten by some animal—probably dogs. Mr. Beck found the first fresh nest. It was situated in a little patch of dirt at the foot of a rocky bluff, and contained eight eggs. After this several such nests were found, containing eight to twelve, and in one instance seventeen eggs, nine or ten being the usual number. With one or two exceptions, the eggs were deposited in well-beaten cattle trails, sheltered from the direct heat of the sun by the thick vegetation on both sides. There were slight signs of the holes; a very slight rise from the surrounding level, and a somewhat fresher look to the dirt, was all that distinguished them. They were about a foot in width and depth, and were round in shape. The dirt immediately around the eggs was soft, but the upper crust, of 3 or 4 in., was extremely hard, as though matted down by some heavy weight, perhaps the body of the tortoise. The eggs were laid in layers, and closely together; from 3 to 5 eggs comprised a layer, which was separated from the next by a lining of dirt. All eggs secured were fresh. It is very possible, although not certain, that one tortoise lays in several holes. The finding of 4 or 5 holes within the radius of 10 ft. or so in many instances leads to the conclusion that one tortoise lays from 40 to 50 eggs, some of which thus are likely to escape the ravages of enemies. Tortoises were found in close proximity to several nests.

*Nov. 13.*—Remained aboard all day. Finished skinning the iguanas, and blew tortoise eggs. It was hard work blowing the eggs. We had some of

the contents saved for supper, and made into omelet. They were richer than hen's eggs.

*Nov. 14.*—Sunday. Took a rest. Saw a tiger shark in the morning, 8 to 10 ft. long.

*Nov. 15.*—Started off in the yawl boat, and went up the west shore. Obtained nine flamingoes and a few *Nesomimus*, boobies, penguins, and a few waders and hawks. We saw several white egrets, but could not get them. Returned at supper time. The flamingoes were wading in a slimy ooze. In doing so they would sink in about 6 in., up to the tarsus. When shot we had to wade into this ooze to recover them. In one case Beck got in up to the breast—a very disagreeable business. On coming out we would be covered with muck, and would have to scrape it off as best we could, there being no water near to wash in.

*Nov. 16.*—Skinned birds all day. Harris went off in yawl to find out about anchorage at "La Tortuga," on Albemarle Island.

*Nov. 17.*—Skinned several iguanas and sea turtle. Got under way in the afternoon, during which operation the kedge anchor was lost. Sailed around to La Tortuga, and came to anchor about 2 miles from here.

*Nov. 18.*—Went ashore near a deserted hut, where we left our surplus baggage. Soon after landing we sighted some cattle within 300 yards of the shore. Although several shots were fired, they got away. There was quite a grove of plantain trees here, and we picked several bunches of bananas. Harris and myself started inland, while Hull and Beck followed the shore, working the lagoons. There were some fair cattle trails leading inland through the brush for some distance: but these finally ceased, and we had to give it up. We started back for the shore, but got lost, and it was noon when we reached it, coming out about a mile below the hut. Found land birds very scarce, but took a few *Geospiza* and *Nesomimus*. After lunch I started down the shore, and got several teal, gulls, a heron, stilt, turnstone and saunderling. Teal were very numerous. Beck got two flamingoes and a blue heron. We left for the vessel about 3 in the afternoon. Turtle numerous and breeding here.

*Nov. 19.*—Up anchor at 5 a.m., but the wind died out, and as the current set on shore had to drop it again. Then we kedged her out again, using a bag of sand in place of the anchor lost. Wind starting, we headed for Iguana Bay.

*Nov. 20.*—Sailed up to "Iguana Cove" with a good breeze, but the captain refused to anchor there, considering it dangerous. We took the six iguanas which we brought alive from Barrington Island, and skinned them. They had apparently taken no nourishment since capture, and were gradually starving. All *females*, and contained eggs.

*Nov. 21.*—Sunday. Intended to go ashore and collect, but the vessel had drifted off during the night, and was becalmed 15 miles off.

*Nov. 22.*—Calm all day; made no progress. Hull, Beck and myself went out in the skiff and secured about 25 birds, mostly *Procellaria*.

*Nov. 23.*—Quite a breeze. We managed to get to Iguana Cove by dark, but not in time to work.

*Nov. 24.*—Wind had almost died out, and we were quite a distance off the island again. We tried to beat up to Iguana Cove, but failed, so set sail for Tagus Cove. This makes several days they have spent trying to get near enough to Iguana Cove to put off in the boat.

*Nov. 25.*—Quite a little wind, and we managed to get as far as the N.E. end of Narborough by night. There we were becalmed for a while—just long enough

to prevent us getting into an anchorage. The whole country was very rough-looking, mostly bare lava, with here and there a little low brush. Narborough was nearly all barren, a few patches of mangroves near the shore, and a few small patches of low, dry bushes. We hove-to for the night.

*Nov. 26.*—Got into Tagus Cove shortly after 1 p.m.: quite a nice little anchorage. The cove was formed by part of an old crater. Water very deep: anchorage about half-way in, 10 fathoms. We pulled along the shore in the skiff some way. We found fresh water running down the sandstone in several places: some little holes in the rocks holding 10 to 20 gallons. It is said a vessel put in here out of water, and, seeing the water oozing down, they cut the places in the rock to catch it, thus obtaining a supply. Penguins and boobies very numerous, also black terns (*Puffinus sabularis*) and small herons. Black iguanas quite plentiful. Quite a few land birds, mostly *Geospiza*.

*Nov. 27.*—Early ashore collecting. Hills very steep, but walking good—mostly smooth sandstone and some soil. We found land birds, except *Geospiza*, rather scarce. We got ten small birds and two hawks. We saw quite a lake right behind the cove, separated from it only by a comparatively small ridge of lava. We got back to the vessel by 10 a.m., and skinned birds all the afternoon.

*Nov. 28.*—Rather a busy Sunday. We got up at 4.30 a.m., and at 5 had coffee. Then we four started for the top of the mountain. We made very fair progress for the first three miles, the walking being very open. As we proceeded higher the brush thickened, and made it much slower progressing. Finally, when we got half-way up in distance, and about four-fifths in height, we made a halt. From here Beck went on to the top, where he found a huge crater, about 1000 ft. deep by 2 miles wide, mostly bare lava. The rest of us started back, taking a few birds and one small snake. No tortoise seen. We got back to the vessel in time for supper, Beck arriving later.

*Nov. 29.*—Skinned yesterday's birds, and loaded ammunition in the morning. In the afternoon Hull and Beck went after sea birds in the skiff, while Harris and myself went on shore. Harris intended to get some land birds. I collected some 20 lizards and large grasshoppers, a species which occurs throughout the group. I noticed a few dragon-flies, but could not catch them. Beck and Hull collected a number of black terns, shearwaters, gulls, boobies, etc. Harris had another chance at a falcon, the one which he saw and shot at two days since. Unfortunately his gun missed fire, and it escaped.

*Nov. 30.*—Skinned birds all the morning, doing about 40 fair-sized ones. After dinner Harris and myself went along the shore in the skiff after urchins. We found four species, all quite abundant. On the bottom, about 3 ft. under water at low tide, we found some magnificent purple urchins, with spines about 4 to 6 in. long. We found four species of star fish, and gathered a lot of sea urchins. Some 18 penguins taken later in the afternoon.

*Dec. 1.*—Skinned penguins all day, each of us doing six (Hull, Beck, and myself)—a long job, as the birds are incredibly fat. Wind was blowing strong in the morning, reminding us of December gales at home.

*Dec. 2.*—Harris, Hull, and Beck went over to the watering place, and thence inland, collecting small birds. They returned at noon with 60 birds. I remained on board and cleaned 175 or so urchins, and dried some star fish. In the afternoon skinned birds.

*Dec. 3.*—Skinned balance of birds, loaded ammunition, and had a general

cleaning up and packing. In the afternoon we went around Turtle Point to a sand beach, hoping to get some turtle and shore birds. We shot an oyster-catcher, which, with a green heron, some turnstone, and ringed plover, were the only birds seen. There were some small shells and sea beaver on the beach. We got two turtle from this beach. When leaving we passed another little beach, and seeing three turtle there, the mate, Beck, and myself landed on the rocks, it being too rough to go in with the boat. We brought the turtles down to where they could be hauled out to the boat with a rope. We landed on the rocks again, and farther along caught several big iguanas. Collected six boobies, five pelicans, some *Larus*, one *Creagrus*, and a few others. We noticed a large crab, of the kind most abundant here, eating a somewhat smaller one of the same species. When disturbed he took his victim in one claw, retreated quickly several feet, and resumed his meal.

*Dec. 4.*—Skinned birds all the morning. The pelicans skinned easily. In the afternoon Hull, Beck, and myself went off in the skiff for iguanas. There was a big surf running, and we found it hard to make a landing. We secured about ten good-sized iguanas.

*Dec. 5 (Sunday).*—Rested.

*Dec. 6.*—Up early, and started in the yawl boat for the small patch of vegetation on the north side of **Narborough Island**. Not much breeze at first, but it gradually freshened, and we made the distance, eight miles, in fair time. There was a big surf running, but we managed to make a landing. We saw several specimens of a bird, probably a **cormorant**, and secured three.\* The birds were wild, and kept in close to the breakers, so that no more could be obtained. We found land birds scarce and wild. We collected a few specimens of *Geospiza*, *Nesomimus*, *Dendroica*, *Certhidea*, *Mniarchus*, *Camarhynchus*, and *Nesopelia*. Several hawks were seen. Black iguanas were common on the rocks, and we found probably a new species of land iguana, of which we collected **32 specimens**. They resembled those taken at Barrington in general character, but were **highly coloured** with different shades of red, yellow, and white.† They had holes in the gravel similar to the Barrington Island specimens. We started back at 1 p.m., picking up another cormorant.

*Dec. 7.*—Skinned birds all the morning, and iguanas the rest of the day. Average length of the Narborough Island species, 5.8-5.9 in. They were *females* for the most part, and considerably smaller than the *males*. Most of the *females* showed no signs of breeding: only one contained seven partly developed eggs. We saw a small bat in the evening. This was the only one seen. It appeared dark, and about the size of the common one of New England.

*Dec. 8.*—Skinned iguanas all day. Just as we were getting through, about 4.30 p.m., a vessel came in sight around the point, and headed up the pass between Albemarle and Narborough, which was followed by another and smaller one. They came in the cove, and were soon anchored alongside of us. They proved to be the British man-of-war *Leander* and the torpedo destroyer *Virago*.

*Dec. 9.*—Hull, Beck, and myself started off in the skiff after iguanas, turtle, cactus, etc., to Albemarle. We collected about 15 good-sized iguanas and some small ones. We pulled along the shore a couple of miles or so, and found a little sand beach, with several turtle on it. There was a big cucumber-cactus here also, and we laid in all that the boat would hold. It was smooth water when we landed,

\* *Phalacrocorax harrisi*.

† This is evidently a new form, differing by its remarkable coloration, and may be named *Conolophus subrietatus pictus* subsp. nov.

but by the time we were ready to start it became quite rough, and we had some trouble in getting out. We returned to the vessel. In the afternoon several officers and midshipmen from the man-of-war came aboard. They had many questions to ask.

*Dec. 10.*—Two officers from the gunboat came aboard at 8 a.m., bringing quite a lot of books for us. Soon after the two ships headed out, taking our mail.

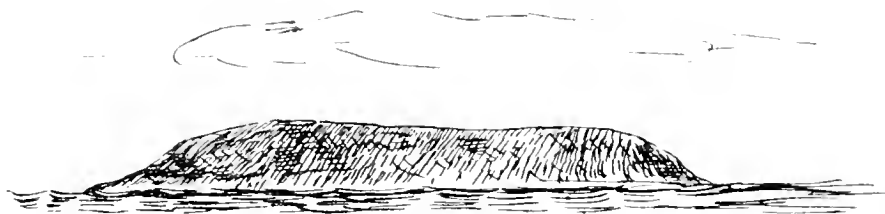
*Dec. 11.*—Did little else but try and get under way. The wind was light and baffling, and all our labour was to no purpose.

*Dec. 12 (Sunday).*—Tried again to get out of the cove, with no success. We poisoned the turtles that were skinned two days since.

*Dec. 13.*—Managed to get out of Tagus Cove late in the morning. We started for **Tower Island** with a fair breeze round the north end of Albemarle. We skinned a few iguanas in the afternoon: one was a *female* with eggs. The egg was spherical, about 1 in. in diameter.

*Dec. 14.*—Skinned iguanas all day. We sighted a vessel in the afternoon, which appeared to be making for Tagus Cove, but did not get nearer than 8 or 10 miles of her.

*Dec. 15.*—Skinned iguanas all day. Weather very hot.



TOWER ISLAND.

*Dec. 16.*—Skinned iguanas, finishing them. Weather hot: a little breeze.

*Dec. 17.*—Fair breeze. We came in sight of Abingdon towards noon. Calm during the first part of the night.

*Dec. 18.*—Calm nearly all day. We had a little rain, the first for a long time. We packed up some stuff in the morning: noticed three or four of the Culpepper tern around the vessel in the evening.

*Dec. 19 (Sunday).*—A good breeze all day. We sailed up to the north side of Abingdon Island. Bindloe was in sight the last part of the day.

*Dec. 20.*—Good breeze. Out of sight of land all day. At 4 p.m. Tower Island bore S.W.—68 miles.

*Dec. 21.*—Good breeze all day. Tower Island in sight most of the time, but could not get near it.

*Dec. 22.*—Condition of affairs about the same. Tower Island in sight.

*Dec. 23.*—Good breeze all day. Out of sight of land. A large school of porpoise came around the vessel towards the evening. The mate struck a couple, but the harpoon pulled out both times.

*Dec. 24.*—Some breeze all day. We found that we were quite a way south of Tower. We could see Chatham in the distance.

*Dec. 25 (Christmas!)*—Not much wind in the morning early. We sighted Tower Island soon after breakfast, and sailed up to it, coming to anchor at 2.30 p.m.;

and soon after Hull, Beck, and myself went ashore after cactus for the tortoises. **Tower Island.** Noticed *Croagrus*, tropic birds, boobies, black terns, frigate birds, shearwaters, petrels, and *Larus fuliginosus*. The shore on the N.E. end is rather bold—steep bluffs and a small black sand beach. At breakfast the captain put a Christmas present at each plate—some chocolate sticks for Beck, and four cigars each for the rest of us. This, combined with some “ha-ha,” was our Christmas celebration. We have sailed 1000 miles since leaving Tagus Cove.

*Dec. 26.*—Harris, Hull and myself went ashore collecting. The walking was very fair, principally smooth lava. Cactus was abundant in patches, and gum trees 10 ft. high. Birds plentiful, especially *Certhidea* and *Nesomimus*; found several species of *Geospiza*, the *Dendroica* and *Nesopelia*; red-footed boobies were nesting in bushes all over the island, and we collected quite a number of eggs. Also saw yellow-crowned night herons, frigate birds, petrels, short-eared owls and *Larus*. Hull found the eggs partly developed in a large-billed *Geospiza* that he skinned. I collected some 30 birds. Hull and myself skinned 15 each in the afternoon. Saw no iguanas except small ones. Noticed some small grasshoppers and one small butterfly.

*Dec. 27.*—Skinned birds all the morning. Dinner a little early, and went ashore collecting; took about 35 birds each. Tramped over a considerable part of the island. In character the island is the same all over. Got a few red-footed boobies' eggs. Also one egg of *Croagrus*. Hull shot a cuckoo, but failed to find it. Took in two boat-loads of cactus for the tortoise. Returned to the vessel at 7 p.m. This was our last day on the Galapagos Islands. We reached San Francisco again on Feb. 8th, 1898.

#### LIST OF THE MOST IMPORTANT WORKS AND ARTICLES ON THE FAUNA OF THE GALAPAGOS ISLANDS, REFERRED TO IN THE FOLLOWING PAGES.

- J. GOULD.—Remarks on a group of ground finches from Mr. Darwin's collection, with characters of the new species. In *Proc. Zool. Soc. Lond.* 1837, pp. 4—7.
- J. GOULD AND CHARLES DARWIN.—*Zoology of the Voyage of the "Beagle" during the years 1832—1836*, vol. iii. Birds (1841).
- P. L. SCLATER AND OSBERT SALVIN.—Characters of new species collected by Dr. Habel in the Galapagos Islands. In *Proc. Zool. Soc. Lond.* 1870, pp. 322—327.
- OSBERT SALVIN.—On the Avifauna of the Galapagos Archipelago. In *Trans. Zool. Soc. Lond.* v. ix., pp. 447—510, 1876.
- THEODOR WOLF.—Ein Besuch der Galapagos Inseln, *Heidelberg*, 1879.
- CHARLES DARWIN.—*Journal of Researches*, etc. Edition of 1890. Chapter xvii., pp. 397—427.
- A. R. WALLACE.—*Island Life*. Edition 1892. Chapter xiii. pp. 275—291.
- W. L. AND P. L. SCLATER.—*The Geography of Mammals*, pp. 53, 54 (1899).
- R. RIDGWAY.—Birds of the Galapagos Archipelago. In *Proc. U. S. Nat. Mus.* v. xix. pp. 459—670, 1897, and previous articles of the same author.
- G. BAUR.—On the Origin of the Galapagos Islands. In *Amer. Naturalist*, 1891, pp. 217—229, 307—326.
- G. BAUR.—Ein Besuch der Galapagos Inseln. In *Beilage zur Münchener Allgemeinen Zeitung*, Febr. 1—4, 1892.
- G. BAUR.—Ein Besuch der Galapagos Inseln. In *Biolog. Centralblatt*, 1892, pp. 221—250.  
A reprint of the former article.

- G. BAUR.—The Differentiation of Species on the Galapagos Islands and the Origin of the Group. In *Biol. Lect. Mar. Biol. Laborat. Wool's Hall*, 1893, pp. 67—78.
- G. BAUR.—New observations on the Origin of the Galapagos Islands. In *Amer. Naturalist*, 1897, pp. 661—680, 864—896.
- G. BAUR.—Birds of the Galapagos Archipelago: A criticism of Mr. Robert Ridgway's paper. In *Amer. Naturalist*, 1897, pp. 777—784.
- A. AGASSIZ.—The Galapagos Islands. In *Bull. Mus. Compar. Zool.* v. xxiii. pp. 56—75 (1892).
- A. GÜNTHER.—President's Anniversary Address. In *Proc. Linn. Soc. Lond.* Oct. 1898, pp. 14—29.

## IV.

## GENERAL REMARKS ABOUT THE FAUNA OF THE GALAPAGOS ISLANDS.

To the zoologist the Galapagos Islands are “classic ground.” Their natural history was unknown until they were visited by the *Beagle*. It was here that Darwin made many of the observations, “the importance of which in their bearing upon the study of natural science has never been equalled.”\* Since Darwin's time, however, large collections have been accumulated, chiefly by Dr. Habel in 1868, by the naturalists of the *Albatross* in 1888 and 1891, by Messrs. Baur and Adams in 1891, and now by the expedition under Mr. Harris. This material is perhaps larger than any material ever brought together from any area of similarly small dimensions. Although we must admit that we are still sadly in want of biological observations upon many of the birds, and of all knowledge of the nidification and eggs of the land-birds, we can hardly believe that this vast material is “still too fragmentary to warrant any serious attempt to solve the problems to which Mr. Darwin first called attention.”† If such collections are not sufficient to throw light upon these problems, no collections will ever do so; and we cannot see how the discovery of five or six more subspecies of land-birds, or of some more accidental visitors, can alter our present conclusions. If we are not able now to solve some of the problems alluded to, then we are afraid it is not want of material that prevents our coming to satisfactory conclusions; but we are then either not able to deduct sufficiently from the material at hand, or no accumulation of zoological specimens will ever help to answer our questions.

As it is, we cannot spare our readers a short discussion on the origin of the Galapageian fauna, and we hope that our conclusions may be found to be acceptable, although we cannot explain everything, and although we do not for a moment think that ours will be the last word upon the subject.

There are two theories: viz., that of Darwin, Wallace, and most other naturalists, that the islands were uplifted from the ocean, and never were in connection with the continent of America, or with each other; and that of Dr. Baur, who said that the islands were once connected with America and with each other, and were submerged in or after the Eocene period. Both these views must be taken into earnest consideration. The geology of the Galapagos Islands shows that their formation is quite different from that of the opposite mainland of South America,‡

\* Salvin in *Trans. Zool. Soc. Lond.* Vol. IX. p. 461.

† Ridgway in *Proc. U.S. Nat. Mus.* Vol. XIX. p. 459.

‡ Agassiz in *Bull. Mus. Comp. Zool.* Vol. XXIII. pp. 56-74.



the intervening sea declines to 1500 and 2000 fathoms, and is almost devoid of shallows and smaller islands towards the mainland. Geological evidence, therefore, is entirely opposed to a former land-connection of the Galapagos Islands with America. The flora has an undoubted American character, although the proportion of species confined to the islands in question is enormous.\* The fauna represents most difficulties. Darwin † says: "But it is the circumstance that several of the islands possess their own species of the tortoise, mocking-thrush, finches, and numerous plants, these species having the same general habits, occupying analogous situations, and obviously filling the same place in the natural economy of this archipelago, that strikes me with wonder." Indeed, a wonder it may be called, that islands so close together, and apparently with the same natural conditions, have so many representative forms. Such facts were almost unknown, or at least not properly understood, at the time of Darwin's exploration; but nowadays they are well known to every naturalist. A similar differentiation of forms—one form representing other closely allied ones on different islands—is now known to exist in every group of islands, apparently more pronounced in groups of greater age than in geologically younger groups of islands. Let us take for examples the *Drepanidae*, *Phalaris*, *Chasiempis*, and *Moho* in the Hawaiian archipelago, the whole fauna of the Malayan and Papuan archipelago, especially the birds, marsupials, lepidoptera, the fauna of Antilles and the Philippines, the parrots of Curaçao, Aruba, and Bonaire, the birds of the Marianne and Caroline Islands—in fact, the fauna of almost every archipelago or of any detached islands on the earth's surface. Only the fact that the various islands are so very close to each other ‡ makes the case of the Galapagos more striking.

Dr. Baur § discusses the question how this "harmonic distribution" has come about. He maintains that there is only one explanation—namely, that the islands were in former times connected, forming a large and continuous mass of land, the volcanic rocks which now form the islands having been elevated on the latter. At that time, he says, the number of species found there was small. Then this mass of land became submerged, and the few original species which inhabited the whole area, having become restricted to the former mountain-tops, now islands, became differentiated in many different forms through isolation. This theory sounds very sensible and probable, but, if applied to the Galapagos Islands it must equally be applied to most other island-groups where similar phenomena exist, as we have explained before. Dr. Baur is convinced that the differentiation of so many forms on the various islands could never have taken place through the accidental arrival of individuals. The necessity of this deduction, however, we cannot see. It is doubtless, in our opinion, quite as intelligible, that the various islands have been populated from one island, where an ancestral form was living. Thus, they were reached at various times, and by-and-by, through isolation, the separated colonies became slightly changed, without the necessity of assuming a submergence of a great area, the existence of which is opposed to geological observations and theories. In fact, the differentiation, as found in the various forms, seems more explainable if we accept that they have reached their present home at various times, because their

\* Darwin, *Journal of Researches*, p. 419 (Edit. 1890).

† *t. c.* p. 423.

‡ *t. c.* p. 423.

§ "The Differentiation of Species in the Galapagos Islands and the Origin of the Group," Boston (in *Biol. Lect.*) 1895, and in *American Naturalist*, 1891, pp. 217-29 and 307-36).

characters are not harmonious, as we do not, for example, find all forms darker or paler, larger or smaller, on the same islands.

The next, and evidently the more important question, is, whence came the inhabitants of the Galapagos. We believe, with Darwin and others, that there can be no doubt that the whole fauna came from America.

The one or two species of rats, and the one bat, have their nearest relatives in South or Central America.

The relationship of the resident birds is as follows :—

Genus *Nesomimus* : Peculiar to the group, though closely allied to the purely American genus *Mimus*, in fact hardly generically separable (p. 142).

Genus *Dendroica* : Purely American (see afterwards, p. 147).

Genus *Certhidea* : Peculiar to the group. Somewhat uncertain, but evidently nearest allied to American forms (see afterwards, p. 148).

Genus *Progne* : Purely American (see p. 151).

Genus *Geospiza* : Peculiar to the group. Evidently nearest related to *Guiraca* and other purely American forms.

The *Dolichonyx* is probably only a visitor. Conspecific with the American form. Genus *Myiarchus* : Purely South American.

Genus *Pyrocephalus* : Purely American. The two forms may almost be called dwarfed forms of the mainland species.

*Coccyzus* : The same as in South America.

The *Strix* has its nearest relative in South America (Ecuador. See afterwards, p. 202).

The *Asio* is peculiar, but nearest to the cosmopolitan *Asio accipitrinus*.

The *Buteo* is nearest allied to the North American *Buteo swainsoni*, which wanders in winter all over South America.

The *Fregata* is indifferent, being a widely spread marine form.

The *Pelecanus* is the Western American form.

The *Salae* are more or less peculiar or Western American marine forms.

The *Phaethon* is indifferent.

The *Ardea* is North American.

The *Herodias* is North and South American.

The *Butorides* is very closely allied to the continental American form.

The *Nyctanassa* is purely American.

The *Phoenicopterus* is not one of the South American species, but the one inhabiting the coasts of the Caribbean Sea, Florida, the Bahamas, etc.

The *Poecilornatta* is closely allied to *P. bahamensis*, which, according to Salvadori,\* inhabits the "Bahamas, Antilles, and the whole of South America, with the Falklands, but is not found in Venezuela, Colombia, and Ecuador."

The genus *Nesopelia* is peculiar to the Galapagos, but nearest related to American genera.

The Rails (*Crexiseus*) belong to an American genus.

The *Haematopus* is peculiar, but evidently nearest to American forms.

The *Spheniscus* is a peculiar species, but nearest akin to a Chilean species.

The *Oceanites*, *Procellaria*, *Oceanodroma*, *Puffinus*, *Aestrelata*, *Diomedea*, *Anous* and *Gulls* are indifferent, being marine.

The *Phalarocorax* is quite peculiar, but not of value for our present question.

\* *Cat. B. Brit. Mus.* Vol. XXVII. p. 281.

The number of North American migrants is very great and remarkable. The *Heteractitis* is the form breeding probably to the north of Alaska (?), but it is certainly misleading to call it a "Pacific" form,\* as it merely extends its wanderings over parts of the Pacific Ocean.

The result is that the whole ornithology, as far as it is not indifferent on account of its being pelagic or cosmopolitan, is American or more or less closely allied to and consequently most likely derived from American forms.

The "obvious leaning toward certain Hawaiian dicacidine forms" †, which Ridgway surmises does not exist, and the "possibility of a former land-connection of the Galapagos Islands with the Sandwich Islands, either continuous or by means of intermediate islands as stepping-stones," does therefore most certainly **not** become a factor in the problem.

Considering the distance from the American continent, the great number of species peculiar to the Galapagos, although remarkable, cannot be astonishing.‡ The footnote on p. 235 (in the Edition of 1890) of Darwin's *Journal of Researches*, based on a manuscript note of Dr. Selater, is erroneous, for neither *Strix punctatissima*, nor *Pyrocephalus nunnus*, *Otus galapagoensis* and *Zenaidura galapagoensis* inhabit the American continent. On the contrary, progress of research has shown that the number of species and subspecies confined to the islands is far greater than it was believed to be.

The *Lucertilia* are of undoubted American origin, although—especially the marine *Amblyrhynchus cristatus*—local and of considerable interest.

The Giant Land-Tortoises offer the greatest difficulty. Nearly all authorities agree that it is not probable that they have crossed the wide sea between the Galapagos Islands and the American continent, although, while they are helpless and quite unable to swim, they can float on the water. If their ancestors had been "carried out to sea once or twice by a flood and safely drifted as far as the Galapagos Islands,"§ these ancestors must have been numerous on the continent. It is absolutely necessary to have palaeontological evidence, before we can answer the question whether they existed on the South American continent or not; and the examination of fossil or subfossil bones if any were found on the Galapagos Islands would also, perhaps, have most important results. At present we cannot, therefore, fully answer the question of the origin of the Giant Land-Tortoises on the Galapagos Islands.

The insect-fauna of the Galapagos Islands is naturally very poor, but there is nothing in it to oppose an American origin.

The number of the land-shells is not very large. There is said to be some slight similarity with Pacific forms (Darwin, *l.c.* p. 416), but it is doubtful if further researches will admit this fact as at all important; and, besides, we firmly believe, that the distribution of small land-shells on islands is not an important factor for zoogeographical problems, the easy transportation with drift-wood, bamboos, or by floating on the water, disqualifying them to a great extent.

\* Ridgway in *Proc. U. S. Nat. Mus.* v. XIX. p. 463.

† Ridgway, *l.c.* p. 467.

‡ On the other hand, we have instances where enormous distances have not caused any such remarkable differentiations—for example, on the Azores. Here, however, different winds, currents, different geological age and other circumstances have produced quite different conditions. Cf. Wallace, *Island Life*.

§ Wallace, *Island Life*, p. 279.

We have thus seen that the birds—which not only form the bulk of the inhabitants of the Galapagos Islands, but which are most important for zoogeographical considerations, since they cannot easily be distributed involuntarily, resisting as they do the winds and currents to a great extent—as well as the rest of the animated nature of this group of islands, is either evidently of American origin, or not opposed to it. As far as the birds are concerned, they can all have reached the Galapagos without a former land-connection. The question therefore arises, are we justified to assume, on account of the presence of the tortoises, a former land-connection, and the disappearance of vast areas of land, here as well as between Africa, Aldabra and the Mascarenes? It seems more natural to assume the disappearance of a great stock of animals, the remains of which have survived, through favourable circumstances and the absence of enemies—men and beasts—on outlying marine islands, than to assume the disappearance, in comparatively recent times (*i.e.*, in the Eocene period or later), of enormous land-masses. On the other hand, if great islands and mountain ranges have been uplifted, others might as well have—and we know they have—been submerged. Palaeontological researches and many more soundings in the ocean seem to be of much importance for the solution of such problems. At present we can only come to the following conclusions:—

**I. The entire fauna of the Galapagos Islands derived originally from America.**

**II. It is uncertain whether there has ever been a land-connection between the various islands and between the islands and the continent or not.**

Now to return to the ornithology of the group. There are several interesting facts which should be mentioned. The absence, with few exceptions, of brightly coloured species, and the prevalence of sombre forms, is striking, but can be understood from the sombre aspect of the sunburnt rocks and the vegetation. A peculiar feature is the quantity of birds found in the dress of immature individuals. This is most apparent and has often been commented on among the *Geospizæ*. It is not, however, confined to the genus *Geospiza*, but is equally found in the genus **Certhidea**. Of *Sula piscatrix websteri*, which breed in great numbers in white plumage on Clarion Island, while greyish brown individuals are rarely seen there, hundreds breed on the Galapagos Islands in a grey-brown dress, very much like that of the young birds, but paler. White specimens of this *Sula* are very rare on the Galapagos Islands. The Anous (*Anous stolidus galapagensis*) resembles somewhat an immature *Anous stolidus* having the crown somewhat darker, and quite dark birds are numerous.

The reason for this peculiarity is not known, but one might suggest that it lies in some want of strength, or a somewhat arrested development.

The great tameness of the birds has been mentioned by most visitors to these islands. We find the same on other oceanic uninhabited islands, most of all on Laysan, where it is quite stupendous.\*

With regard to the affinities between the fauna of the various islands, we find that the birds of those islands which are nearer to each other are generally much more allied or identical, while the more distant islands have many less forms in common. This of course applies almost only to the land birds. In many cases Narborough, Albemarle, James, Jervis, Duncan, Indefatigable and Barrington have the same forms, in others at least James, Jervis, Duncan, and Indefatigable. The

\* Cf. Schauinsland, *Drei Monate auf einer Koralleninsel*, and Rothschild, *Avifauna of Laysan*, Part 1

more outlying islands, Chatham, Charles, and Hood, and again Bindloe, Abingdon, and Tower, as well as Wenman and Culpepper, have generally more differentiated forms. Abingdon and Bindloe have apparently almost always the same subspecies, if the species is found on both. The ornithology of Hood and Tower is very poor in the number of species, but very different. Wenman and Culpepper have also very few species of land birds, but they are nearly all different from those of the other islands. The *Nesomimus* of Wenman, however, we cannot distinguish from that of the central islands. Wenman and Culpepper have often, but by no means always, the same forms.

Both Wenman and Culpepper are as yet apparently insufficiently explored. Narborough and Albemarle have the same forms, as might be expected from their close proximity, but the *Nesomimus* seems to be quite different, although closely allied. These facts seem not to have been explained before: in fact, only a large material could help to show them.

The evident affinities with the North and Central American ornithology (cf. *Phoenicopterus ruber*, *Haematopus galapagensis* (very closely allied to *H. frazari* from Lower California), *Ardea herodias*, and perhaps *Myiarchus* and *Dendroica*) are easily explained by the tendency of northern forms to migrate in a southerly direction, while tropical forms do not actually migrate. Analogous facts are observed in the Canary and Cape Verde Islands, where a great proportion of European forms is found. The southern hemisphere has evidently sent hardly any colonists to the Galapagos Islands. The only striking example of these is *Spheniscus mendiculus*. This is by far the most northern home of any member of the order *Impegnnes*, which is entirely restricted to the southern hemisphere. No species is known to cross the equator, only three reach as far north as Peru, Rio Grande do Sul, and South Africa, and *Spheniscus mendiculus* alone lives on the equator. Of no other resident bird can we confidently say that it can only have been derived from the southern hemisphere. Even migrants from the south are not known to occur, with the exception of the alleged occurrence of a single specimen of *Querquedula versicolor* (see p. 203).

It has been thought to be possible that the larger islands might have different representative forms in various parts. Especially of the large island of Albemarle the probability has been suggested, that the birds of North- and South-Albemarle might differ, as the tortoises from these parts are recognised as two different species. Our collections, however, do not support this idea, but they seem to prove that only one representative form is found on every island.

Salvin has also raised the question, whether the elevated interior portions of the islands, where "clouds usually hang over the higher mountains, where the moisture is far greater than on the sea-shore, and consequently the vegetation is far more luxuriant," were inhabited by different birds. Mr. Harris and his companions did not find this to be the case, but they found the same subspecies in suitable places in the various parts of the islands.

During our work we have had most assistance from Mr. Ridgway's admirable work on the *Birds of the Galapagos Archipelago*. Principally we agree with Mr. Ridgway in going as far as possible in distinguishing, and consequently naming, as many forms as possible; and we fully bear witness "that the real promoter of chaos and enemy of order is the 'lumper,' and not his much maligned co-worker, the 'hair-splitter.'"

Our material, consisting of not less than 3075 skins from the recent expedition under Mr. Harris, and the Baur collection of about 1100 skins, is by far the largest

hitherto brought together. Besides this, we have had constant access to Gould's and Salvin's types in the British Museum. It is therefore natural that we have, in some cases, come to conclusions different even from those of the latest authority, Mr. Ridgway. In all, or nearly all such cases, we found that it has been the weight of our large material which altered the decision. The instances where we deviate from Ridgway among the most difficult group, the *Fringillidae* (genus *Geospiza*), are not numerous. The various species of *Pyrocephalus* described by Ridgway could not be recognised, nor could we possibly separate the *Certhideae* from the central group of islands. In the genus *Sula* good work has been done by Harris' party in collecting for the first time, apparently, specimens of what had been called *Sula cyanops*. It is not *S. cyanops*, but the rare *Sula variegata*. The Galapagos Islands are its breeding-place.

Perhaps the most extraordinary discovery is the flightless *Phalacrocorax harrisi* Rothsch. Dr. Sharpe has placed it in a new genus which he called *Nannopterum*, but we do not see the necessity of doing so. The *Diomedea* breeding on Hood Island, hitherto believed to be *D. exulans*, is *D. irrorata*, formerly only known from the type-specimen in the British Museum.

We have for the first time used trinomial forms for the local forms of the *Passeres*. If trinomial forms are used everywhere else, there is no reason why the birds of the Galapagos Islands should be deprived of this most useful form of nomenclature. In cases where certain individuals of representative forms are hardly, if at all, distinguishable, but where a series is easily separable, the recognition of subspecies is inevitable. Our material has generally left very little doubt to us, whether we should treat a form as species or subspecies. In cases where we could not easily decide, or where our material has misled us, we must trust to future explorations for a modification or correction of our present arrangement.

The advent of men has apparently not yet influenced the ornithology of the Galapagos to a great extent. It is only on Charles Island that we can confidently say that the *Nesomimus trifasciatus* has disappeared, and where probably at least one or two thick-billed finches have become extinct. As the earliest settlement of men has been on Charles Island, and as we know that they had no regard for the birds—sailors, finding the tameness of the birds strange and novel, used to take a cruel pleasure in knocking them down with sticks—we are probably right in ascribing these disappearances merely to human influence.

It is to be feared that the progress of guano-digging and cultivation, and the fact that cattle, goats, horses, asses, pigs, dogs and cats have become wild on various islands (see Wolf & Baird in *Amer. Naturalist*, 1891, p. 318), will influence the status of the ornithology ere long, and we must therefore consider it rather fortunate that such large collections are already safely preserved, especially in the museums of Tring, London, and Washington.

## V.

### THE BIRDS OF THE GALAPAGOS ISLANDS.

#### GENUS NESOMIMUS Ridgw.

This genus has been separated from *Mimus* on account of its longer and basally more compressed bill and longer tarsus, but these characters are hardly sufficient for generic separation, the longer tarsus especially being a very weak character.

Mr. Ridgway remarked that there are two groups "which in a more exact sense might be considered as species, the several allied forms being more properly subspecies." Four or five groups would be even more natural, *N. trifasciatus*, *N. macdonaldi*, and *parvulus* with *affinis* standing rather by itself. Ridgway mentioned eight species; we are now able to recognise eleven different forms. In all the species the *male* has a longer bill and is generally a little larger than the *female*, but similar in colour.

### 1. *Nesomimus trifasciatus* (Gould).

*Orpheus trifasciatus* J. Gould in *P. Zool. Soc. Lond.* p. 27 (1837).

*Mimus trifasciatus*, Gray, *Zool. Voy. Beagle*, III. Birds, p. 62. Pl. XVI. (Charles L.) (1841).

*Nesomimus trifasciatus*, Ridgway, p. 483 (1861).

This species is easily recognisable by its large size and broad blackish brown band across the chest, interrupted and concealed in the middle. There are, however, not two bands, as one might expect from Ridgway's "key." The wing-coverts have very conspicuous large white spots. The wing of the male is 128—130 mm. long, the tail 123 (about—most specimens being in worn plumage, with the tails much abraded), tarsus 40, exposed culmen 26—27 mm. The same measurements in the *female* are: Wing 116—120, tail 115 (approximately), culmen 25—26, tarsus 38—40 mm. "Iris seal-brown, tarsi, feet and bill blackish."

No specimens of this species have been collected since Darwin's visit to the Galapagos, where it was found on Charles Island, and the two skins in the British Museum are the only ones known from that island. Neither Dr. Habel, the naturalists of the *Albatross*, nor Messrs. Baur & Adams met with this bird on Charles Island. Our collectors did not find a *Nesomimus* on Charles Island, where it is probably now extinct; but on Gardner Island, a little islet close to Charles Island, they found *N. trifasciatus* rather plentiful. At the time of their visit (October) they were in worn plumage, and no young birds were met with.

Of all the species of *Nesomimus* this is one of the most distinct ones, and it differs from all the others in the colour of its iris, which is of a rich seal-brown, while all the other species have a greenish or pale yellow iris. One of our skins has a few white feathers in the crown.

### 2. *Nesomimus macdonaldi* Ridgw.

*N. macdonaldi*, Ridgway in *Proc. U.S. Nat. Mus.* XII, p. 103. fig. 1; XIX, p. 484 (1890).

Easily distinguished from *N. trifasciatus* by the markings on the breast, which is not crossed by a wide interrupted black band, but only by an area of dark brown spots, the crop-region too being crossed by a band of smaller dark brown spots, separated from the other row of spots by a narrow unspotted whitish belt. The feathers of the upper parts have more distinct brownish grey edges, so that the upper surface has a much paler aspect.

The bill is very long in adult *males*. "The iris is yellowish."

The home of this bird is Hood Island, where five skins were collected by the *Albatross*, and where Baur & Adams caught about half a dozen, one of which they skinned, while the others reached us in spirits.

Our collectors found them common. They were in rather worn plumage in

October. Dr. Baur procured also a specimen on Gardner Island, near Hood Island, a small island in front of Gardner Bay. This island has nothing to do with the other Gardner Island, near Charles Island. This latter one is marked on the chart, the one near Hood not. Dr. Baur visited only Gardner Island near Hood Island, Harris' expedition the one near Charles Island. The existence of these two Gardner Islands has led Mr. Ridgway to make his note on p. 484, doubting Dr. Baur's statement that he got *N. macdonaldi* on Gardner Island. The specimen is not lost at Guayaquil, nor are most of the other specimens said to be lost by Mr. Ridgway. Mr. Ridgway has evidently only received for examination the skins and a small portion of the spirit-specimens. Dr. Baur has now published a careful list of the specimens actually lost by him at Guayaquil, and all the other spirit-birds are in our collection.

### 3. *Nesomimus adamsi* Ridgw.

*N. adamsi*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 358 (1894); XIX. p. 487 (1896).  
(*Mimus melanotis* partim Gould, Sundevall and Ridgway 1889.)

This mocking-thrush is an inhabitant of Chatham Island, where it has been known to exist since 1841, but was then confounded with *N. melanotis*. It differs, however, clearly from the latter in having a more or less developed black line on each side of the throat, under the ear-coverts, sometimes running up to the base of the bill. Across the chest a dusky shade, in which are a number of brown spots, thus forming an indistinct band across the chest. There are, however, a few specimens in which this band is hardly indicated at all. The ear-coverts are just as black as, but certainly not blacker than, in *N. melanotis*. The pileum is often, but not always, lighter than in *N. melanotis*. In the young the feathers of the back and rump are broadly margined with pale rusty cinnamon, and the foreneck, chest, and sides of body are thickly spotted with black, as in a European song-thrush. "Iris yellowish." It is somewhat arbitrary whether this form is placed in the same section with *N. macdonaldi* or with *N. melanotis*; we have therefore not given it a trinomial name for the present, although it is hardly more than a subspecies. We have the type and three skins from Dr. Baur, as well as some spirit-specimens from the same collector, and Harris' party found the bird common on Chatham Island. They were in good plumage in October. Some skins are strongly washed with buff, but this is evidently due to some external process.

### 4. *Nesomimus melanotis personatus* Ridgw.

*N. personatus* Ridgw. in *Proc. U.S. Nat. Mus.* XII. p. 104 (1890); XIX. p. 488 (1896).

This form is very much like *N. melanotis melanotis*, but differs in being slightly larger and darker above, with the flanks more tinged with brown. Sides of the neck less widely white. "Iris yellowish."

This form was discovered on Abingdon by the naturalists of the *Albatross*. Messrs. Baur & Adams obtained several which were put in spirits of wine, and Mr. Harris' expedition met with it on the same island, where it was not rare.



### 5. *Nesomimus melanotis melanotis* (Gould).

*Orpheus melanotis*, Gould in *Proc. Zool. Soc. Lond.* p. 27 (without locality) (1837).

*Mimus melanotis* Gould, *Voy. Beagle*, III. Birds, p. 62. Pl. XVII. (Chatham and James Is.) (1841) ;

Sharpe, *Cat. B. Brit. Mus.* VI. p. 349 (1881).

*Nesomimus m.*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 489 (1896).

This is by far the best known species of *Nesomimus*. It is known from Indefatigable, Jervis, and James Islands. Mr. Harris' party also found it frequently on Wenman, one of the two small detached northern islands. This is one of the most peculiar phenomena in the distribution of the Galapagos birds : but we may state that we have most carefully compared our five series, and do not find any constant character at all to distinguish the Wenman birds from those of Jervis, James, and Indefatigable.

Another interesting fact is that no *Nesomimus* was found on Duncan Island, although diligently sought for. We have a large series from all the four islands.

### 6. *Nesomimus melanotis carringtoni* W. Rothsch.

*N. carringtoni* W. Rothsch. in *Bull. B. O. Club* (October) (1898).\*

Very closely allied to *N. melanotis melanotis*, but distinguishable by a longer and slenderer bill, shorter wing and generally paler upper surface. Wing shorter, and tips to rectrices larger than in *N. bauri*. Wing ♂ 108—111 mm., ♀ 190—104 mm., tail ♂ 110—115, ♀ approximately 105 (all worn), exposed culmen ♂ about 28 mm., ♀ about 26 mm. "Iris yellowish."

Former collectors did not mention a *Nesomimus* on Barrington Island ; Messrs. Baur & Adams, however, say that they procured specimens there, but they were lost. The new collections contain a good series of this form.

Eight specimens in Tring Museum, including the type.

The name of this form has unfortunately been misprinted, as it should of course have been spelt with a *b*.

### 7. *Nesomimus melanotis hulli* W. Rothsch.

*N. hulli*, W. Rothschild in *Bull. B. O. Club*, p. 52 (May 1898).

Differs from *N. melanotis melanotis* in having the buffy-white tips to the primaries—and still more those to the secondaries—decidedly wider, and in having a very distinct moustache-like line of black spots from the base of the mandible to the neck. Dimensions as in *N. melanotis melanotis*.

This form was found abundantly on Culpepper Island. It is named as a compliment to Mr. Hull, one of the collectors of the expedition.

Six specimens in Tring Museum, including the type.

### 8. *Nesomimus melanotis bauri* Ridgw.

*N. bauri*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 357 (1894). XIX. p. 492 (1896).

Differs from *N. melanotis melanotis* in having a longer bill, lighter sides of breast and body, smaller white terminal spots to the rectrices, and in having a moustache-like line of blackish spots along the sides of the throat. It differs from *N. melanotis personatus* of Abingdon Island in being much lighter above, the colour

\* *Nesomimus barringtonensis* nom. nud. Baur, in *Amer. Naturalist*, 1897, on list between pages 780 and 781, without description, must be added as a probable synonym. The specimen obtained was really lost at Guayaquil.

of the upperside being about the same as in *N. melanotis melanotis*. Dimensions hardly less than of *N. melanotis personatus*, but the dusky black streaks on the flanks are much narrower than in the latter. "Iris yellowish." Wing ♂ 115—121 mm., ♀ 110—111 mm.

Messrs. Baur & Adams discovered this species on Tower Island, where it was also found abundantly by Harris' party. The Tring Museum possesses the type (which has been in spirits), and a good series collected by Baur's and Harris' parties.

#### 9. *Nesomimus melanotis bindloei* Ridg.

*N. bindloei* Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 358. XIX. p. 492 (1894).

Very similar to *N. melanotis bauri*, but smaller, with the tarsus generally 2 or 3 mm. longer, the lesser wing-coverts with slightly lighter tips, ear-coverts more uniformly black, monstachial line of spots on sides of throat less distinct, while on the other hand there are generally some small black spots on the sides of the neck, under the ear-coverts and sometimes even on the chest. Discovered by Baur & Adams, and found to be common on Bindloe Island by our collecting party.

The Tring Museum possesses the type and ten others from the Baur collection, in addition to a good series of the new collection. ♂ wing, 108—117 mm.; ♀ wing, 103—107 mm. (average 103).

#### 10. *Nesomimus parvulus parvulus* (J. Gould).

*Orpheus parvulus*, J. Gould in *Proc. Zool. Soc. Lond.* p. 27 (1837).

*Mimus parvulus*, Gray, *Zool. Voy. Beagle*, v. III. Birds, p. 63. t. 18 (1841).

*Nesomimus parvulus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 491.

Easily distinguished from *N. melanotis* by its smaller size, especially its shorter and somewhat less curved bill, generally paler colour of the upperside and more brownish, paler striped ear-coverts. A brownish shade across the chest is visible in most specimens. Wing of ♂ ad. wing 111—113 mm., exposed culmen 18—21 (average 20); ♀ ad. wing 104—109 mm., exposed culmen 17—20.5 (average 18). The colour of the upperside varies much, some specimens being much darker than others.

This species is abundant in North and South Albemarle.

#### 11. *Nesomimus parvulus affinis* W. Rothschild.

*N. affinis*, W. Rothschild in *Bull. B. O. C.* p. 53 (May 1898).

Very closely allied to *N. parvulus parvulus* of Albemarle, but above darker and deeper brown than even the darkest *N. parvulus parvulus*. The stripes on the sides of the body are generally broader and darker. White spots on wing-coverts smaller. Measurements as in *N. parvulus parvulus*.

Discovered by Harris' expedition on Narborough Island. Six skins in the Tring Museum.

#### KEY TO THE FORMS OF THE GENUS *NESOMIMUS*.

1. { Breast crossed by an interrupted band of dark brown spots : 2.  
    { Breast not crossed by a band of brown spots : 4.
2. { Wing under 115 mm. : *N. adamsi*.  
    { Wing over 115 mm. : 3.

3. { Sides of chest blackish brown : *N. trifasciatus*.  
 { Sides of chest white with brown spots : *N. macdonaldi*.
4. { Bill smaller : 5.  
 { Bill larger : 6.
5. { Above lighter, with more distinct pale edges to the feathers and larger white  
 tips to the wing coverts : *N. parvulus*.  
 { Above much deeper brown with less distinct pale edges, tips to wing-coverts  
 smaller : *N. p. affinis*.
6. { Rump distinctly rufous : *N. m. bindlovi*.  
 { Rump not distinctly rufous : 7.
7. { Whitish tips to the remiges much wider : *N. m. hulli*.  
 { Whitish tips to the remiges much narrower : 8.
8. { Darker above : 9.  
 { Paler above : 10.
9. { Generally larger, flanks darker, sides of neck less broadly white : *N. m.*  
*personatus*.  
 { Generally smaller, flanks a little lighter, sides of neck broader white :  
*N. melanotis*.
10. { Wing longer, tips to rectrices smaller with distinct brown shaft line : *N. m.*  
*bauri*.  
 { Wing shorter, tips to rectrices larger and without dark shaft-stripes : *N. m.*  
*carringtoni*.

#### GENUS DENDROICA Gray.

*Dendroica* Gray, *List. Gen. B. App.* III. p. 8 (1842).

The genus *Dendroica* is largely represented in North and Middle America, the West Indies and the most northern part of South America, while the other parts of South America are greatly frequented by migrants from North America, but have no resident forms of the genus. The Galapagos Islands are inhabited by one species, which has no very near ally in South America, but rather in the West Indies.

#### 1. *Dendroica aureola* (Gould).

*Sylvicola aureola* Gould, *Zool. Beagle*, III. Birds p. 86. Pl. XXVIII. (1841).

*Dendroica aureola*, Sharpe, *Cat. B. Brit. Mus.* X. p. 282 (1885); Salvin, *Trans. Zool. Soc. Lond.* IX. p. 473; Ridgway in *Proc. U.S. Nat. Mus.* XIX. pp. 465, 493.

We have this species from the following islands:—Culpepper, Wenman, Abingdon, Bindloe, Tower, Albemarle, Narborough, James, Jervis, Duncan, Iudefigable, Chatham, Charles, Gardner and Hood.

The affinity to *D. petechia* of Jamaica is remarkable. *D. aureola* differs from the latter in having a more intensely orange-rufous, much darker pileum, in being generally slightly darker on the back, and in having the wing generally one or two millimetres longer. Specimens from Gorgona Island, on the coast of Colombia, and Cocos Island are quite like those from the Galapagos Islands. The species is also said to occur at Guayaquil (Baur & Adams) and in Peru (Solzmann & Raimondi), but we have not seen continental specimens.

*D. rufopileata* of Curaçao, Bonaire and Aruba has the crown still deeper, of a

rufous-chestnut brown, and is much smaller. *D. aurocapilla* Ridgw. from Grand Cayman is apparently only distinguishable by its lighter crown, and perhaps slightly shorter wing. The differences between *D. petechia* of Jamaica and *D. aurocapilla* are extremely slight and apparently not constant, unless the latter is of a somewhat darker green above. We have no *D. gundlachi* to compare. All these forms are evidently only of subspecific value.

#### GENUS CErTHIDEA Gould.

*Certhidea*, Gould in *Proc. Zool. Soc. Lond.*, p. 7 (1837).

Gould described this genus as belonging to the *Fringillidae*. Messrs. Selater and Salvin (cf. *Nomencl. Av. Neotrop.* p. 16; *Trans. Zool. Soc. Lond.* v. IX, p. 476; *Cat. B. Brit. Mus.* v. XI, p. 27) placed it in the *Coerebidae*, subfamily *Dacninae*, near *Dacnis* and *Controstrum*; Mr. Ridgway (*Proc. U. S. Nat. Mus.* v. XIX, p. 497) considers it to belong to the *Mniotiltidae*. We find it difficult to decide between *Mniotiltidae* and *Coerebidae*, as we find the bill to agree well with some *Dendroicae*, and also with some of the smaller forms of *Dacnis*, while the wing, in which the first primary is considerably shorter than the second and third, agrees more with the *Mniotiltidae* than with *Dacnis*. A very close and thorough examination of the anatomy of a good many *Mniotiltidae*, *Coerebidae*, and *Certhiidae* will be necessary to decide finally the position of *Certhidea* and of the value of a number of Passerine families, the division of which is at present a great "crux ornithologicae."

We have been obliged to unite several of the species recognised by Ridgway in the central group of islands. Ridgway's material was very insufficient.

#### 1. *Certhidea olivacea olivacea* Gould.

*Certhidea olivacea*, Gould in *Proc. Zool. Soc. Lond.* (1837) p. 7, *Zool. Voy. Beagle*, III. Birds, p. 106, pl. XLIV.; Selater, *Cat. B. Brit. Mus.* XI, p. 28; Ridgway in *Proc. U. S. Nat. Mus.* XIX, p. 498. *Certhidea saltrini*, Ridgway in *Proc. U. S. Nat. Mus.* XVII, p. 358, XIX, p. 500. *Certhidea albenarlei*, Ridgway in *Proc. U. S. Nat. Mus.* XVII, p. 360, XIX, p. 500.

In this, as well as in other species of the genus, the perfectly adult birds in full colour (probably the nuptial dress) are as rare as we have found them among the finches. The adult *male* in full dress is as follows:—Upperside pale olive, pileum and hindneck more olive-grey, rump and upper tail-coverts lighter and more yellowish-brownish; wings and tail dusky brown, outwardly edged with light olive, inner webs of remiges edged with whitish grey; upper wing-coverts broadly bordered with light reddish brown, under wing-coverts white, strongly washed with buff and yellowish cinnamon; short superciliary line, extending to about 4 mm. beyond the eye; chin, throat, and foreneck bright rufous cinnamon; remainder of under surface creamy buff, with an olive tinge; sides washed with olive brown; breast with more or less concealed spots of bright rufous cinnamon; under tail-coverts washed with rufous cinnamon. Wing, 55—57 mm.; tail, 37—40; bill, from nostril to tip, 7 mm. The adult *female* seems to have the wing mostly a little shorter, not exceeding 56 mm., mostly 54 to 55 only; the abdomen paler, more whitish; and it seems from our large series that the *female* never assumes such a largely and bright rufous cinnamon area on the throat and foreneck as the adult *male*, although some of the *females* have a certain amount of cinnamon colour on the throat. The immature birds of both sexes are much paler, and without a shade of rufous cinnamon anywhere.

We have altogether received, and have before us now, 176 skins of *Certhidea olivacea*—viz., 10 from Jervis, 12 from Narborough, 35 from Indefatigable, 45 from various places on Albemarle, 28 from Duncan, and 46 from James Island. We are unable to detect any differences between the specimens from the various islands, the differences of colour assigned to Ridgway's *C. salcini* and *albemarlei* being due to different age of the specimens, the larger bill of *C. salcini* being not in the least borne out by our material.

### 2. *Certhidea olivacea luteola* Ridgw.

*Certhidea luteola*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 360, XIX. p. 501.

We have a large series from Chatham Island, including the type, and find that the birds from there are closely allied to *C. olivacea olivacea*, but differ in being generally more olivaceous on the back, and distinctly darker and somewhat more olive beneath. It seems also that the bill has a tendency to be darker, for many of our specimens have perfectly black bills, while of the enormous series of *C. olivacea olivacea* not one has a really black bill. None of our *C. olivacea luteola*—all collected either in June (Baur) or October—has a rufous throat, but some freshly coming feathers in one of our *males* show beyond doubt that a red throat is sometimes attained!

This form is only known from Chatham Island.

### 3. *Certhidea olivacea ridgwayi* subsp. nov.

The *Certhidea* of Charles Island differs much from *C. olivacea olivacea* and *C. olivacea luteola* in the much lighter under-surface, which wants the olive tinge. Its upperside is perhaps more brownish-greyish, but this is difficult to say for certain, as all our specimens are in abraded plumage. The throat is of the same rufous-cinnamon, but appears to be more rusty, as it is on a lighter, less olive ground, and in lighter surroundings. The rectrices, which have only very narrow light brownish tips in *C. olivacea olivacea* and *C. olivacea luteola*, have whitish tips of 1 to 1½ mm. in width. The bill of most of our specimens is deep black, and is perhaps generally a little stouter. We have only ten skins from Charles Island. One of these is in its first plumage, which differs much from the dress of the adult bird. It is above dark blackish brown, on the pileum almost uniform black, on the back, rump, and upper tail-coverts with broad light brown edges to the feathers, which are again very narrowly fringed with black on the utmost tips, all the feathers ashy grey at their bases. Wings and wing-coverts similarly edged, more rusty on the latter. Feathers of underside ashy grey at base, then dark slate-colour and rusty buff on their tips; throat patched with blackish slate-colour, caused by the greater extent of the slaty colour in the middle of the feathers.

In the colour of the underside *C. o. ridgwayi* resembles *C. cinerascens*, but is not so white, and the adult *males* have a red throat, which is apparently never assumed by *C. cinerascens*.

Named in honour of Mr. Robert Ridgway, to whom we owe the best work on the birds of the Galapagos Islands.

### 4. *Certhidea olivacea becki* Rothsch.

*Certhidea becki*, Rothschild in *Bull. B. O. Club.* VII. p. 53 (May 1898).

The form of *Certhidea* found on Wenman Island by the Harris expedition, in August 1897, differs from *C. olivacea olivacea* in being darker above, darker and

browner on the chest, flanks, and sides of breast. The wing is a little longer, measuring 56 to nearly 59 mm. in our *males*, and 52 to 54 mm. in our *females*. *C. o. becki* is much more closely allied to *C. o. fusca* from Abingdon and Bindloe Islands than to *C. o. olivacea*, but differs in being still a faint shade darker above and especially on the sides and flanks. The wing is longer, as in *C. o. fusca* it does not exceed 54 mm. in the largest *males*. The bill of *C. o. becki* measures 8 to 9 mm. from nostril to tip. The throat has a distinct ochraceous patch in one *male* and an ochraceous shade in two *females* before us. We are not able to say if this colour would be as bright and widely spread as in adult *males* of *C. o. olivacea*, if a larger series from the proper season were examined.

We have only ten specimens from Wenman.

This form is named in compliment to Mr. Beck, who accompanied the expedition as collector.

### 5. *Certhidea olivacea drownei* Rothsch.

*Certhidea drownei*, Rothschild in *Bull. B. O. Club*. VII. p. 53 (May 1898).

Only two specimens, both marked "♂," were procured on Culpepper Island. They are very much like *C. o. becki*, but the sides of the breast are darker, more olive, and the pileum is darker, the darker blackish bases of the feathers being somewhat extended. They seem also to be considerably larger. The wing of one measures 62 mm., that of the other 57, but we believe the latter to be a *female*, although it is marked "♂." The bill from nostril to tip is 9 mm. in one, 8 in the other, but the bill seems to be rather wide at base. The throat is somewhat ochraceous in both.

A larger series would be desirable to confirm this subspecies. It is named as a compliment to Mr. Drowne, another of the collectors.

### 6. *Certhidea olivacea mentalis* Ridgw.

*Certhidea mentalis*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 359, XIX. p. 594.

This is a most doubtful form from Tower Island. Mr. Ridgway has separated it from its nearest ally, *C. fusca*, on account of its being, as he states, "rather smaller, colour darker and less olivaceous, the under parts dull light olive-greyish, becoming pale buffy on chin and under wing-coverts." Unfortunately all the specimens from Dr. Baur's collection seem to have been in spirits, therefore the slight differences in colour are not of much importance, and our new series of about thirty specimens, skinned on the spot, are all in such dreadfully abraded, worn plumage, that they are quite unfit for comparison with regard to colour. There is no appreciable difference in size. It is, however, remarkable that all the specimens from Tower, collected in December, except one, have black mandibles, and of those of Dr. Baur's, shot early in September, two have blackish, the others brownish white mandibles, while in our large series from Abingdon and Bindloe, collected in August, there is not one with a blackish mandible. This character, on the other hand, is probably seasonal. The buff colour on the chin may be a character peculiar to the Tower form, but this is as yet not certain, as we can only see it in four of the typical specimens collected by Dr. Baur. Freshly mounted material, and if possible from the same season, both from Tower and Abingdon or Bindloe Islands, will be necessary to decide finally about the form *mentalis*.

7. *Certhidea olivacea fusca* Sel. & Salvi.

*Certhidea fusca*, Selater & Salvin in *Proc. Zool. Soc. Lond.* (1870, pp. 323, 324); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 477; Selater, *Cat. B. Brit. Mus.* XI. p. 28 (1886); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 502.

This form is decidedly paler below than the other subspecies of *C. olivacea*, and less olivaceous above and beneath, and the adult *male* does evidently never acquire the tawny, cinnamon, or ochraceous throat, chin, or superciliary line. The bill is generally rather longish, measuring 8.3 to 9.1 mm. from nostril to tip of upper jaw. In about fifty skins from Abingdon and Bindloe before us, there is none with a wholly black bill.

*C. o. fusca* is common on Abingdon and Bindloe Islands, and specimens from the two islands are indistinguishable.

8. *Certhidea cinerascens cinerascens* Ridgw.

*Certhidea cinerascens*, Ridgway in *Proc. U.S. Nat. Mus.* XII. pp. 105, 119, 127.  
*Certhidea olivascens* (lapsus calami), Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 124.  
*Certhidea cinerascens*, Ridgway in *U.S. Nat. Mus.* XIX. p. 503.

This form differs so much from all the preceding ones, by its much paler under-surface, which is brownish white, its more greyish back and generally shorter bill, that it will probably be necessary to keep it (together with *bifasciata*) specifically distinct from the *olivacea*-group. The bill does not exceed 8.5 mm. (from nostril to tip). The rectrices have very narrow white tips, which are widest on the outermost rectrices, where also the inner web is bordered with white, the upper wing-coverts have pale whitish-brown edges. Unfortunately our series, which is collected in October, is in very abraded, worn plumage, but it seems that the throat is never rufous or ochraceous at all, but the breast has a buff tinge in the middle.

This form is known from Hood Island, and we have also one from Gardner near Hood Island.

9. *Certhidea cinerascens bifasciata* Ridgw.

*Certhidea bifasciata*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 359; XIX. p. 304.

Nearest to *C. cinerascens cinerascens*, from which it differs in being still whiter beneath, being almost pure white with a buff tinge, and with two fairly distinct whitish bars across the wing, formed by the wide almost white tips to the middle and greater upper wing-coverts. Only found on Barrington Island.

The iris of all *Certhidee* is brown.

## GENUS PROGNE Boie.

*Progne*, Boie in *Ibis* p. 971 (1826).  
*Placoprogne*, Baird, *Revue Anar. B.* p. 283.

This genus is spread over the greater parts of temperate and tropical America and West Indian Islands. One species peculiar to the Galapagos Islands.

1. *Progne concolor* Gould.\*

*Hirundo concolor*, Gould in *Proc. Zool. Soc. Lond.* p. 22 (1837).

*Progne concolor*, Salvin in *Texas Zool. Soc. Lond.* IX. p. 176; Sharpe, *Cat. B. Brit. Mus.* X. p. 176, Sharpe & Wyatt, *Monograph Swallows*, II. p. 463, pl. 90.

*Hirundo modesta*, Néboux in *Rev. Zool.* p. 291 (1840).

*Progne modesta*, Gould, *Zool. Bougle*, III. Birds, p. 39, pl. 5; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 505.

This species differs from *P. sabis* (= *purpurea*) in its considerably smaller size, the wing of the adult *male* not measuring more than 130 mm., and generally less, and in the absence of the concealed spot under the wing. The underside of the *female* differs widely from that of the *female* of *P. sabis*, being deep sooty brown without any white.

Darwin discovered this swallow on James Island (not Chatham Island, as quoted by mistake in *Cat. B. Brit. Mus.* X. p. 176), Néboux obtained it on Charles Island, Townsend on Indefatigable, where it had also been seen by Habel, Bair (American Naturalist, 1897, p. 783) mentions it from Barrington (teste Néboux), and we have received a beautiful series of twenty-six skins from Charles, Chatham, and Albemarle Islands.

"The iris is brown in both sexes, feet and bill black."

## GENUS HIRUNDO L.

Nearly cosmopolitan.

1. *Hirundo rustica erythrogastra* Bodd.

*Hirundo erythrogastra* Bodd. *Tabl. Pl. Enl.* p. 45 (1783).

Five skins of the North American swallow were procured in October and November on Charles and Chatham Islands. They are doubtless migrants from the north.

## GENUS GEOSPIZA J. Gould.

(Plate VI.)

*Geospiza*, J. Gould, in *P. Zool. Soc. Lond.* 1837. p. 5 (Type: *G. mayrostris*).

*Cactornis*, J. Gould, *ibid.* p. 6 (Type: *C. scanders*).

*Camarhynchus*, J. Gould, *ibid.* p. 6 (Type: *C. psittacula*).

*Platyspiza*, Ridgway, in *P. U.S. Nat. Mus.* XIX. p. 546 (1896).

*Cactospiza*, Ridgway, *ibid.* p. 546 (1896).

In the *Catalogue of Birds* Dr. Sharpe recognised the three genera created by Gould in 1837, but Mr. Ridgway, in 1894 and 1896, united *Geospiza* and *Cactornis* for good reasons, keeping, however, *Camarhynchus* separate, without, in our opinion, sufficient reasons, and created two new generic names (*Cactospiza* and *Platyspiza*), without need and to no practical purpose, as he did not even use these terms in his nomenclature. We cannot see the use of subgeneric names, as they are, by universal agreement, not to be used in nomenclature. If it is convenient to separate groups within a genus they may be named *a*, *b*, *c*, or groups with longer, intermediate or

\* The name *concolor* has been rejected on account of the existence of a *Hirundo concolor* of Sykes in 1832. As, however, Sykes' *concolor* belongs to another genus, there is no logical reason for rejecting that name. The disturbing paragraph "once a synonym always a synonym" is a great mistake if adopted in similar cases. We are not accepting this custom, and one of us has already elsewhere written on the subject.



shorter bills, as the case may be; but names which are not to be used are, in our opinion, an unnecessary burden in such cases. Our reason for uniting *Camarhynchus* with *Geospiza* is, that we see about the same intergradation in the form of the bills of that supposed genus with the genus *Geospiza* in Ridgway's sense, as we saw between *Cactornis* and *Geospiza* in the old sense. We cannot admit the coloration as a generic character, not only because in our case it would bring the young of some of the species in another genus than the adult *males*, but we cannot see that, in ornithology, it can be used as a generic character in any case, as the sexes and ages, and sometimes seasonal plumages, differ so materially in many birds, and abnormal colorations, such as albinos, are rather frequent. Mr. Ridgway admits that he "indeed finds himself quite unable to give precise characters for the genus *Camarhynchus*," and that "the differences in the form of the bill presented by *Camarhynchus*, as defined by him, from *Geospiza*, while perfectly obvious on comparison of specimens,\* are extremely difficult to describe, since they result chiefly from variations of curvature in its outlines and relative proportions of various minor details hardly susceptible of exact definition." This certainly does not sound very convincing. Mr. Ridgway further admits that the transition from "*Cactornis pallidus*" to "*Camarhynchus psittaculus*" is complete, but we find this to be the same with "*Cactornis pallidus*" and *Geospiza*; in fact, we think that "*Cactornis pallidus*" is still closer connected with *Geospiza* than with *Camarhynchus* in the old sense. Ridgway's figures (in *P. U.S. Nat. Mus.* XIX. Plates XVI., XVII.) are very instructive, and will explain our meaning to those who have no specimens to refer to. See also our Plate VI.

Mr. Harris makes the following observation: "The long-billed *Geospizae* (or *Cactornis*) were observed to be more cactus-feeders than the thick-billed forms—for example *G. strenua*. Such *Geospizae* as *strenua*, *pachyrhynchos*, and *conirostris* were observed to be more seed-eaters than the slender-billed ones (*Cactornis*). The smaller species, as *fuliginosa*, *fratercula*, and *fortis* were observed to frequent the shores, of the more northern islands especially, in search of food, whereas the slender-billed *Geospizae*, and those with very large beaks, were **never** seen feeding on the rocky shores."

The genus *Geospiza* is, in the *Catalogue of Birds*, Vol. XII., placed at the head of the *Fringillidae*, followed by *Chloris* and separated by ten genera from *Gairaca*. The South American members of the genus *Gairaca*, in Dr. Sharpe's sense, are, nevertheless, the nearest relations to *Geospiza*, the form of the bill being indeed very similar between the thick-billed *Geospizae*, such as *Geospiza strenua* and *Gairaca cyanoides*, especially the backward extension of the culmen (nasal bones in skeleton) is very much the same in these genera; while the wing is less pointed, the feet larger and stronger, the tail very much shorter in *Geospiza*. The first primary in *Geospiza* is rudimentary, not visible from below, and adapted to its covert; the second (first long) primary is shorter than the third. The resemblance with certain thick-billed Hawaiian finches, such as *Telespiza*, cannot have any serious consideration, as indicative of real relationship.

Most of the species are well defined, others less, and some vary greatly in dimensions and proportions. It is evident that adult black *males* are not equally frequent in certain species. While black individuals are surprisingly rare in many species, they are very frequent in *Geospiza couirostris* Ridgw. There can be no doubt, we think, that all the black specimens are adult *males*. In the members of

\* We should think not in the case of "*Cactornis pallidus*"

the old genus *Camarhynchus* totally black individuals are not found, but it seems that all the *Geospiza* and *Cactornithus* in the old sense, except "*Cactornis*" *pullidas*, have the adult *male* black, with the exception of the under tail-coverts, which have white borders. The bill is only black in black-plumaged adult *males*; but not in all. It seems evident that those with brown bills are less aged than those with black bills; but why the latter, and in fact black individuals of most of the species, are so rare is quite unexplainable to us.

The variations in size are great within some of the species, and younger birds have very small bills—a fact which has more than once led authors to mistakes.

### 1. *Geospiza magnirostris* J. Gould.

*Geospiza magnirostris*, J. Gould in *P. Zool. Soc. Lond.* 1837. p. 5; *Zool. Beagle*, III. Birds, p. 100, Pl. XXXVI. (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 478 (1876) (bill); Sharpe, *Cat. B. Brit. Mus.* XII. pp. 6, 7 (fig.); Ridgway *l.c.* p. 512.

It is very strange that this largest-billed form of finches from the whole group has not been met with by any collector since Darwin's visit to the Galapagos. There are, in our opinion, only two possibilities:

- (1) That this form is a larger representative of *G. strenua* on Charles Island.
- (2) That the few specimens in the British Museum are exceptionally large individuals of *G. strenua*.

The first theory is probably the correct one. The origin of the type-specimens is not exactly known. Probably neither Dr. Sharpe nor Mr. Ridgway remembered in the moment when they treated of these finches what Darwin said in his *Journal of Researches* (new edition, 1890, p. 420) about his omission to label his collections. He there says: "Unfortunately most of the specimens of the finch-tribe were mingled together, but I have strong reasons to suspect that some of the species of the sub-group *Geospiza* are confined to separate islands"; and again, on p. 424, "whereas the numerous specimens shot either on Charles or on Chatham Island (for the two sets were mingled together) all belonged to the two other species." It is thus evident that the locality of Chatham Island for *G. magnirostris* is open to doubt. We have no doubt that all the specimens came from Charles Island. Neither Dr. Habel, nor Baird & Adams, nor the recent collectors whose collections are before us, found **any** very large *Geospiza* on Charles Island, not even *G. strenua*. The "*Albatross*" only procured one specimen, which Ridgway refers to *G. strenua*. Considering, however, that it is an immature bird, and that the two forms *G. magnirostris* and *strenua* are so closely allied that they differ only in having the wings and bills a few millimètres larger or smaller, it is quite possible that it is a young of *G. magnirostris*. It is probable that *G. magnirostris* is exterminated or extremely scarce. This is quite possible when we consider that *Nesomimus trifasciatus* has disappeared from Charles Island, and that these finches, according to Darwin (*Zool. Beagle, l.c.* p. 100), did "much injury by digging up roots and seeds from a depth of even six inches." It is therefore to be supposed that they were killed by the colonists, who complained of their injuries, and who first settled on Charles Island about 1830. The locality Chatham Island is certainly wrong, for no big-billed form has ever been found there; and there are no early settlers who might have killed them long ago.

The dimensions of the three black specimens in the British Museum are: culmen, 26.5, 27, 27 mm.; height of bill at base, 23.5–24 mm.; wing, 91, 91, 95 mm.; tarsus, 25 mm.

The second possibility—viz., that *G. magnirostris* cannot be separated from *G. strenua*—must be considered, because the measurements of a number of *G. strenua* will show how much they differ in proportions of bill and wing; but as we do not find the combinations of a culmen of over 26.5 mm. and more, with a wing of 91 mm. and more, we cannot unite *G. magnirostris magnirostris* and *G. magnirostris strenua*, as the nomenclature of these forms should probably be, under one name.

## 2. *Geospiza strenua* J. Gould.

*Geospiza strenua*, J. Gould in *P. Zool. Soc.* (1837) p. 5; *Zool. Voy. Beagle*, III. Birds, p. 100, Pl. XXXVII. (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 479 (1876); Sharpe, *Cat. B. Brit. Mus.* XVI. p. 8 (1888); Ridgway, *l.c.* p. 514.  
*Geospiza pachyrhyncha*, Ridgway in *P. U.S. Nat. Mus.* XV111. p. 293 (1896); Ridgway, *l.c.* p. 516.

Ridgway enumerates **Charles Island** as one of the islands inhabited by this bird, but we presume that the specimen procured by the "*Albatross*" must belong to *G. magnirostris* if it came from Charles Island. We shall see below how small young individuals of these finches are, compared with adult birds.

**Chatham Island** is given on the authority of Darwin; but no such birds ever being found there, and Darwin himself stating that he had mixed the finches up, we must entirely disregard the statement that this species ever occurred on Chatham Island, and we think that the type must have come from James Island, our skins from there agreeing with the type of the species in the British Museum.

*G. strenua* is evidently not rare on **James Island**, for we have seen 24 specimens from there, in addition to those in the British Museum. The black *males* from James measure as follows:—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
24 mm.	22 mm.	13 mm.	16 mm.	88 mm.
24 "	20 "	13 "	15 "	86 "
21 "	18 "	12 "	14 "	82 "

It was first found on **Bindloe** by Dr. Habel. We have examined 34 Bindloe skins. The black *males* measure:—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
22.5 mm.	19.5 mm.	12 mm.	—	(Moulting.)
21.5 "	18.5 "	12.5 "	15 mm. } (Dr.	82 mm.
20 "	17 "	11 "	14 " } Baur)	82 "
22.5 "	19 "	12 "	14 "	82 "
24.5 "	21 "	13.5 "	17 "	86 "

Habel also discovered it on **Abingdon Island**. It is evidently very common on

Abingdon, as we have received not less than 39 skins from the recent expedition. The black *males* measure :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
24.5 mm.	21 mm.	11 mm.	16.5 mm.	84 mm.
22 "	20 "	11 "	15 "	84 "
25.5 "	21 "	13 "	16 "	85 "
22 "	21 "	13 "	16 "	83 "
24 "	21.5 "	12 "	16 "	88 "
23.5 "	20 "	13.5 "	15 "	84 "

**Indefatigable** is also known to be inhabited by *G. strenua* since Habel's expedition. It was also found there by Messrs. Baur & Adams, and we have altogether received 11 specimens from this island, but not a single one is a fully adult *male*. We are giving the measurements first of the largest of our specimens, secondly of our blackest *male*, which is about half black. The measurements are :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
25 mm.	21 mm.	14 mm.	17 mm.	84 mm.
24 "	19 "	13 "	15 "	(Damaged.)

**Tower Island** is also inhabited by *G. strenua*. Specimens from Tower, collected by Messrs. Baur & Adams, were described by Ridgway as belonging to a new species, which he called *G. pachyrhyncha*. Specifically they belong doubtless to *G. strenua*, but it is true that most of the Tower specimens are rather large. As, however, they are reached or even eclipsed in nearly all their measurements by specimens from other islands, we cannot at present separate them even sub-specifically. If a large material of adult males should confirm the constancy of this form, it would have to be called *G. strenua pachyrhyncha*. The 3 black *males* of the 9 we have examined measure as follows :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
25.5 mm.	22 mm.	13 mm.	17 mm.	87 mm.
24 "	22 "	12 "	17 "	87 "
26 "	22.5 "	13.5 "	17.5 "	89 "

**Jervis Island** is another home of this finch. Baur & Adams and the recent collectors must have found it rather common there, for we received altogether not less than 26 specimens, and black *males* were rather frequent among them. They are generally not very large, but so variable and so close to specimens from other

islands, some fully reaching the latter in all dimensions, that it is impossible to separate them. The black *mules* measure :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
23 mm.	21 mm.	13 mm.	16 mm.	87 mm.
24 "	22 "	13 "	17 "	84 "
23 "	19 "	11·8 "	15 "	88 "
24 "	21 "	13·5 "	16 "	86 "
23·5 "	18·5 "	11 "	14 "	83 "
23 "	21 "	11·5 "	14·5 "	83 "
23 "	18·5 "	12 "	14 "	85 "
22·5 "	20 "	12 "	15 "	83·5 "
21 "	19 "	11 "	14 "	82 "
21·5 "	19·5 "	12 "	14·5 "	—

Baur said that on **Albemarle Island** he procured specimens of *Geospiza magnirostris*. These were, according to Mr. Ridgway, lost in a box at Gnayaquil, a statement which, as Dr. Baur himself stated afterwards, arose out of some mistake, probably on Dr. Baur's side, and in fact we found these specimens in a bottle in spirits. They are clearly not *G. magnirostris*, but *G. strenua*. One of the two shot by Dr. Baur at La Tortuga is very large, the other very small. We have examined 9 skins from Albemarle (La Tortuga, Dr. Baur, Tagus Cove, recent expedition), and find the black *mules* to measure as follows :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
24 mm.	22 mm.	14 mm.	16 mm.	(Moulting.)
19 "	17 "	13 mm.	13 "	83 mm.
23 "	19 "	12 mm.	15 "	83 "
24 "	21 "	13 "	15 "	83 "

From **Duncan Island** we have only seen three young individuals in grey plumage. They have fairly large beaks (culmen 22 to 24 mm.), and we have no doubt belong *G. strenua*.

From **Barrington** we received only one specimen, a fairly black *male*, but with the bill deep brown, reddish brown on the mandible, and the abdomen streaked with greyish brown. It measures :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
22 mm.	19 mm.	14 mm.	15·5 mm.	86 mm.

From **Wenman Island** we have also one single *male* only, but it is quite black. It measures :—

Culmen.	Basal depth of bill.	Gonys.	Basal width of mandible.	Wing.
24 mm.	22 mm.	14 mm.	16 mm.	86 mm.

We should most certainly have expected a new species from Wenman Island, but we can see no reason whatever to separate our specimen from typical *Geospiza strenua*.

While the differences in size between the *males* and *females* are very small, the young birds are much smaller than old ones. The accompanying figures will illustrate that these differences occur alike in the various islands, and also that they cannot satisfactorily be separated.

### 3. *Geospiza darwini* sp. nov.

This is perhaps a form originally evolved from the following species, *G. conirostris*, but it has a much larger and heavier beak, and thus stands somewhat between *G. strenua* and *G. conirostris*.

*Adult ♂*. Intensely black, feathers on breast, abdomen, and back slightly edged with olive ; it differs conspicuously from the other large *Geospizae*, *G. maguirostris*, *G. strenua* and *G. conirostris*, by the olive rump, a character more or less apparent in the small *Geospizae* only ; under tail-coverts whitish buff, secondaries tipped slightly with buffy white, outer edge of primaries olive. Bill compressed and rounded, like in *G. conirostris*, but, unlike the other species of *Geospizae*, abruptly narrowed 3 millimetres from the tip and elongated sharply to the point.

*Adult ♀*. Head, neck and throat black, slightly edged on each feather with olive buff, rest of body blackish, broadly variegated with olive buff, wings brown edged with dark buff. 4 ♂♂, 1 ♀ measure as follows :—

	Culmen.	Height of Bill.	Width of Bill.	Gonys.	Wing.
♂.	24 mm.	20 mm.	14 mm.	14 mm.	85 mm.
♂.	23 "	18 "	13 "	13 "	83 "
♂.	23 "	17 "	13 "	12 "	82 "
♂.	23 "	19 "	15 "	14 "	86 "
♀.	24 "	19 "	15 "	15 "	84 "

*Hab.* Culpepper Island, Galapagos.

### 4. *Geospiza conirostris conirostris* Ridgw.

*G. conirostris*, Ridgway in *P. U.S. Nat. Mus.* XII. p. 106, Fig. 2 (1890) ; Ridgway in *P. U.S. Nat. Mus.* XIX. p. 516 (1896),

*G. media*, *l. supra c.* p. 107, Fig. 3 (1890) ; Ridgway, *l. infra c.* p. 577, Pl. LVII. Fig. 13 (1896).

Ridgway has separated two species of big-billed finches from Hood Island, *G. conirostris* and *G. media*, and with only eight of the former and four of the latter supposed species before him, this might have seemed very plausible, but with our

72 specimens from Hood Island, together with one from Gardner near Hood, there does not remain a shadow of doubt that they are one somewhat variable species. This species is characterised by its bill being much more elongated and narrower than in *G. strenua*, and by the prevalence of blackish colour in the *females* and young birds, which are much darker than in *G. strenua*, being brownish black above and below, on the underside with whitish edges from the chest downwards. The culmen varies in *males* from 24 to 18.5 mm., the basal width of mandible from 13 to 9 mm., the height at base from 18 to 14 mm., the gonyx from 13.5 to 10.5 mm.

##### 5. *Geospiza conirostris brevisrostris* Ridgw.

*Cactornis brevisrostris*, Ridgway in *Proc. U.S. Nat. Mus.* Vol. XII. p. 108, Fig. 4 (1890).

*Geospiza brevisrostris*, Ridgway *op. cit.* XIX. p. 541.

In 1890 Mr. Ridgway described from a single immature specimen of the "Albatross" expedition as new a finch which he called *Cactornis brevisrostris*, which in 1896 he also places among the *Cactornis* group of *Geospiza*, comparing it with *Geospiza barringtoni*. After a close examination of the figure and our one skin from Gardner Island (near Charles Island), we are forced to remove it altogether from the *Cactornis* group, it being barely distinguishable from the smaller-billed specimens (= *media* Ridgway cf. *antea*) of *Geospiza conirostris* from Hood Island.

There is some uncertainty about the locality of the type specimen, as Ridgway in both 1890 and 1896 first quotes it as coming from Chatham Island, and then several times as being found on Charles Island, again on p. 512 in Vol. XIX. of the Washington periodical he omits it on Charles (resp. Chatham) and places the number for it by mistake on James Island. We think the real home must be Charles, because we have one specimen which we take to belong to *brevisrostris* from Gardner (near Charles), which has the same fauna as the larger Charles Island.

The only difference we can see between *G. conirostris conirostris* and *G. conirostris brevisrostris* is that the bill of the latter is slightly smaller and narrower.

We possess only one probably adult *female* from Gardner Island (near Charles Island), collected by the recent expedition.

(We have one young *Geospiza* from Indefatigable which agrees with Ridgway's description of Dr. Habel's specimen from the same island. These birds are too light to belong to *G. conirostris brevisrostris*, and all the measurements are distinctly smaller.)

This form, unfortunately, cannot finally be named or described, on account of the absence of adult specimens in collections, as far as we know; but it will probably be an unnamed subspecies of *G. conirostris*. See also Salvin's remark in *Trans. Zool. Soc. Lond.* IX. p. 481 under *G. fortis*.)

##### 6. *Geospiza conirostris propinqua* Ridgw.

*Geospiza propinqua*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 361 (1894) and *op. cit.* XIX. p. 543 (1896).

Described from Tower Island, whence we have a series from Dr. Baur, including the type and a good many from the new expedition, among them a fair number of adult *males*. They agree so well with *G. conirostris conirostris*, that one has to examine them very closely to discover the points of difference in the

shape of the beak so ably pointed out by Mr. Ridgway. We can therefore only consider it to be a subspecies of *G. conirostris*. The type is one of the smallest of all our adult *males*.

Five adult *males* from the new collection measure as follows :—

Culmen.	Height at Base.	Basal Width	Gonys
22 mm.	17 mm.	13 mm.	13 mm.
23 ..	15 ..	11 ..	12 ..
19 ..	13 ..	11 ..	11 ..
22 ..	16 ..	13 ..	12 ..
22 ..	14 ..	12 ..	12 ..

### 7. *Geospiza conirostris* subsp. ?

We have three young specimens of a *Geospiza* from Culpepper Island which we believe to be a form of *G. conirostris*, from which they differ in not being quite so dark, and the light margins to the feathers being more buffy, and the beaks appear to be a little larger, the back paler, the wing-coverts rather broadly margined with rusty rufous.

We cannot come to any definite decision without examining adult specimens.

### 8. *Geospiza dubia dubia* Gould.

*Geospiza dubia*, J. Gould in *Proc. Zool. Soc. Lond.*, pt. V. p. 6 (1837)—*Zool. Voy. Beagle*, III. Birds p. 103 (1841); Salvin in *Trans. Zool. Soc.* IX. pt. 11, p. 480 (1876); Sharpe, *Cat. B. Brit. Mus.*, XII. p. 9 (1888); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 519 (1896).

The type of this species came from Chatham Island, and is no longer in existence (cf. Sharpe, *l.c.*). The Smithsonian Institution received a series from the "Albatross" voyage, and Messrs. Baur & Adams, as well as the Harris' expedition, collected good series of it.

This species differs from the foregoing ones in its much shorter bill, and from *G. fortis* in its larger-sized bill.

Besides forty-seven skins from Chatham, we have five from Barrington and fourteen from Duncan Island, which we cannot separate from *G. dubia*. There is, however, no perfectly adult *male* from either Barrington or Duncan Island, and the Barrington specimens are on an average rather small.

### 9. *Geospiza dubia albemarlei* Ridgw.

*Geospiza albemarlei*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 362 (1894), *id. op. cit.* XIX. p. 523 (1896) (not separated from *G. fortis*).

Mr. Ridgway originally compared his *G. albemarlei* with his *G. media* (= *conirostris*) and *G. dubia* Gld., but afterwards, on comparing his Albemarle specimens with *G. fortis*, came to the conclusion that they were hardly, if at all, different, but admitted that some specimens were nearer *G. dubia* than *G. fortis*.

From the examination of a large series from Albemarle and three from Narborough Island it is evident, however, that this form can be separated, but must be treated as a subspecies of *G. dubia*, and not of *G. fortis*, because it is always separable from the latter by its larger bill and wing. The differences from *G. dubia* are exceedingly slight, but generally the wing is 2 to 4 mm. longer, and the culmen a little more arched.



10. *Geospiza dubia bauri* Ridgw.

*Geospiza bauri* Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 362 (1894), and *op. cit.* XIX. p. 518 (1896).

This form is only known from James Island, where it seems to be rare, as we have only three skins from the Baur collection, including the type. It has a larger beak than *G. dubia dubia*, while the wing is of exactly the same length, and therefore we do not think it can be more than subspecifically separated.

11. *Geospiza dubia simillima* subsp. nov.

This form from Charles Island is almost indistinguishable from *G. dubia albemarlei*, but the wing is from 2 to 3 mm. longer. We have one perfectly adult ♂, and four immature birds.

12. *Geospiza fortis fortis* Gould.

*Geospiza fortis*, Gould in *P. Zool. Soc. Lond.* p. 5 (1837); *Zool. Voy. Beagle*, III. Birds, p. 101, pl. XXXVIII (Charles Island); Salvin in *Trans. Zool. Soc. Lond.* IX. pl. IX. p. 481 (1876); Sharpe, *Cat. B. Brit. Mus.* XII. p. 10 (partim).

*Geospiza nebulosa*, Gould in *P. Zool. Soc. Lond.* 1837, p. 5; Sharpe, *Cat. B. Brit. Mus.* XII. p. 11 (partim).

*G. fortis*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 521.

This species is most frequent on Charles (whence the type came), Duncan, Jervis, James, Gardner near Charles Island, Indefatigable, Chatham, and Cowley Islands. The specimens from Albemarle, which Ridgway (*loc.*) finally united with *G. fortis*, belong to *G. dubia*, of which they are a subspecies, being far too big to be *G. fortis*. The birds from Bindloe, which Ridgway had not seen, and which were lumped with *G. fortis* by Salvin and others, belong clearly to the same form as those from Abingdon. They can only be separated as a subspecies from *G. fortis*. We have one young *female* from Barrington Island, which agrees in the shortness of its wing with *G. f. fratercula* rather than with *G. f. fortis*. It may possibly belong to an unnamed subspecies, but adult *males* are required to decide this question.

13. *Geospiza fortis fratercula* Ridgw.

*Geospiza fratercula*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 363 (1894), *id.* in *Proc. U.S. Nat. Mus.* XIX. p. 525.

Ridgway knew this form from Abingdon Island only, but our series from Bindloe is perfectly similar. We cannot fully appreciate the alleged differences in the form of the bill, and the only difference we can see is the shorter wing, which is about 3 to 6 mm. shorter than in *Geospiza fortis fortis*. We cannot detect tangible differences in colour between these forms.

14. *Geospiza fuliginosa fuliginosa* Gould.

*Geospiza fuliginosa*, Gould in *Proc. Zool. Soc. Lond.* 1837, p. 5; Salvin in *Trans. Zool. Soc. Lond.* IX. 1876, p. 482; Sharpe, *Cat. B. Brit. Mus.* XII. p. 12; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 526.

*Geospiza parvula*, Gould in *Proc. Zool. Soc. Lond.* p. 6 (1837); *Zool. Voy. Beagle*, III. Birds, p. 102, tab. XXXIX. (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 483; Sharpe, *Cat. B. Brit. Mus.* XII. p. 13; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 529.

As will be seen from the above synonymy, Gould, Salvin, Sharpe and Ridgway have separated a species called *G. parvula*, which we unite with *G. fuliginosa*.

The type of "*G. parvula*," according to Darwin, had been collected on James Island. Sharpe's locality, Chatham Island, for the same must therefore be incorrect. Salvin describes and figures specimens from Bindloe Island, which are different, but cannot be called *G. parvula*. Ridgway quotes as islands inhabited by *G. parvula*, Chatham, James, Bindloe, Abingdon, but he is evidently not very confident with regard to the value of his *G. parvula*, saying that he thinks "it can be demonstrated that the line between the two supposed species cannot be sharply drawn." We have examined, of what we consider typical *G. fuliginosa* :—

22 skins from Charles Island. Wings, 61—65 mm. ; culmen 12—14.

104 from Chatham Island. Wings 60—66 mm. ; culmen 12—14.2.

10 from Hood Island. Wings about 62 mm. ; culmen 12—14. No black-billed adult *male* among them.

46 from Albemarle Island. Wings, 60—65 mm. ; culmen 13—14.

11 from Narborough Island. Wings, 63—65 mm. ; culmen 12—13. The wings average rather long, but the number of specimens is so much smaller than from other islands that this of no importance.

28 from James Island. Wings, 62—64.5 mm. ; culmen 12—13.5. We are not able to separate the specimens from James Island in the least from typical *G. fuliginosa*.

26 from Barrington Island. Wings, 60—65 mm. ; culmen 12—14.

46 from Duncan Island. Wings, 62—65 mm. ; culmen, 12—14.

21 from Indefatigable. Wings, 61—65 mm. ; culmen, 13—14.

12 from Gardner (near Charles) Island. Wings, 60—65 mm. ; culmen, 13—14.

26 from Jervis Island. Wings, 60—67 mm. ; culmen, 13—14.

We have thus examined over 350 specimens, but in the measurements very young birds or such with the wing in moult are not included, as they may only help to give a wrong impression.

#### 15. *Geospiza fuliginosa minor* subsp. nov.

We have examined forty-three skins from Bindloe Island, with the wing 58—62 mm., the culmen, 11—13.5 ; seventy-three from Abingdon Island, wing, 58—63 mm., culmen, 12—13.5. In addition to these small differences, however, the bill is much slenderer and more compressed laterally. The number of adult *males* which we were able to measure is very small, but the material is quite sufficient to show beyond any doubt that the Abingdon and Bindloe form deserves the rank of a subspecies.

#### 16. *Geospiza acutirostris* Ridgw.

*Geospiza acutirostris*, Ridgway in *Proc. U. S. Nat. Mus.* XVII. p. 363 (1894) ; Ridgway, *op. cit.* XIX. p. 531. Pl. LVII. fig. 21 (1896).

This species differs very distinctly from *G. fuliginosa* and *G. fuliginosa minor* in its rather long, thin, straight and pointed bill. We have been able to examine sixty-five specimens, including the type. In no other species have we seen such a proportion of black-billed adult black *males*, while black *males* with yellowish beaks are very scarce. All the birds of the Harris' expedition were killed in December.

The measurements of *G. acutirostris* are given very correctly by Ridgway.

This species is only known from Tower Island.

17. *Geospiza denti-rostris* Gould.

*Geospiza denti-rostris*, Gould in *P. Zool. Soc. Lond.* 1837, p. 6; *Zool. Beagle*, III. Birds, p. 102 (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 483 (partim); Sharpe, *Cat. B. Brit. Mus.* XII. p. 11; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 532.

There are in the British Museum a *male* and a *female*, which are identified by Dr. Sharpe as *G. denti-rostris*. One is evidently the type. It is in our opinion an immature bird, probably a *female*. Its culmen measures 14·7 mm.; the bill from nostril to tip, 10·8; wing, 68. The other specimen is a black *male*, and marked on its original label "Charles Island." Its culmen measures 14·8 mm.; the bill from nostril to tip, 9·8. The former specimen, the type, has the "tooth," from which it has received its name, much in front of the middle of the cutting edge of the upper jaw, only a few millimètres from the tip, and the "tooth" is well visible from above. In Admiral Markham's bird, however, the "tooth" is exactly in the middle of the cutting edge of the upper jaw, and not to be seen from above. The type has no exact locality marked, and no original label. Except for the presence of the "tooth" it might almost be an immature *G. fortis*.

It is curious that neither Mr. Townsend, Messrs. Baur & Adams, nor Harris' expedition came across such a bird, and the dissimilarity of the two only known skins in the British Museum forces one to suspect that they might be aberrations; but we must await further observations before coming to a definite conclusion about it.

18. *Geospiza* spec. inc.

We have one black *male* of a *Geospiza*, skinned from a bird in spirits brought home by Dr. Baur, from Chatham Island, where it had been killed on September 8th, 1891. Its bill is almost but not quite black. Its upper jaw has no "tooth," but in dimensions this bird agrees wonderfully with *G. denti-rostris*. The culmen measures 14·5 mm.; the bill from nostril to tip, 9·8; the wing, 69. Without further evidence we are not able to say whether this species is the same as *G. denti-rostris*, whether it is a hybrid between one of the larger and one of the smaller species of *Geospiza*, or whether it belongs to a hitherto unknown and unnamed species.

19. *Geospiza difficilis* Sharpe.

*Geospiza denti-rostris* partim (non Gould!) Salvin in *Trans. Zool. Soc.* IX. p. 483.

*Geospiza difficilis* Sharpe, *Cat. B. Brit. Mus.* XII. p. 12; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 532.

The colour of this species is generally very dark, and very brownish. Not a single specimen has the abdomen whitish. The bill has no "tooth," the culmen is remarkably elevated and arched near the base, and depressed again in front of the nostril. The length of the culmen in our old *males*—though none of them has a perfectly black bill—is 14—14·8 mm.; the wing, 63—64. The iris is brown. We have a large series from Abingdon Island collected in August. The only authentic locality for this species is Abingdon Island. The locality Charles Island for a skin from Markham must be erroneous, such a distribution being unheard of.

20. *Geospiza debiliostris* Ridgw.

*Geospiza debiliostris*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 363 (1894); XIX. p. 533.

Messrs. Baur & Adams collected several of this species in spirits, and our recent collection contains a large series. Most of our specimens show also a

depression on the culmen in front of the nostril, but not so well marked as in *G. difficilis*. In size of the bill *G. debiliostris* approaches *G. fortis*, but the bill is smaller and not so high. The culmen of adult *males* measures 16 mm.; greatest height of bill near base, 9.6—10 mm.; wing, 71—73 mm.; the tarsus, 26 mm.; middle toe without claw, 15 mm.

### 21. *Geospiza scandens scandens* (Gould).

*Catortus scandens*, Gould in *Proc. Zool. Soc. Lond.* 1837, p. 7; *Zool. Voy. Beagle*, III. Birds, p. 104, Pl. XLII.; Salvin in *Trans. Zool. Soc. Lond.* IX, p. 485 (1876); Sharpe, *Cat. B. Brit. Mus.* XII, p. 19.

*Geospiza scandens*, Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 534.

*G. scandens scandens* is only known from James Island, but *G. scandens intermedia* and *G. scandens fatigata* are so closely allied that it is very difficult to separate them. Young specimens of these subspecies are not always separable. Adult black *males* with black bills of *G. scandens scandens*: culmen, 18—18.5 mm.; wing, 70—72 mm.

### 22. *Geospiza scandens intermedia* Ridgw.

*Geospiza intermedia*, Ridgway in *Proc. U.S. Nat. Mus.* XVII, p. 361; Ridgway *op. cit.* XIX, p. 535. (2) *Catortus assimilis*, Gould in *Proc. Zool. Soc. Lond.* 1837, p. 7; *Voy. Beagle*, III. Birds, p. 105, Pl. XLIII.

The form from Charles Island differs from typical *G. scandens* in having the bill slightly larger. The culmen of adult *males* measures 19—21.5 mm.; the wing, 70—75 mm. We have it also from Gardner.

*Catortus assimilis* of Gould certainly did not come from Bindloe Island, because Darwin had evidently not collected there at all. Consequently the Bindloe form cannot be called *assimilis*. The type of *assimilis*, an immature bird, came most probably from Charles Island; the name is therefore best placed provisionally as a synonym of *G. scandens intermedia*.

### 23. *Geospiza scandens fatigata* Ridgw.

*Geospiza fatigata*, Ridgway in *Proc. U.S. Nat. Mus.* XVIII, p. 293; Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 539.

*Geospiza barringtoni*, Ridgway in *Proc. U.S. Nat. Mus.* XVII, p. 361; Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 541.

This form is very closely allied to *G. scandens intermedia*, but the bill and wing is generally slightly larger, and the tarsus 1 or 2 mm. longer, while the feet appear stronger and clumsier. We are not able to detect the slightest difference between specimens from Indefatigable and Barrington Islands, though we have the type of "*G. barringtoni*" and two dozen other specimens from Barrington to compare.

We have *G. scandens fatigata* from Indefatigable, Duncan, Albemarle, Jervis, Chatham, and Barrington Islands. The number of black *males* is everywhere rather small, and generally we find a much larger proportion of adult black-billed black-plumaged *males* among the few specimens of Dr. Baur's collection than among the large series collected by the Harris expedition.

Our *males* from Indefatigable Island measure: culmen, 19, 20, 20.5, 21, 22, 22.5 mm.; wing, 75—76 mm.

Those from Albemarle : culmen, 19·2—21 mm.; wing, 73—75 mm.

Those from Jarvis : culmen, 19—20 mm.; wing about 73 mm.

Neither among those from Chatham nor among those from Duncan do we have any black adult *males*, but the measurements of our series from both these islands agree fully with birds in the same plumage, apparent age and sex from the other islands.

Our *males* from Barrington Island measure : culmen, 20—21 mm.; wing, 72—75 mm. The shape of the bills of the type specimen and of some of our other specimens certainly look somewhat different, as they are plumper at the tip, but other specimens again are quite like those from the other islands.

#### 24. *Geospiza scandens abingdoni* (Scl. & Salv.)

*Cactornis abingdoni*, Selater & Salvin in *Proc. Zool. Soc. Lond.* 1870, pp. 323, 326; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 486 (1876); Sharpe, *Cat. B. Brit. Mus.* XII. p. 20.

*Geospiza abingdoni*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 540.

*Cactornis assimilis*, Salvin, *l.c.*, p. 486, and Sharpe, *l.c.*, p. 18 (partim : Bindloe, non Gould!).

The birds from Abingdon and Bindloe are no doubt the same, and it was a mistake to identify the Bindloe birds with Gould's *Cactornis assimilis*, as Darwin never set his foot on Bindloe Island. (See remarks under *G. scandens intermedia*.)

*G. scandens abingdoni* is still larger than *G. scandens fatigata*, the bill is deeper, higher at base. We have, however, only a very poor series, and no perfectly adult *males*.

#### 25. *Geospiza scandens septentrionalis* subsp. nov.

This new subspecies occurs on Wenman and Culpepper Islands. It has a very much smaller bill than any of the other forms of *G. scandens*, and is evidently a somewhat darker or rather more brownish bird, the young individuals and *females* being darker and more brownish, the wing-coverts of the *females* being broadly bordered with brownish cinnamon, not whitish. The young *males* have the borders to the upper wing-coverts much narrower than adult *females*. We have a good number of black *males*, but none with quite black beaks.

The culmina measure from 14·5 to 16·5 mm., the wings 70 to 75·5, tails about 50, tarsus 21.

Our specimens from Wenman cannot be separated from those from Culpepper. (Type No. 311, Harris coll., Wenman Island, August 4th, 1897; eyes brown, bill horn-colour, tarsi and feet blackish.)

#### 26. *Geospiza pallida* (Scl. & Salv.)

*Cactornis pallida*, Selater & Salvin in *Proc. Zool. Soc. Lond.* 1870, pp. 323, 327; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 487; Sharpe, *Cat. B. Brit. Mus.* XII. p. 20.

*Camarhynchus pallidus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 565.

*Cactornis hypoleuca*, Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 109 (1890).

*Camarhynchus productus*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 364; Ridgway, *op. cit.* XIX. p. 566.

This is one of the most distinct species of the genus *Geospiza*. With the scanty material at the disposal of Selater, Salvin, and Sharpe, the genera *Geospiza*, *Cactornis*, and *Camarhynchus* seemed well enough defined; and if they were, there would be no doubt that *G. pallida* belonged structurally to *Cactornis*, but not at all to *Camarhynchus*, where Ridgway placed it on account of its coloration. In

fact, in form of the bill there is not a great difference between *G. scandens* and *G. pallida*, and, as *G. scandens* (the *Cactornis* of former authors) is connected through intermediate species with *Geospiza* in the old sense, and *G. pallida* with the *Camarhynchus* in Salvin's & Sharpe's sense, it is evident that the three supposed genera cannot be separated.

*G. pallida* is apparently a somewhat rare species; for, although we have now thirty-nine skins before us, this seems not much, as they are from five or six islands, and there are not many adult *males* among them. Also the British and U.S. National Museum have, if we are not mistaken, only three or four skins. The adult *male* will be described below for the first time.

We have omitted Ridgway's *Camarhynchus hypoleucus* and *C. productus* with our *G. pallida*, the differences stated to exist between these forms evidently being of an individual nature rather than specific. The adult bird of *G. pallida* may be described as follows:—

Adult *male*: Bill horn-black. Upperside ashy grey, more brown on the lower back and rump, the centre of all the feathers blackish brown, more defined on the crown. Wings and tail deep brown with narrow, light greyish outer and wider almost white inner edges; under wing-coverts white, with a slight yellow tinge. Underside white with a very faint buff tinge, flanks shaded and faintly striped with brown, the chest tinged with brownish buff, all the bases of the feathers blackish grey. "Iris brown, feet blackish." Wing, 76—78 mm.; culmen, 17—18; tail, 47—49; tarsus, 23—24. In some skins, especially in one almost adult *male* from Albemarle Island, the culmen does not exceed 15 mm. in length, the wing not 75 mm.; but as there are all intergradations between these and others, the smaller size cannot be considered as a specific character.

Adult *female*: Like the adult *male*, but (? always) slightly more brownish and more uniform above; dimensions smaller. Wing, 73—74 mm.; culmen, 16 mm.

The birds which are olive above and buffish yellow below are immature ones, but it is somewhat puzzling to account for the distinct blackish brown stripes on the lower throat, chest, and sides of the body in some of them. Neither the apparently most adult ones, nor the most yellowish, and therefore, according to our view, youngest of our series, have these stripes well developed. These striped birds may be the *females*, but in that case several of our birds from different collections would be wrongly sexed.

We have *G. pallida* from Indefatigable, Jervis, Duncan, James, and Albemarle Islands.

There is also a skin taken out of a jar of spirits said to contain Chatham Island birds only, collected by Messrs. Baur & Adams, but we are inclined to believe that this specimen has by mistake found its way into the Chatham jar.

## 27. *Geospiza crassirostris* (Gould).

*Camarhynchus crassirostris*, Gould in *Proc. Zool. Soc. Lond.* 1837 p. 6; *Zool. Voy. Beagle*, III. Birds, p. 103, pl. XLI. (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 489; Sharpe, *Cat. B. Brit. Mus.* XII. p. 16 (1888); Ridgway in *Proc. U. S. Nat. Mus.* XIX. p. 551.

*Camarhynchus variegatus*, Selater & Salvin in *Proc. Zool. Soc. Lond.* 1870, pp. 323, 324, fig. 2; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 489, pl. 85 (1876); Sharpe, *Cat. B. Brit. Mus.* XII. p. 15; Ridgway in *Proc. U. S. Nat. Mus.* XIX. p. 549.

There can be no doubt, in our opinion, that *Camarhynchus variegatus* is a synonym of *C. crassirostris*, since specimens from Charles Island, and the other

islands whence the type of *C. crassirostris* might have come, do not differ from those of Abingdon and Bindloe, where the type of *C. variegatus* had been found, and since we find some birds from several of the islands inhabited by this form to agree with the type of *C. crassirostris*.

We have already given our reasons for uniting the genera *Geospiza* and *Camarhynchus*.

We have before us specimens of *G. crassirostris* (= *variegatus*) from Charles, Chatham, Indefatigable, James, Albemarle, Jervis, Duncan, Abingdon, and Bindloe Islands. From several of these we have no black-throated adult *males*. Descriptions of this species are given by Sclater & Salvin, Sharpe, and the most complete by Ridgway, *l.c.* 1897.

The types of *G. variegatus* were procured on Abingdon and Bindloe. Mr. Townsend did not find it there, nor did Messrs. Baur & Adams come across it, and therefore Dr. Baur doubted the locality, declaring that "it was certainly not true" that *G. variegatus* and *G. habeli* were found simultaneously on Bindloe and Abingdon; but we shall see that it is nevertheless true that these forms occur together.

Ridgway (*l.c.*) reprints the three descriptions purporting to have been taken from the same specimen, "the type," now in the British Museum. We have compared the latter also, but we do not think that it is the type at all! This will account for the discrepancies in the various published descriptions. The type of *G. crassirostris*, according to the descriptions and figure of Gould, and in the *Voyage of the Beagle*, had no black crown, sides of head and ear-coverts, while the supposed type now in the British Museum has these parts black, as described by Salvin, *l.c.*

It would perhaps seem that Sharpe (*l.c.*) had again the real type, without a black head, before him when he wrote Vol. XII. of the *Catalogue of Birds*, but the shortness of his description leaves it doubtful.

## 28. *G. psittacula psittacula* (Gould).

*Camarhynchus psittaculus*, Gould in *Proc. Zool. Soc. Lond.* 1837, p. 6; *Zool. Voy. Beagle*, III. Birds, p. 193, pl. XL.; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 488; Sharpe, *Cat. B. Brit. Mus.* XII. p. 16; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 552.

*Camarhynchus rostratus*, Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 363 (James Island).

*Camarhynchus compressirostris*, Ridgway in *Proc. U.S. Nat. Mus.* XVIII. p. 294; XIX. p. 558 (Jervis Island).

The type of *G. psittacula* (Gould) is said to have come from James Island. We consider the birds from James, Indefatigable, Barrington, Jervis, and Duncan to belong to the same form, while we are somewhat doubtful with regard to those from Charles Island. We have also one very young bird from Chatham, of which it is impossible to say with certainty whether it belongs to *G. psittacula psittacula* or not, but which does not disagree with the latter.

## (?) 29. *Geospiza psittacula townsendi* (Ridgw.)

*Camarhynchus townsendi*, Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 110 (1890).

We have only four skins from Charles Island, and they are all *females*. Three of them have black bills, a character not to be seen in our (apparently) adult *females* from other islands. The bill seems a little higher, the upper jaw especially, than in specimens from other islands.

We enumerate these Charles Island specimens provisionally as a subspecies of *G. psittacula*, but we do not consider it an established form, as a better series may prove its identity with *G. psittacula psittacula*.

### 30. *Geospiza affinis* (Ridgw.)

*Camarhynchus affinis*, Ridgway in *Proc. U.S. Nat. Mus.* XVII, p. 365 (1894); XIX, p. 554

The form from Albemarle and Narborough Islands differs so much from *G. psittacula* in its smaller size, especially of the bill and wings, that we, for the present, allow its specific rank. The "rather broadly and distinctly streaked breast" of the type, which is before us, is no specific character, since it is found in a number of immature *G. psittacula* and other allied forms.

Adult *males* with black bills have the entire head, neck and chest black, the black colour developing into broad streaks on the sides of the breast. The culmen of adult *males* is 12.5—13.5 mm., the wing 68—72.

### 31. *Geospiza incerta* (Ridgw.)

*Camarhynchus incertus*, Ridgway in *Proc. U.S. Nat. Mus.* XVIII, p. 294, XIX, p. 560.

Three skins before us from James Island, one of them the type, belong no doubt to the form called by Mr. Ridgway *C. incertus*. They are very closely allied to *G. affinis*, in fact hardly differ from the latter at all, except by their apparently smaller bills. The culmen measures 12—13 mm., but probably not one of these specimens is adult. One of them is marked *male*, and its beak is very dark, almost black, marked by the collector on the label as "blackish, lighter below," but, although being darker on the head than the others, especially on the lores and ear-coverts, it wants the black head.

Five specimens from Duncan are not separable from those from James Island, but they are also *females* or immature *males*, and adult *males* would be necessary to finally settle their relationship.

We have seen that the specimens from Jervis Island, which lies in the middle between James and Duncan Islands, are true *G. psittacula*. Therefore, if the Duncan and James birds are the same, we should probably find it also on Jervis Island. Much better material is required to decide whether *G. incerta* can be separated from *G. affinis* or not.

### 32. *Geospiza habeli* (Sel. & Salv.)

*Camarhynchus habeli*, Selater & Salvin in *Proc. Zool. Soc. Lond.* (1870) pp. 323, 325, fig. 3 in text; Salvin in *Trans. Zool. Soc.* IX, p. 490, Pl. XXXVI, (1876); Sharpe, *Cat. B. Brit. Mus.* XII, p. 17 (1888); Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 555.

*Camarhynchus bindloei*, Ridgway in *Proc. U.S. Nat. Mus.* XVIII, p. 291 (1896), XIX, p. 556.

*G. habeli* from Bindloe and Abingdon is a very distinct form, the bill being rather deep, the height at base being almost or fully equal to the distance from nostril to tip of upper jaw. Length of culmen 15.5—16 mm., wing 74—76 mm.

We have examined, besides those in the British Museum, twelve skins from Bindloe and thirteen from Abingdon, including the type of *C. bindloei*, but we cannot recognise any differences between the birds from the two islands.



33. *Geospiza paupera* (Ridgw.)

*Camarhynchus pauper*, Ridgway in *Proc. U.S. Nat. Mus.* XII p. 111, XIX. p. 559.

It seems strange that this species was not found by Darwin and Baur and Adams. The "Albatross" had obtained, it seems, three specimens, while our recent expedition has obtained a full dozen, among which, however, there is only one *male* with the head and throat chiefly black. The culmen of our oldest birds with black bills measures about 12.9—13.5, the wing about 69—73 mm.

*G. paupera* is evidently a good species, its bill being somewhat stout and at the same time elongated, much less high than it is in *G. psittacula* and allies.

It is only known from Charles Island.

34. *Geospiza salvini* (Ridgw.)

*Camarhynchus salvini*, Ridgway in *Proc. U.S. Nat. Mus.* XVII p. 364, XIX. p. 561.

The small curved-billed *Geospiza* from Catham Island is apparently very yellowish and buffish in all ages, and much larger than *G. prothemelas*. Mr. Ridgway has, besides seven skins in Dr. Baur's collection, examined eleven specimens procured by Mr. Townsend, naturalist of the U.S. Fish Commission steamer "Albatross." We have before us altogether sixty-three skins, sixteen from the Baur collection, forty-seven from the Harris expedition. Among these seventy-four skins thus seen by ornithologists, there is not a single black-headed individual. As the birds shot by Mr. Townsend were procured in March, Dr. Baur's in August and September, Mr. Harris' in October, we may perhaps conclude that this species does not assume a black head and throat at all; but this is by no means certain, and it will be most valuable to see specimens killed between October and March, and between March and August. The adult *male*—if we presume it has never a black head—is black-billed, streaked with black on the sides of the breast, these streaks being produced by the arrow-shaped black markings in the middle of the feathers, and agrees with Mr. Ridgway's description, *l.c.* The culmen measures 11.5—12 mm., the wing 66—67 mm. The adult *female* is like the adult *male*, but slightly smaller, the culmen not above 11—11.5, the wing 63—65 mm.; the sides of the breast are less streaked, the arrow-shaped black markings in the middle of the feathers being indistinct. Some of the young birds are very boldly streaked on the underside, the black markings being less arrow-shaped and reaching to the tip of the feathers, while others are hardly streaked at all. Most of the latter being marked "♀," we suppose they are all *females*. The strongly yellowish tint of *G. salvini* in all ages is very conspicuous if a series is compared with any of the other species, but some young *G. prothemelas* have exactly the same colour.

35. *Geospiza prothemelas* (Sel. & Salv.)

*Camarhynchus prothemelas*, Selater & Salvin in *Proc. Zool. Soc. Lond.* 1870, pp. 323, 325, fig. 4 (type from Indefatigable Island); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 490 (1876); Sharpe, *Cat. B. Brit. Mus.* XII. p. 17 (1888); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 563.

As far as our material enables us to judge, we consider at present the forms from the following islands to be what we call *Geospiza prothemelas* (Sel. & Salv.)

1. Indefatigable Island. We have before us twenty-nine skins, collected in

August, September and October, nearly all marked as *females*, none with black beak or black head.

2. Duncan Island. Nine skins, no black-billed or black-headed specimen. September.

3. Albemarle Island. Twenty-three skins, among them six black-headed *males*. Shot in July (Baur), and November (Harris, etc.)

4. Narborough Island. Four skins, one black-headed. December.

5. James Island. Twenty-six skins, five black-headed *males*; none with black bill. All shot in August, September and October.

6. Jervis Island. Twelve skins; none black-headed. August and September.

7. Charles Island. Twenty-seven skins, of which seventeen are more or less black-headed and black-throated. All these latter are marked "♂"; the *female* therefore does not seem to assume a black head. All November.

8. Gardner Island (near Charles). Five, all young.

9. Barrington Island. Three young individuals.

10. Cowley Island (east of Albemarle). One young individual (Baur coll.). It is most peculiar that Ridgway had also black-headed individuals from James and Charles Islands only; but no doubt the black heads are only seasonal, although ours from Charles Islands are all killed in November, Ridgway's in April.

*G. prothemelas* is the smallest form of the curved-billed *Geospizae* (*Cuniarhynchus* of Gould, Salvin, Sharpe, Ridgway), and young birds with little curved bills are sometimes easily mistaken for very young *G. fuliginosa*, while others are very yellowish, so as to resemble *G. salcini*.

#### EXPLANATION OF PLATE VI.

Fig. 1.	<i>Geospiza strenua</i> ,	Bindloe I.	♂ ad. Aug. 1897 (No. 706).
" 2.	" "	"	♂ ad. Sept. 1891 (Baur coll.).
" 3.	" "	"	♀ med. Aug. 1897 (No. 726).
" 4.	" "	James I.	♀ ad. Aug. 14th, 1891 (Baur coll.).
" 5.	" "	"	♀. Sept. 1897 (No. 1364).
" 6.	" "	"	♀. Sept. 1897 (No. 1323).
" 7.	" "	Tower I.	♂ ad. ! Dec. 1897 (No. 2985).
" 8.	" "	"	? ♀ ad. Sept. 1891 (Baur coll.).
" 9.	" "	"	♀ ad. Dec. 1897 (No. 2888).
" 10.	" "	Jervis I.	♂ ad. ! Sept. 1897 (No. 1205).
" 11.	" "	"	♀. Aug. 1891 (Baur coll.).
" 12.	" "	"	♂ juv. Aug. 1891 (No. 474, Baur coll.).
" 13.	" "	Albemarle I.	♂ ad. ! July 1891 (Baur coll.).
" 14.	" "	"	♂ ad. July 1891 (Baur coll.).
" 15.	" "	"	♀ juv. July 1891 (Baur coll.).
" 16.	" "	Indefatigable I.	♂ quite young, Aug. 1891 (Baur coll.).

These 16 figures are given to show the variation within one form, according to age and sex. Figures 1, 4, 7, 8 and 10 show about the largest bills in our series, while figures 15 and 16 show the smallest, both being young birds. Figures 17 to 20 show also the variation within one form, while figures 21 to 39 show the bills of typical individuals of some of the other forms.



1



2



3



4

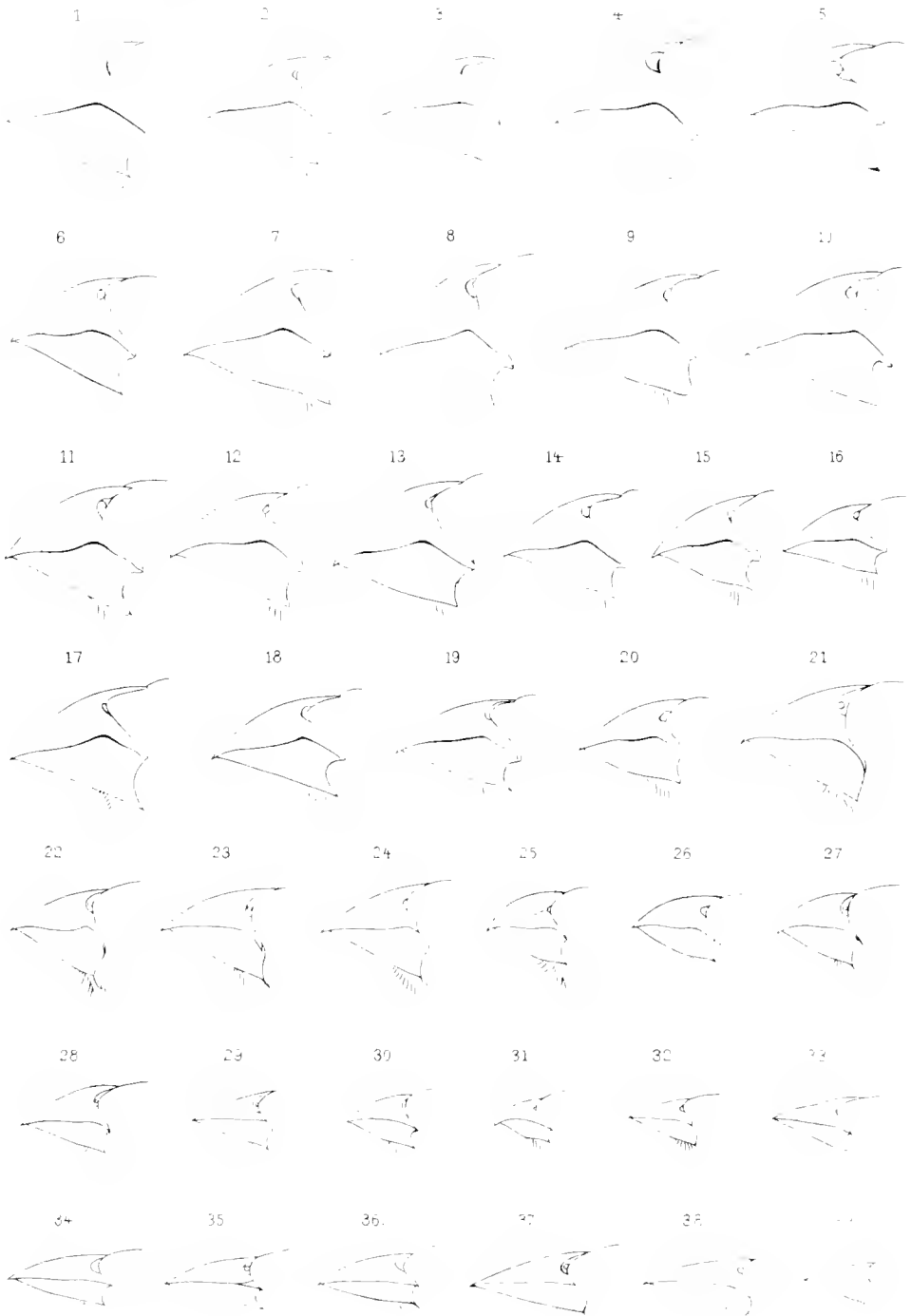
1 ALBATROSS (DIOMEDEA IRRORATA) ON HOOD ISLAND.

2 ANOUS STOLIDUS GALAPAGENSIS ON HOOD ISLAND.

3 PHALTHON AETHEREUS ON ITS NEST, HOOD ISLAND.

4 AMBLYRHYNCHUS CRISTATUS, HOOD ISLAND.





BILLS OF THE GENUS *GEORPILA*.

688 B.F.

- Fig. 17. *Trospiza centrostris*. ♂ ad ! Hood I. 1891 (Baur coll.)  
 .. 18. " " ♂ fore ad. Hood I. Oct. 1897 (No. 2913).  
 .. 19. " " ♂ juv. (but black). Oct. 1897 (No. 1969).  
 .. 20. " " ♂ juv. " " (No. 1962).  
 .. 21. " *darwini*. ♂ ad. (type). Culpepper I. July 1897 (No. 157).  
 .. 22. " *dubia*. ♂ ad. Chatham I. June 1891 (No. 78, Baur coll.).  
 .. 23. " *dubia albemarlei*. ♂ ad. Albemarle I. Nov. 1891 (No. 2468).  
 .. 24. " *bauri*. ♂ ad. (type). James I. Aug. 1891 (No. 562, Baur coll.).  
 .. 25. " *psittacula*. ♂ ad. James I. Sept. 1897 (No. 1287).  
 .. 26. " *habeli*. ♂ ad. Bindloe I. Aug. 1897 (No. 703).  
 .. 27. " *crassirostris*. ♂ ad. Albemarle I. July 1891 (Baur coll.).  
 .. 28. " *fortis*. ♂ ad. Charles I. Nov. 1897 (No. 2239).  
 .. 29. " *debilirostris*. ♂ (black, but bill not). James I. Nov. 1897 (No. 1352).  
 .. 30. " *paupera*. ♂ Charles I. Nov. 1897 (No. 2349).  
 .. 31. " *prothemelas*. ♂ ad. Charles I. Nov. 1897 (No. 2217).  
 .. 32. " *fuliginosa*. ♂ ad. Jervis I. Aug. 1891 (Baur coll.).  
 .. 33. " *difficilis*. ♂ ad. Abingdon I. Aug. 1897 (No. 571).  
 .. 34. " *pallida*. ♀. Jervis I. Nov. 1897 (No. 1111).  
 .. 35. " " ♀. James I. Aug. 1891 (Baur coll.).  
 .. 36. " " ♂ ad. James I. Nov. 1891 (No. 1280).  
 .. 37. " *scandens intermedia*. ♂ not ad. Gardner I. Oct. 1897 (No. 2112).  
 .. 38. " " " ♂ ad ! Charles I. Nov. 1897 (No. 2365).  
 .. 39. " *acutirostris*. ♂ ad. Tower I. Dec. 1897 (No. 2907).

#### GENUS DOLICHONYX Swains.

*Dolichonyx*, Swainson in *Phil. Mag.* 1827, p. 435.

Eastern parts of North America ; in winter over great portions of eastern South America.

##### 1. *Dolichonyx oryzivorus* (L.).

*Fringilla oryzivora*, Linnaeus, *Syst. Nat.* ed. X. p. 179 (1758).

*Dolichonyx oryzivorus*, Darwin *Zool. Beagle*, III. Birds, p. 106 ; Salvin in *Trans. Zool. Soc.* IX. p. 491 ; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 567.

The bobolink had been found by Darwin on James Island. The Harris expedition obtained a young *male* on Charles and a *female* on Chatham Island, the former in November, the latter in October and several others were seen. They are, of course, stragglers from North America.

#### GENUS MYIARCHUS Cab.

*Myiarchus* Cabanis in Tschudi's *Fauna Peruana*, Aves, p. 152 (1845).

*Eribates*, Ridgway in *U.S. Nat. Mus.* XVI. p. 606 ; XIX. p. 568.

*Dispotina* Kaup 1851, *Myioma* Cabanis & Heine 1859, *Oxyrhopus* Reichenbach 1850, *Kaupornis* Bonaparte 1850 are synonyms of *Myiarchus* according to Selater, *Cat. B. Brit. Mus.* XIV. p. 246 (1888).

We do not see a necessity to deviate from Dr. Selater's view of the genus *Myiarchus*, and if limited according to the latter author we cannot see how *Eribates*

of Ridgway can be recognised, especially if compared with *M. nigriceps* of Ecuador. Ridgway himself only created the name *Eribates* as a subgeneric term, but does not use it.

### 1. *Myiarchus magnirostris* (Gray).

*Myiobius magnirostris*, Gray in *Voy. Beagle*, III. Birds, p. 48 (1841).

*Tyrannula magnirostris*, Lc. Pl. VIII.

*Myiarchus magnirostris*, Salvin in *Trans. Zool. Soc. Lond.* IX. p. 493; Selater, *Cat. B. Brit. Mus.* XIV. p. 262 (1888); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 569.

We have this species from the following islands: Chatham, Charles, Gardner, Hood, Barrington, James, Duncan, Indefatigable, Jervis, Albemarle, Narborough, Abingdon and Bindloe, and one caught on the vessel off Wenman Island.

There are no differences between any of these, except that those from Chatham seem to have the wing about 2—4 mm. shorter. As, however, we have only one fresh skin and two from spirits (the type in the British Museum being of doubtful origin), we cannot maintain that this character is of specific or subspecific value. A larger series would be necessary to show the value of this peculiarity.

The *female* is considerably smaller than the *male*, with the wing about 5 mm. shorter. There is generally a little less cinnamon-rufous on the inner webs of the rectrices, but other differences in colour are not to be seen.

### GENUS PYROCEPHALUS Gould.

*Pyrocephalus*, Gould in *Voy. Beagle*, Zool. III. Birds, p. 44 (1841); Selater, *Cat. B. Brit. Mus.* XIV. p. 211.

This genus is most closely allied to *Myiobius*, from which it hardly differs in structure, except by its somewhat more elongated bill and less developed rictal bristles, but the coloration of the *males* makes all its members very conspicuous.

The genus is absent from the West Indies, but spread over the whole of South America, from Southern Florida through Central America to Argentina, and is frequent on the Galapagos Islands.

Only two forms can be distinguished in the Galapagos Archipelago, the forms separated by Ridgway on account of certain alleged differences in colour not being recognisable.

### 1. *Pyrocephalus nanus* Gould.

*Pyrocephalus nanus*, Gould, *Zool. Beagle*, III. Birds, p. 45, Pl. VII. (1841); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 572.

*Pyrocephalus intercedens*, Ridgway in *Proc. U. S. Nat. Mus.* XVII. p. 366; XIX. p. 575.

*Pyrocephalus caroleusis*, Ridgway in *Proc. U. S. Nat. Mus.* XVII. p. 365; XIX. p. 576.

*Pyrocephalus abingdoni*, Ridgway in *Proc. U. S. Nat. Mus.* XVII. p. 367; XIX. p. 578.

This species differs from *P. rubineus* of South America and *P. mexicanus* of Central America in its much smaller size and the coloration of the *female*, which is broadly striated on the breast in *P. rubineus* and *P. mexicanus*, but only faintly or not at all distinctly streaked on the breast in *P. nanus*.

The type of *P. nanus* is only known to have come from the "Galapagos Islands," but the exact island where it was procured is not known. Ridgway restricts its habitat to **James** Island. From this island we have twenty-four skins, about half of them being *males*. From **Indefatigable** Island we have thirty-six



skins, and we do not find the slightest difference from those from James. The *female* is, according to Ridgway, brighter yellow beneath, browner above, and the top of the head more tinged with yellow. These characters may have been visible in what we should have called the type,\* but they are only of an individual nature, as we find *P. nanus* to vary very much in the depth of the colour, freshly moulted specimens differing from bleached ones, and young *males* running through many shades of colour. From **Albemarle** we have sixteen specimens, but only five adult *males*. Neither *males* nor *females* differ at all from those from James and Albemarle Islands. From **Duncan** we have nineteen skins, nine *females* and immature *males*, and nine adult *males*. They do not differ from those from James, Indefatigable, and Albemarle Islands. One adult *male* and three young *males* from **Jervis** are like the former. From **Charles** Island we have not less than forty-two skins, and we do not find them to differ in any way from the former. The alleged differences of *P. carolinensis* do not exist. The same must be said of those of **Abingdon** and **Bindloe** Islands. From the latter we have six adult *males* and three *females*; from the former two *males* and one *female*. The underside of the *males* is extremely variable in colour, being much brighter and more vermilion after the moult, more scarlet in others, and sometimes orange-chrome-yellow. The latter is especially the case with most of Dr. Bair's specimens, which look as if they had been partially immersed in spirits for a short time, or had been in contact with some other chemical. The specimen from Bindloe, mentioned by Ridgway on p. 578 (*l.c.*), which has the throat and chest pure scarlet and the breast and abdomen abruptly "pale saturn red," is probably in some way partly discoloured. As its right side is not quite like the left side, it should have convinced Mr. Ridgway that these shades of colour are not of any specific value. Our other *male* from Bindloe is totally different from the one in Dr. Bair's collection.

We have, besides the above-mentioned skins, many examples in spirits, but they are useless as skins, the colour being entirely gone.

## 2. *Pyrocephalus dubius* Gould.

*Pyrocephalus dubius*, Gould, *Voy. Beagle*, Birds, III. p. 46; Ridgway in *Proc. U.S. Nat. Mus.* XVII. p. 368 (1894); XIX. p. 579.  
*Pyrocephalus minimus* Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 113 (1890).<sup>1</sup>

This species inhabits **Chatham** Island only. It differs from *P. nanus* in being considerably smaller, the wing about 4 or 5 mm. shorter, the tail at least 5 or 6 mm. shorter. The *males* do not seem to become so bright scarlet beneath as those of *P. nanus*. The *female* has a broad and conspicuous superciliary stripe, is much more ochraceous buff beneath than the *females* of *P. nanus*, and the throat is not so pale and not in such a sharp contrast to the breast.

## GENUS COCCYZUS Vieill.

*Coccyzus*, Vieillot, *Analyse*, p. 28 (1816).

"Temperate and tropical America generally."

\* No. 418 of Dr. Bair's collection, Indefatigable Island, August 5th, 1891, an adult *male*, is marked as the type of *P. intercedens* by Ridgway, but as the alleged differences have apparently only been noticed in the *female*, the latter should be the real type of *P. intercedens*.

1. *Coccyzus melanocoryphus* Vieillot.

*Coccyzus melanocoryphus* Vieillot in *Nouv. Dict. d'Hist. Nat.* VIII. p. 271 (1817); Shelley, *Cat. B. Brit. Mus.* XIX. p. 307 (1891); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 587.

We have received specimens from Chatham and Charles Islands, collected by Messrs. Baur & Adams and the Harris' expedition in the months of September, October, and November. Dr. Baur (*Amer. Naturalist*, 1897, p. 782) obtained it also on Albemarle, but the specimen has been lost in Guayaquil.

We cannot separate these birds from continental specimens. They have generally a very stout beak and much black about the face, but many continental skins do not differ at all.

## GENUS BUTEO Cuv.

*Buteo*, Cuvier, *Lec. Anat. Compar.* I. Ois. (1800).

Nearly cosmopolitan.

1. *Buteo galapagoensis* (Gould).

- Polyborus galapagoensis*, Gould in *Proc. Zool. Soc.* 1837. p. 9.  
*Circus gal.*, Gould, *Zool. Voy. Beagle*, III. Birds, p. 23. Pl. II. (1841)  
*Buteo gal.*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 587.  
*Buteo galapagoensis*, Sharpe, *Cat. B. Brit. Mus.* I. p. 170 (1874).  
*But. galapagoensis*, Salvin in *Trans. Zool. Soc.* IX. p. 495.  
*Buteo leucops*, Gray, *Cat. Accipitr. Brit. Mus.* p. 36 (1848).  
*Poecilopternis infulatus*, Kaup, *Contr. Orn.* p. 76 (1850).

The buzzard of the Galapagos Islands is apparently closely allied to the North American *B. swainsoni*, but has much larger feet and bill, and is generally larger. The *female* is larger than the *male*.

We have thirteen specimens in the light phase (ochraceous beneath) and eleven in the dark phase (almost uniform dark sooty brown). According to Mr. Ridgway only dark-coloured adults have hitherto been taken. We do not believe that our light-coloured specimens are all young. They are killed at the same time as the adults, are of both sexes, all equally coloured, those in fresh plumage are much brighter, those in worn dress paler, and in two moulting specimens the new feathers are of the same colour as the old ones. In none of the dark birds can we find actual remains of the light plumage, and the series of light ones does not look like being young birds. We are therefore inclined to believe that this buzzard occurs in a dark and in a light phase, like *Buteo swainsoni*.

The buzzard is now known to occur on the following islands:—Chatham, Albemarle, Duncan, Hood, Indefatigable, Barrington, Bindloe, Abingdon, James and Jervis. It seems to be absent from Charles Island.

A well incubated egg, which was not saved, was found on September 1st on Indefatigable, another fresh one on August 13th on Abingdon Island. The egg is greenish white, very much like that of the goshawk, without gloss and without any markings. It measures 57.2 by 45.3 mm. The nest is composed of sticks and substantially lined with grass. It was placed in a "tree-cactus" 10 feet from the ground.

## GENUS STRIX L.

*Strix*, Linnaeus, *Syst. Nat.* ed. X. p. 92 (1758).

1. *Strix punctatissima* Gray.

*Strix punctatissima*, Gray, *Zool. Voy. Beagle*, III. Birds, p. 34, Pl. IV. (1841); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 491; Sharpe, *Cat. B. Brit. Mus.* II. p. 297 (1875); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 583.

The barn-owl of the Galapagos Islands is the dwarf of the genus, and of a very dark coloration. It is evidently restricted in its range to the Galapagos Islands. Statements of its occurrence on the continent of South America are doubtless erroneous. It has been said to occur at Para (Strickland's *Orn. Synonymus*, p. 182), but the specimen on which this assertion had been founded is the Australian *S. castanops* (Salvin, *l.c.*). The birds said to be "rather abundant in the valley of Quito" (Orton, *Amer. Nat.* IV. p. 711) belong probably to the form described by Hartert as *S. flamma contempta* (Nov. Zool. V. p. 500), which resembles the Galapagos species (or subspecies) a good deal in coloration, but is much larger. (Wing 310 mm., in *S. punctatissima* only 220 mm.)

Only Darwin and Habel seem to have procured specimens of this owl, while neither Townsend nor Baur & Adams met with it. Harris believes that he heard it several times, and that he saw it, on Chatham Island, but unfortunately no specimen was procured.

## GENUS ASIO Brisson.

*Asio*, Brisson, *Orn.* I. p. 28 (1760).

Nearly cosmopolitan.

1. *Asio galapagoensis* (Gould).

*Brachyotus galapagoensis*, Gould in *Proc. Zool. Soc. Lond.* 1837, p. 10.

*Otus galap.*, Gould, *Zool. Voy. Beagle*, III. p. 32, Pl. III.

*Asio galap.*, Sharpe, *Cat. B. Brit. Mus.* II. p. 238 (1875); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 585.

*Asio galapagoensis*, Salvin in *Trans. Zool. Soc.* IX. p. 493 (1876).

This owl is particularly interesting, being apparently the only known near ally of the short-eared owl, which has a nearly—though not strictly—cosmopolitan distribution. The authors quoted above have given accurate descriptions of this species.

Ridgway has named Albemarle, Hood, Indefatigable, James, Tower and Bindloe Islands as its homes. We have also specimens from Duncan (common), Barrington (common), Chatham and Gardner Islands. It was also observed on Culpepper Island, but it has never been obtained on Charles Island.

## GENUS FREGATA Brisson.

*Fregata*, Brisson, *Orn.* VI. p. 506 (1760).

Intertropical seas.

1. *Fregata aquila* (L.).

*Pelecanus aquilus*, Linnaeus, *Syst. Nat.* ed. X. I. p. 133 (1758).

*Fregata aquila* and *Fregata aquila minor*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. pp. 590, 591.

*Fregata aquila*, Grant, *Cat. B. Brit. Mus.* XXV. p. 443.

Ridgway and Grant have quite correctly accepted the name *F. ariel* for the small species found in the South Pacific and Indian Oceans, from Madagascar

to Australia and the Society Islands, and recognised *F. minor* (*Pelecanus minor* Gmelin), as given to small specimens of the common large species, *F. aquila* (L.). On the other hand Ridgway (*loc.*) raises the question whether *F. aquila minor* is worthy of recognition as a separate form from true *F. aquila aquila*, or not. If so, the small form would be an occasional visitor to the Galapagos, while *F. aquila aquila* would be of regular occurrence according to Ridgway.

Our material from the Galapagos proves that the **small** form is resident on the islands, and, we think, it proves also that the large and small form completely intergrade in the same colonies, and that therefore they are not separable as subspecies.

On Culpepper, Wenman, Tower, Gardner and Hood Islands they were found breeding. On Indefatigable, Duncan, Jervis, James, Chatham, Barrington, and Albemarle Islands they were found to be common, and they were also seen on Abingdon, Charles, Bindloe, and Narborough Islands. The *males* vary in the two principal measurements as follows :

♂ ad. Culpepper. Bill from gape to tip in a straight line 116, 112, 110 mm., wing 580, 580, 548 mm.

♂ ad. Barrington. Bill, as above, 125, wing 645 mm.

♂ ad. Tower. Bill, as above, 130, wing 660 mm.

♀ ad. Culpepper. Bill, as before, 135, wing 600, 610 mm.

♀ ad. Wenman. Bill, as before, 158, wing 690 mm.

It is evident, and known, that the *females* are, as a rule, much larger than the *males*, but the Wenman *female* is a very large specimen.

The following note is on the label of this large *female*. "Wenman Island, ♀, August 4th, 1897. Length 42.50 in., extent 96 in. Iris dark brown, feet madder red, tarsi paler, bill horn-colour, gular sac and eyelids indigo blue. This bird is coloured entirely different from anything seen so far." We do not find anything extraordinary in these notes, the *males* only having a red gular sac, this being blue in the *females*.

The differences stated by Ridgway to exist in coloration—viz., that in the smaller birds the plumage is more glossy, and the back brilliant green mixed with purple, instead of the reverse—do not hold good, and are merely of an individual character.

The nests, composed of some sticks and placed in low bushes, contained one egg each. On Wenman they were fresh in the first week of July.

## GENUS PELECANUS L.

*Pelecanus*, Linnaeus, *Syst. Nat.*, ed. X. I. p. 132.

Tropical and temperate regions of the world, but absent from the Pacific islands and other maritime groups of islands far from the mainland or other large islands.

### 1. *Pelecanus fuscus californicus* Ridgw.

*Pelecanus (fuscus?) californicus*, Ridgway in Baird, *Brewer & Ridgway's Water-Birds of North America*, II. p. 143; *id.*, *Man. North Amer. B.* p. 82 (1887); *id.*, in *U.S. Nat. Mus.* XIX. p. 593; Grant, *Cat. B. Brit. Mus.* XXV. p. 478.

We quite agree with Mr. Grant, that the changes of plumage and the measurements are generally quite the same in *P. fuscus* and *P. californicus*, and that the reddish colour of the basal portion of the gular sac during the breeding season is

the only character to distinguish them by, if indeed correct. Unfortunately this peculiarity cannot often be seen in skins. However, although the measurements are often the same, we have not seen such small individuals as Mr. Hartert shot on Aruba, from the west coast of America, for example, from California and central America, or from the Galapagos Islands. All specimens from the west coast are large, and those from the Galapagos group do not, as a rule, excel those from farther north.

We have received this pelican from Albemarle, and Abingdon Islands only, but they were seen near and on some of the other isles. A nest with three eggs was found among the mangroves on Indefatigable Island, on September 3rd. The eggs are like those of other pelicans, measuring 78·5 by 51, 78·5 by 50·5, and 72 by 52·5 mm.

#### GENUS SULA Briss.

*Sula*, Brisson, *Orn.* VI. p. 495 (1760).

Temperate and tropical seas.

#### 1. *Sula piscatrix websteri* Rothsch.

*Sula piscator*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 598.

*Sula websteri*, Rothschild in *Bull. B. O. Club*, VII. p. 52 (May 1898); Grant, *Cat. B. Brit. Mus.* XXVI. p. 655 (quotation only).

When Mr. Rothschild described this form, as *S. websteri*, sp. n., in the *Bull. B. O. Club*, VII. p. 52, we had only a few specimens, but now we have before us three dozen of them, of which twenty-four are in the white plumage. They are mostly from Clarion Island, only six, in various plumages, from the Galapagos group.

The original diagnosis reads as follows:—

“Adult, in white plumage, closely resembling *S. piscatrix*, having the same hoary-grey on the primaries, but at once distinguishable by its dark brownish-grey tail; the bill is also more slender, and the red at the base of the mandible is more extended. Young in grey plumage somewhat variable, very different from the young of *S. piscatrix*, being not so dark above, and the feathers of the back uniform brown, not edged with light grey; below darker than the young of *S. piscatrix*. Size of *S. piscatrix*.”

*Hab.* Clarion Island, Galapagos, and the neighbouring seas.

Comparing now our series with a large series from the North Pacific and from the West Indian Islands, we find that none of those ever has a brownish-grey tail when in the white breeding-plumage, nor do we find it described in that plumage from anywhere else. Out of our twenty-four white birds from Clarion and the Galapagos Islands, however, only **one** has a white tail, and two others have brownish-grey tails with some admixture of white. All the other twenty-one white-plumaged adult birds, all in breeding plumage, mostly taken from their nests, have the tail brownish grey or greyish brown, with whitish tips to the middle rectrices. In addition to this remarkable character we find that the average measurements of the wing are longer, *S. piscatrix piscatrix* having the wing about 15—15·5, seldom 15·7—15·8 in., *S. piscatrix websteri* 16—16·5 in. in length. The other differences stated in the original description of *S. websteri* are not constant when examining a larger series. The bird considered then to be “young” is not in the first plumage. We have now young birds which are like those from other countries, although perhaps a little darker. It is remarkable that such a large proportion of

brown birds are found in the Galapagos Archipelago. They are, although not in their first plumage, immature birds, and would, no doubt, assume their white garment a year or two later.

This interesting form, which we do not hesitate to consider a subspecies of *S. piscatrix*, is already described in Baird, Brewer & Ridgway's *Water-Birds of North America*, II. p. 182, from an adult *female* procured by Colonel A. J. Grayson on Socorro Island in the Revilla Gigedo group.

This Gannet is named as a compliment to Mr. Frank B. Webster, of Hyde Park, Mass., U.S.A.

We consider the increased knowledge about this form to be one of the most interesting results of the expedition. These birds breed in enormous colonies. On Clarion Island, in the Revilla Gigedo group, the nests were found in the first week of July. They were all placed on bushes from 2 to 10 ft. from the ground, composed of twigs, very shallow and lined with coarse grass. In the Galapagos Island (Tower Island, last week in December) they were partly found on bushes, partly on the ground. The eggs are like those of *S. piscatrix piscatrix*.

## 2. *Sula variegata* (Tsch.).

*Dysporus variegatus*, Tschudi, *Fauna Peru., Ocu.* p. 313 (1845).

*Sula variegata*, Grant, *Cat. B. Brit. Mus.* XXVI. p. 434.

*Sula cyanops*, Reichenbach, *Naturores*, Pl. XXIxc. Nos. 2289-90 (1850); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 595.

This rare species of gannet has for a long time only been known in its spotted juvenile plumage. Grant (*l.c.*) has for the first time duly recognised and described the adult bird, but he did not emphasise the close relationship to *S. cyanops*. It is most excusable that Sundevall and Baur should have mistaken the adult *S. variegata* for *S. cyanops*. The two are—in the adult plumage—nearly alike, except that the bill is red or whitish pink, yellow towards the tip, in *S. variegata*; while it is horn-colour or yellowish, but **never reddish pink** in *S. cyanops*. The feet also are evidently darker in *S. variegata*. The tail shows generally more white on the basal portions of the middle rectrices, but this character is not constant.

*S. variegata* is evidently not rare on the Galapagos Islands, being found from Wenman and Culpepper to Charles, Hood, and Tower Islands.

The nests are placed in a slight hollow on the ground between the rocks or on the cliffs, and consist of a few pebbles. The eggs are two in number, but sometimes only one was found. They are like the eggs of *S. cyanops*.

They breed in colonies on Wenman, Culpepper, Hood, Garduer (near Charles), and Tower Islands.

## 3. *Sula nebouxi* Milne-Edw.

*Sula nebouxi*, Milne-Edwards in *Ann. Soc. Nat. Zool.* 52 (6), XIII. art. 4. p. 37. Pl. XIV. (1882);

Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 596; Grant, *Cat. B. Brit. Mus.* XXVI. p. 435.

*Sula gossi*, Ridgway in *Auk*, V. p. 241; Ridgway in *Proc. U.S. Nat. Mus.* XII. pp. 114, 120, 121 (1890).

*Sula cyanops* (non Sundevall!), Salvin in *Proc. Zool. Soc. Lond.*, 1883. p. 427.

This species is frequent on the Galapagos Islands. We have it from Albemarle, Barrington, Abingdon, Hood, and Chatham, but they were observed on or near most of the other islands. Curious to say, we have among twenty-six specimens only one *female*. This, however, does not differ from the *male*.

A younger bird has the whole neck smoky brown, with paler tips to the

feathers, the chest pale brown, upper tail-coverts pale brown, otherwise like adults. This specimen, however, is probably not in the first plumage, but in a transitional one. Its eyes were found to be "brown with light ring, bill greenish blue, gular sac greenish blue, feet lead-colour and buff" (Hull).

This species was found breeding on Abingdon, Hood, and Gardner Islands. It lays one or two eggs, generally two, in hollows in the ground among the rocks. The eggs are like those of other species of *Sula*, *i.e.* very light blue, and covered with a chalky white deposit. They vary much in size and shape, measuring 66 by 45, 67 by 43, 65 by 44, 60 by 43, and 58 by 45.5 mm.

#### 4. (?) *Sula brewsteri* Goss.

*Sula brewsteri* Goss in *Auk* V. p. 242 (1888) : Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 597.

We have no evidence of this species occurring in the Galapagos Archipelago at all. It is possible that the specimen called *Dysporus leucogaster* (= *Sula sula*) by Sundevall (*P. Z. S.* 1871, p. 125), caught in the archipelago by Kinberg, that one caught on board the vessel near Tower Island by Habel, and which escaped afterwards, and the birds seen by Messrs. Baur & Adams on Bindloe and Cowley Islands, were *S. brewsteri* (or *S. sula brewsteri* as it might be more correctly named, in view of the similarity of the female to *S. sula sula*), but it is just as possible that they were young of *S. nebouxi*.

One specimen of *S. brewsteri* was obtained by R. H. Beck on the vessel at 110° long., 11°20' lat. N., on January 11th, 1898. A female. "Its feet and tarsi yellowish pea-green, bill light horn-colour with a greenish cast, gular sac pea-green, spot in front of eye dark slate, Iris dark brown with a light ring around the edge. Length 32, extent 62."

### GENUS PHALACROCORAX Brisson.\*

*Phalacrocorax*, Brisson, *Orn.* VI. p. 511 (1760).

Almost cosmopolitan, but apparently absent from the central portions of the Pacific Ocean.

#### 1. *Phalacrocorax harrisi* Rothschild.

*Phalacrocorax harrisi*, Rothschild in *Bull. B. O. Club* VII. p. 52 (1898).

*Nannopterum* (gen. nov.) *harrisi*, Sharpe, *Genera and Species of Birds*, p. 235 (1899).

♂ ad. Upperside brownish black, bases of the feathers blackish grey. Neck brownish black behind, dark brown with pale brown edges to the feathers in front, silky white filaments scattered about the sides of the neck and head. Quills blackish brown with a hoary grey "bloom," paler on the outer webs and tips. Wing-coverts and scapulars dark hoary grey, with black borders. Tail-feathers fourteen—narrow, very stiff, black. Underside dark brown, tips and margins of the feathers more or less pale brown, sometimes nearly whitish. "Iris grass-green,

\* We may here mention that, if the twelfth edition of Linnæus (1766) is accepted as the starting-point of zoological nomenclature, *Carbo* Laccépède would be the generic title of this genus. Grant in *Cat. B. Brit. Mus.* XXVI. accepts *Phalacrocorax* Brisson 1760, while he rejects *Owocrotalus* Brisson 1760. Such inconsistent nomenclature can surely not be recommended.

greenish, or hazel, with a greenish tint." Gular sac at base slate-colour, below the bill nearly as light as flesh, on the lores slate-colour. Bill blackish, horn-colour towards the tip and below. Legs and feet black. Length (measured in the flesh) 36—39½ in., extent 28—32 in. Bill from end of frontal feathering to tip in a straight line 76—82, wing 175—190, tail 155—165, tarsus 65—75, outer toe about 120—125, inner toe about 45—50 mm.

This extraordinary bird, the wings of which are of about the same length as those of the great auk (*Alca impennis*), and which cannot possibly enable it to fly, was only found in the surf on the north coast of Narborough Island. Only a few specimens were procured. We do not see the necessity of separating it generically. It is named in honour of Mr. Charles Miller Harris, the able leader of the expedition.

## GENUS PHAETHON L.

*Phaethon*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 134 (1758).

Tropical seas in general.

### 1. *Phaethon aethereus* L.

*Phaethon aethereus*, Linnaeus, *l.c.*: Salvin in *Trans. Zool. Soc. Lond.* IX. p. 497; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 600; Grant, *Cat. B. Brit. Mus.* XXVI. p. 457.

Only this species of Tropic Bird is known from the Galapagos Islands. We have about half a dozen from Tower Island, from Baur & Adams, and a large series from the Webster expedition from Hood Island, as well as from Culpepper and Gardner.\*

The eggs were found in holes in the rocks on Hood Island in the latter week of October.

## GENUS ARDEA L.

*Ardea*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 141 (1758).

Nearly cosmopolitan.

### 1. *Ardea herodias* L.

*Ardea herodias*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 143 (1758); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 601; Sharpe, *Cat. B. Brit. Mus.* XXVI. p. 80.

We have received five *females* from Albemarle and Indefatigable, shot between August and November. They are all rather paler on the neck, upper and under wing-coverts. They are, however, quite or almost matched by some North American examples of *A. herodias* in the British Museum. It may be that these characters are of subspecific value, or that they are peculiar to the *female* (?). It would be reckless to separate the two forms at present, but we recommend their closer study with a bigger material for the future.

A nest in a large bush was found on Indefatigable Island on September 2nd. It contained three eggs, which are like those of other herons, measuring 61.5 by 46 and 64 by 47 mm.

\* We received *Phaethon rubricauda* from near the Clarion Islands, Revilla Gigedo group.



## GENUS HERODIAS Boie.

*Herodias*, Boie in *Isis*, 1882, p. 559.

Nearly cosmopolitan.

1. *Herodias egretta* (Gm.)

*Ardea egretta*, Gmelin, *Syst. Nat.* I. p. 629 (1788).

*Herodias egretta*, Sharpe, *Cat. B. Brit. Mus.* XXVI, p. 95; Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 601.

Dr. Baur has found on Albemarle "a rookery of a white heron (the adults fully white").

We have received a beautiful adult *male* from Albemarle Island. It does not differ from South American examples, the wing being 410 mm. long, but it seems to us that North American birds have the wing generally about 20 to 30 mm. shorter. The long-winged South American birds probably form a distinct subspecies.

## GENUS BUTORIDES Blyth.

*Butorides*, Blyth, *Cat. B. Asiat. Soc.* p. 281 (1849).

Distributed over America, Africa, and Madagascar, temperate and tropical portions of Asia to Australia. Absent from Europe.

1. *Butorides plumbeus* (Sund.)

*Ardea plumbea*, Sundevall in *Proc. Zool. Soc. Lond.* 1871, pp. 125, 127.

*Butorides plumbeus*, Salvin in *Trans. Zool. Soc. Lond.* IX, p. 497 (1876); Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 603.

*B. sanderulli*, Reichenow in *Journ. f. Orn.* 1877, p. 253; Sharpe, *Cat. B. Brit. Mus.* XXVI, p. 185.

(There is no reason to reject the specific name *plumbea*, the *Ardea plumbea* of Merrem being a bird belonging to a totally different genus, and we do not accept the illogical rule "Once a synonym, always a synonym.")

The *Butorides* of the Galapagos Islands is easily distinguished from all the other species of the genus by its very much darker underside, darker neck without, or with only indications of rufous, but with very distinct black longitudinal patches. Further by their darker wings, which have no white edges to the inner primaries, and by the very narrow and deep rufous brown, instead of buff or rusty wide, edges to the wing-coverts. *B. plumbeus* is also stouter built and larger than its American relations.

We have received specimens from Chatham, Bindloe, Jervis, Hood, Indefatigable, Wenman, Abingdon, Albemarle, and Barrington Islands. Ridgway mentions also Duncan, Charles, and James Islands. Dr. Baur observed it on Tower Island. One specimen, killed on board ship at Barrington Island on October 7th (No. 1548), had the "Iris bright orange-red, legs redder than orange red, bare skin on lores bluish."

## GENUS NYCTANASSA Stejneger.

*Nyctherodius*, Reichenbach, *Syst. Av.* 1852, p. XVI. (non *Nyctherodius* Macgillivray 1842.)

*Nyctanassa*, Stejneger in *Proc. U.S. Nat. Mus.* X, p. 295 (1887).

Warmer portions of America.

1. *Nyctanassa violacea* (L.).

- Ardea violacea* Linnaeus, *Syst. Nat.*, ed. 10, I, p. 143 (1758).  
*Nycticorax violaceus*, Gould in *Zool. Voy. Beagle*, III, Birds, p. 128 (1841).  
*Nyctanassa violacea*, Ridgway in *Proc. U.S. Nat. Mus.*, XIX, p. 606.  
*Nycticorax pauper*, Selater & Salvin in *Proc. Zool. Soc.*, 1870, pp. 323, 327; Salvin in *Trans. Zool. Soc.*, IX, p. 498 (1876).  
*Nyctanassa pauper*, Sharpe, *Cat. B. Brit. Mus.*, XXVI, p. 134, pl. 1c. (1898).

We take it on the authority of Mr. Ridgway that the "Yellow-crowned Night Heron" of the Galapagos is not separable from the the wide-spread species. Ridgway says, "Placing together four adults from the Galapagos with one from Socorro Island, and three from Louisiana, I find it impossible to detect any differences of coloration or proportions that are not of a purely individual character."

Although we have received not less than seventeen skins from Charles, Chatham, Bindloe, Tower, Albemarle, and Hood Islands, they were all autumn birds, except two from July 6th and 14th, collected by Dr. Baur. All these are so much darker than the birds before us, shot in breeding plumage in various parts of Central America, Mexico, Florida, and the Bahamas, that we should have thought they belonged to a different form, but having no adult spring specimens, and considering the great variation of *N. violacea*, we must accept Ridgway's statement who had spring specimens in full plumage before him.

There is no doubt whatever that the original description, as well as that in the *Catalogue of Birds*, and the plate in the latter work, Vol. XXVI, are taken from a young bird. We should recommend, nevertheless, the re-examination of a greater number of adult skins in nuptial plumage from the Galapagos, as we have an idea that they do not attain such light colours as *N. violacea* from other countries.

## GENUS PHOENICOPTERUS L.

*Phoenicopterus*, Linnaeus, *Syst. Nat.*, ed. 10, I, p. 139 (1758).

Tropical and subtropical regions chiefly of both hemispheres.

1. *Phoenicopterus ruber* L.

- Phoenicopterus ruber*, Linnaeus, *Syst. Nat.*, ed. 10, I, p. 139; Salvin in *Trans. Zool. Soc. Lond.*, IX, p. 498; Salvadori, *Cat. B. Brit. Mus.*, XXVII, p. 11 (1895); Ridgway in *U.S. Nat. Mus.*, XIX, p. 608.  
*P. glyphorhynchus*, Gray in *Ibis* 1869, pp. 439, 442, pl. XIV, fig. 5.

The difference on which Gray had founded his *P. glyphorhynchus* not being characteristic for the Galapagos flamingoes, the birds from there have been united with the North American *P. ruber*, which inhabits "the coasts of the Caribbean Sea and of the Gulf of Mexico north to Southern Florida and the Bahamas." Although this distribution is peculiar, it is not unique, and we see no sufficient reasons to separate the Galapagos birds from *P. ruber*.

Ridgway (*loc.*) says that the Galapagos flamingoes are distinctly paler in coloration and of a slightly smaller average size. It is true that we find brighter specimens among the Bahama Islands flamingoes, but we have only a very poor series to compare, while our Galapagos series is both large and beautiful. The brightest Galapagos skins are some that are greasy. Ridgway's measurements show a slightly smaller average size for Galapagos birds, but this is not sufficient to separate the latter from *P. ruber*. We have specimens from Albemarle, Charles and James Islands. Habel saw it on Indefatigable.

## GENUS POECILONETTA Eyt.

*Poecilonetta*, Eytou, *Mémogr. Annotid.* p. 16 (1838).

South America.

1. *Poecilonetta bahamensis galapagensis* Ridgw.

*Poecilonetta bahamensis*, Gould in *Zool. Beagle*, III. Birds, p. 135 (not *Anas bahamensis* Linnaeus).  
*Dafila bahamensis*, Salvin in *Trans. Zool. Soc. Lond.* IX. p. 499, and in *Proc. Zool. Soc. Lond.* 1883,  
 p. 428.

*Poecilonetta galapagensis*, Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 115 (1889), and in XIX. p. 612  
 Salvadori, *Cat. B. Brit. Mus.* XXVII. p. 284.

The little pintailed duck of the Galapagos is very closely allied to *P. bahamensis bahamensis*, and can only be ranked as a subspecies of the latter. The only distinguishing character which can be depended on is the brown speckled patch at the root of the upper jaw. It is certainly incorrect to say that the "sides of the head" are thickly speckled with brown, for there are among our unique series of forty-five skins from the Galapagos Islands several perfectly adult birds which have the sides of the head purely white, and only behind the base of the bill a light brown, dark speckled patch, while in *P. bahamensis bahamensis* the white reaches almost up to the bill, leaving only a very narrow brown speckled patch. The crown is generally a shade lighter brown, but not regularly more grey. The speckling on the breast has a somewhat different appearance, and the spots there seem to be more frequent in *P. bahamensis galapagensis*. In the *males* of the latter the chest feathers have three blackish brown spots, while in *P. bahamensis bahamensis* there seems to be always one only. The *females* have a much shorter wing than the males, and the chest feathers have, as in young *males*, one black spot near the tip.

We have this duck from Chatham, James, Indefatigable, Albemarle, and Charles Islands. It is also known to occur on Duncan, Hood, Barrington, Jervis, and Tower.

[*Querquedula versicolor* (Vieill.).

According to Sundevall Mr. Kinberg obtained a specimen somewhere in the Galapagos Archipelago. It has not been found since among the islands. (Cf. Ridgway, *l.c.* p. 614).]

## GENUS NESOPELIA Sundev.

*Nesopelia*, Sundevall, *Math. av. disp. Tentam.* p. 99 (1872).

The genus *Nesopelia* is restricted to the Galapagos Islands. It is closely allied to *Zenaidura*, but the tail is composed of twelve rectrices, while it is said to have fourteen in all species of *Zenaidura*. The bill is rather long and arched near the tip, the feet are larger, the tail somewhat short and stiff.

1. *Nesopelia galapagoensis galapagoensis* (Gould).

*Colombi-galline des Gallapagos* Néboux in *Rev. Zool.* p. 290 (1840)

*Zenaidura galapagoensis* Gould, *Zool. Voy. Beagle*, III. Birds, p. 115, Pl. XLVI. (1841); Salvin in  
*Trans. Zool. Soc.* IX. p. 499.

*Nesopelia galapagoensis* Salvadori, *Cat. B. Brit. Mus.* XXI. p. 391; Ridgway in *Proc. U.S. Nat. Mus.*  
 XIX. p. 615.

When Ridgway wrote his *Birds of the Galapagos Islands* the following islands

were known as the home of this interesting pigeon: Albemarle, Duncan, Charles, Hood, Chatham, Indefatigable, James, Tower, Bindloe. Baur adds (*Am. Nat.* 1897, p. 784) Jarvis Island. We have received it from most of these places, and in addition from Abingdon, Narborough, and Gardner Islands. Specimens from all these islands do not differ, as far as we can see, but we have received a large series from Wenman and Culpepper, and find them to differ materially in size.

Two *females* from Hood Island are semi-albinistic. Their tails are for the greater part of their length light grey, while one of them has also the primaries white with brown tips.

## 2. *Nesopelia galapagoensis exsul* subsp. nov.

Differs from *Nesopelia galapagoensis galapagoensis* in being larger. While the wing of the latter varies in the *male* from 130 to 140 mm., it measures in our new subspecies 142 to 148 mm. As we have measured twenty from Culpepper and three from Wenman, we cannot be mistaken. Also the *females*, of which we have only one from Culpepper and two from Wenman, have the wing longer than *females* from the southern and central islands of the group—*i.e.*, 130 to 135—while in the latter it varies between 120 and 129 mm. The tail is also about 5 to 8 mm. longer in the birds from Culpepper and Wenman Islands.

“The iris is brown, the bill black, the feet pinkish red, skin round the eye indigo-blue.”

All the birds from Culpepper and Wenman Islands were collected in July.

The *females* of both forms differ from the *males* in their much smaller size, duller upper surface, and more whitish wing-coverts, while the sides of the neck are often as glossy as in the *male*. Immature birds are below brownish, with whitish fringes to the feathers, the sides of the neck are not glossy, and the lesser upper wing-coverts have rufous edges.

Mr. Harris writes: “The extreme scarcity of *Nesopelia* on Albemarle, Charles, and Chatham Islands is noticeable, as these islands are infested with wild house-cats, and these pigeons, being principally ground-birds, are easily caught by the cats.”

## GENUS CRECISCUS Cab.

*Creciscus*, Cabanis in *Journ. f. Oen.* 1856, p. 428.

New World from temperate North America to Peru and Chili. If the genus *Creciscus* is separated from *Porzana* at all, then the Galapagos rails belong doubtless to *Creciscus*.

### 1. *Creciscus spilonotus* (Gould).

*Zapornia spilonota*, J. Gould in *Darwin's Voy. Beagle*, III. Birds, p. 132, Pl. XLIX. (1841).

*Porzana spilonota*, Salvin in *Trans. Zool. Soc. Lond.* IX. p. 590 (not v. X.) (partim!); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 618 (partim?).

*Porzana galapagoensis*, Sharpe, *Cat. B. Brit. Mus.* XXIII. p. 113; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 619.

Dr. Sharpe was the first author who recognised that there were two forms of rails in the Galapagos Islands, one, a larger and more powerful one, discovered by the collectors of the “*Beagle*,” and apparently not found since, on James Island,\* the

\* Darwin, *Journal of Researches into the Nat. Hist. and Geol. of countr. vis. dur. voy. round the World*, p. 402 (ed. 1890): “So damp was the ground that there were large beds of a coarse cyperus, in which great numbers of a very small water-rail lived and bred.”

other, a smaller bird and generally, though not always, more spotted, was discovered by Habel on Indefatigable Island, but united with *C. spilonotus* by Salvin. Dr. Sharpe at once saw that they were different species, but somehow he referred the name of *Zapornia spilonota* to the form from Indefatigable Island, although Darwin had never landed on the latter isle, and specially mentions that he got the rails on James Island. Apart from the evidence of locality, the figure of this rail in the *Voyage of the Beagle*, III. (Birds) and the original description are evidently, in our opinion, those of the large, dark form from James Island. Dr. Sharpe believes that the type of *Zapornia spilonota* is lost, but we see no reason for doubt that the skins now in the British Museum are actually the types, since there are no others of which we know, and since Gould was not always careful to mark the specimen from which he made the original description as the "type." We have no doubt at all that the name "*spilonota*" belongs to the rail from James Island, and that therefore "*Porzana galapagensis*" Sharpe is a synonym of the latter. We cannot, either, agree with Dr. Sharpe that this form belongs to another genus than the rail from Indefatigable. The sole difference between the two Galapageian rails is that the one from James Island is a little larger, with stronger beak and legs, slightly deeper brown back, and unspotted or very slightly spotted wing-coverts, while the rail from Indefatigable is a little smaller, with smaller bill and legs, lighter brown back, and generally more frequently spotted wing-coverts, flanks, and lower abdomen, while the back and rump is also mostly dotted with white. The amount of the white spotting varies very much, being less and almost quite absent in some individuals.

We have not received *Creciscus spilonotus*, which is only, as far as we are aware, represented in the British Museum at present.

## 2. *Creciscus sharpei* sp. nov.

*Porzana spilonota* (not *Zapornia spilonota* Gould!), Sclater and Salvin in *Proc. Zool. Soc. Lond.* (1868) p. 456. (1870) p. 323; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 500 (partim!).

*Creciscus spilonotus*, Sharpe, *Cat. Brit. Mus.* XXIII. p. 137 (1894).

*Porzana spilonota* (partim!), Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 618.

Indefatigable Island (Habel and Harris' expedition).

♂ ad. Head, nape, and underside as far as the abdomen slate-colour. Rest of upperside chocolate-brown, lighter and more brownish on the upper back and neck, darkest on the rump and upper tail-coverts, which are almost blackish. Wing-coverts nearly always, back, rump and upper tail-coverts in some individuals frequently spotted with white, inner secondaries mostly spotted with white. Lower abdomen and flanks brownish slate-colour, more or less spotted or barred with white, under tail-coverts spotted with white. Iris red, bill blackish, feet dark brown. Total length (in the flesh) 146 to 154 mm., wing 67 to 69, bill from end of frontal plumes 15.5 to 16.6, middle toe and claw 27 to 29, tarsus about 21.

♀ ad. Differs from the *male* in having the chin and upper throat lighter, almost whitish grey, in being a shade lighter slaty grey below, in being, perhaps, less spotted with white, on the whole, and generally a little smaller. Total length (in the flesh) 137 to 145 mm., wing 65 to 67.

We have received four *males* and four *females*, evidently all adult individuals, shot in September and October 1897.

*Creciscus sharpei* is hardly more than a subspecies of *C. spilonotus*. If the genus *Creciscus* is separated from *Porzana*, then there is no doubt that the Galapageian forms belong to *Creciscus*, as a comparison will show at a glance.

## GENUS GALLINULA BRISS.

*Gallinula*, Brisson, *Orn.* VI. p. 3 (1760).

Nearly cosmopolitan.

1. *Gallinula galeata* (Licht.).

*Crex galeata*, Lichtenstein, *Verz. Doubl.* p. 80 (1823).

*Gallinula galeata*, Sharpe, *Cat. B. Brit. Mus.* XXIII. p. 177 (1894); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 621.

Dr. Baur obtained three specimens on Albemarle Island, and we have received a single *male* from the same island. This specimen does not show the differences from continental examples seen in those shot by Dr. Baur. The frontal shield is not narrower, but on the contrary very broad, the coloration as dark as in true *G. galeata*.

On the label we find the following remarks: "Albemarle, Nov. 10, 1897 (R. H. Beck). Length 14.50, extent 23.50 in. Bill and frontal plate red, nearly or quite vermilion, tip to 0.30 of an inch greenish yellow. Tarsi lemon yellow, with a greenish cast behind. Toes olive green. Tibia with vermilion circle at below the feathers, remainder yellowish green."

## GENUS HAEMATOPUS L.

*Haematopus*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 152 (1758).

Nearly cosmopolitan.

1. *Haematopus galapagensis* Ridgw.

*Haematopus palliatus* (non Temm.) Salvin in *Trans. Zool. Soc. Lond.* IX. p. 502 (1875).

*H. galapagensis*, Ridgway in *Auk* III. p. 331 (1886); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 621; Sharpe, *Cat. B. Brit. Mus.* XXIV. p. 116.

*H. leucopus galapagensis*, Seebohm, *Geogr. Distr. Charadriidae*, p. 307 (1888).

The oyster-catcher of the Galapagos group resembles the American *H. palliatus*, but differs in being deeper blackish above, in having more black on the tail and secondaries, as well as on the inner primaries and tail-coverts.

We have received skins from Albemarle, Hood, Bindloe, James, Indefatigable, Tower and Chatham Islands.

The bill varies considerably in length in both sexes.

## GENUS AEGIALITIS BOIE.

*Aegialitis*, Boie in *Isis*, 1822, p. 558.

Almost cosmopolitan.

1. *Aegialitis semipalmata* Bp.

*Charadrius semipalmatus*, Bonaparte in *Journ. Acad. Nat. Sci. Philadelphia*, V. p. 98 (1825).

*Aegialus semipalmatus*, Sharpe, *Cat. B. Brit. Mus.* XXIV. p. 250.

*Aegialus semipalmatus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 628.

We cannot recognise the genus *Aegialeus*, which is said to differ from *Aegialitis* by a web connecting the outer and middle toes, because this web is also present, only smaller in the genus *Aegialitis* as restricted by Dr. Sharpe.

*A. semipalmata* is before us from Chatham, Charles, Albemarle, Jervis and Indefatigable Islands. The specimens have been obtained from July 29th to December 3rd.

#### GENUS CALIDRIS Cuv.

*Calidris*, Cuvier, *Leç. Anat. Comp.* I. Pl. II. (1800).

Restricted to the Arctic regions during breeding period, but visiting the shores of the whole world in winter.

##### 1. *Calidris arenaria* (L.).

*Tringa arenaria*, Linnaeus, *Syst. Nat.* ed. 12, I. p. 251 (1766).

*Calidris arenaria*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 629.

Albemarle, Chatham, Hood, Abingdon, Jervis and Bindloe Islands. Found on Albemarle as early as July 29th.

#### GENUS ARENARIA Briss.

*Arenaria*, Brisson, *Orn.* V. p. 132 (1760).

*Streptilas* auct. mult.

Breeding in northern portions of Northern Hemisphere only, sea-coasts of the whole world to the sub-Antarctic regions during migration period.

##### 1. *Arenaria interpres* (L.).

*Tringa interpres*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 148 (1758).

*Arenaria interpres*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 625.

Not rare on the sea-shores almost throughout the whole year. Dr. Baur obtained specimens on Charles Island as early as June 30th, and on Albemarle on July 30th. They were in worn breeding plumage. It is known that turnstones are sometimes seen on the coasts of tropical islands during their breeding time, but there is every sign that they do **not** breed there. Harris' party obtained specimens from September to November on Culpepper, Chatham, Charles, Indefatigable and Jervis Islands.

#### GENUS SQUATAROLA Leach.

*Squatarola*, Leach, *Syst. Cat. Mamm. & Birds Brit. Mus.* p. 29 (1816).

Breeding in the tundras of the northernmost portions of the Northern Hemisphere, cosmopolitan during migration.

##### 1. *Squatarola squatarola* (L.)

*Tringa squatarola*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 149.

*Squatarola squatarola*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 626.

Obtained by Messrs. Baur & Adams on Albemarle Island in August; by Beck on Charles Island in November.

GENUS HETEROPYGIA Coes.

*Heteropygia*, Coes in *Proc. Philad. Acad.* 1861, p. 161.

If the genus *Heteropygia* is separable from *Tringa*, which seems very doubtful, its distribution would be Siberia and North America ; in winter south to Chili and Australia.

1. *Heteropygia bairdi* (Coes).

*Actodromas bairdi*, Coes in *Proc. Philad. Acad.* 1861, p. 194.

*Heteropygia bairdi*, Sharpe, *Cat. B. Brit. Mus.* XXIV, p. 570.

One male, Barrington Island, October 6th, 1897.

GENUS TRINGA L.

*Tringa*, Linnaeus, *Syst. Nat.* ed. 10, I, p. 148 (1758).

Cosmopolitan during migration.

1. *Tringa minutilla* Vieill.

*Tringa minutilla*, Vieillot in *Nour. Diet.* XXXIX, p. 452 (1819) ; Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 631.

Indefatigable (Habel), Charles Island (Beek), Barrington Island (Beek).

GENUS HETERACTITIS Stejn.

*Heteractitis*, Stejneger in *Auk* I, p. 236 (1884).

1. *Heteractitis incanus* (Gm.).

*Scolopax incana*, Gmelin, *Syst. Nat.* I, p. 658 (1788).

*Heteractites incanus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX, p. 632.

We have it from Culpepper, Chatham, Charles, Abingdon, Albemarle and Indefatigable Islands. Townsend obtained it also on James and Hood Islands.

GENUS HELODROMAS Kaup.

*Helodromas*, Kaup, *Naturl. Syst.* p. 144 (1829).

Nearly cosmopolitan during migration.

Not being at leisure at present to discuss the somewhat difficult question of the genera of the *Totaniinae*, we accept the genus *Helodromas* of the *Catalogue of Birds*, but we are afraid it will have to be joined to *Rhyacophilus*, if not to *Totanus*.

1. *Helodromas solitarius* (Wils.).

*Tringa solitaria*, Wilson, *Amer. Orn.* VII, p. 53, Pl. LVIII, f. 3 (1813)

*Helodromas solitarius*, Sharpe, *Cat. B. Brit. Mus.* XXIV, p. 444.

Two specimens were procured on Chatham Island on October 12th. The species has not yet been recorded from the Galapagos Islands.



## GENUS NUMENIUS Brisson.

*Numenius* Brisson, *Opn.* VI. p. 311 (1760).

Cosmopolitan during migration: Arctic and temperate regions of Northern Hemisphere during breeding time.

**Numenius hudsonicus** Lath.

*Numenius hudsonicus*, Latham, *Ind. Orn.* II. p. 712 (1790); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 504; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 633; Sharpe, *Cat. B. Brit. Mus.* XXIV. p. 364.

*Numenius borealis*, Salvin in *Proc. Zool. Soc.* 1883, p. 429.

This bird breeds in the Arctic and sub-Arctic regions of North America; in winter over the greater portions of South America. We have specimens from Charles, Chatham, Albemarle and Indefatigable Islands.

Salvin (*l.c.*) mentions also a specimen of *N. borealis*, as being shot on Charles Island by Captain A. H. Markham. This was evidently done by a pen-slip, for the specimen is *N. hudsonicus*. (Cf. Sharpe, *Cat. B. Brit. Mus.* Vol. XXIV. p. 367, specimen *b*<sup>1</sup>.)

## GENUS HIMANTOPUS Brisson.

*Himantopus*, Brisson, *Opn.* VI. p. 33 (1760).

Hot and temperate regions round the world.

**1. Himantopus mexicanus** (P. L. S. Müll.)

*Charadrius mexicanus*, P. L. S. Müller, *Syst. Nat. Anhang*, p. 117 (1776).

*Himantopus mexicanus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 633; Sharpe, *Cat. B. Brit. Mus.* XXIV. p. 320.

*H. nigricollis*, Salvin in *Trans. Zool. Soc. Lond.* IX. p. 502.

We do not notice any differences between our Galapagos skins and those from other parts of America. We have specimens from Indefatigable, Albemarle, and Chatham Islands; Ridgway mentions also James Island. This species inhabits temperate North America, southward to Brazil and La Plata.

## GENUS LARUS L.

*Larus*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 136 (1758).

Cosmopolitan.

**1. Larus fuliginosus** Gould.

*Larus fuliginosus*, Gould in *Voy. Beagle*, III. Birds, p. 141 (1841); Salvin in *Trans. Zool. Soc.* IX. p. 505, Pl. LXXXVII; Saunders, *Cat. B. Brit. Mus.* XXV. p. 222; Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 635.

This dark-coloured gull is apparently confined to the Galapagos group. It is now known to inhabit Abingdon, Bindloe, James, Indefatigable, Barrington, Chatham, Charles, Albemarle, Jervis, Tower, and Hood Islands. One fresh egg was picked up on November 10th on Albemarle Island. It is very pale dirty greenish, with liver-brown spots and patches, and underlying purplish mauve spots, and measures 6J by 43 mm.

## GENUS XEMA Leach.

*Xema*, Leach in *Ross's Voyage Baffin's Bay*, App. II. p. LVII. tab. (1819).

*Creagrus*, Bonaparte in *Nauwanua*, 1854, p. 213.

*Chama*, Reichenow in *Journ. f. Orn.* 1889, p. 188.

In placing the large Galapagos gull in the genus *Xema*, we are following the *Catalogue of Birds* (Vol. XXV.), not being at present in a position to discuss the genera of the *Luridae*, but it is with some reluctance that we unite *Xema* and *Creagrus* into one genus. The differences between the two forms, on the other hand, are not so important as Ridgway makes them out to be. The beak is more curved in *Creagrus*, somewhat higher near the base, and the tarsus is of the same length as the middle claw, while in *Xema sabini* the tarsus is much longer than the foot. This latter character is the only one that might be considered to be of generic importance, but if this principle is adopted, then several more divisions will have to be accepted than Mr. Saunders admitted in the *Catalogue of Birds*, Vol. XXV. (cf. p. 161, where the following genera are adopted: *Xema*, *Rhodostethia*, *Larus*, *Gabianus*, *Leucophaeus*, *Pagophila*, and *Rissa*).

1. *Xema furcata* (Nébox).

*Mouette à queue fourchée*, Nébox in *Rév. Zool.* 1840, p. 290.

*Larus furcatus*, Lc.; *Voy. Véous*, Atlas Pl. X. (1846).

*Creagrus furcatus*, Salvin in *Trans. Zool. Soc.* IX. p. 506.

*Xema furcatum*, Saunders in *Proc. Zool. Soc.* 1882, p. 525, pl. 34.

*Xema furcata*, Saunders, *Cat. B. Brit. Mus.* XXV. p. 165.

*Creagrus furcatus*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 638.

This beautiful gull is evidently very common at the Galapagos Islands, where it may be seen near most of the islands, from Culpepper to Hood, but it finds suitable nesting-places on a few of the islands only. It is also known to occur off the coast of Peru and at Malpelo Island, but the original locality "Monterey, California," cannot be accepted, as Monsieur Nébox, who brought the specimen home, came from the Galapagos Archipelago! Ridgway and Saunders gave the most accurate and most detailed descriptions of this gull.

Numbers were found breeding in July on Wenman and Culpepper, in October on Tower, and in December on Hood Island. The number of eggs was only one in every case. The nest consisted of pebbles, or pebbles and pieces of bones, placed among the rocks on the cliffs, but some were also found without any indication of a nest on the bare ground among the rocks. The eggs resemble those of other gulls, and vary in the same way. They are more or less regularly ovate (Ridgw. pl. XVI. fig. 1). Most specimens are very light greenish or bluish white with large and bold spots and patches of a very dark brown, and with underlying greyish-mauve spots. The spots are either spread all over the egg, or accumulated near the thick end, and sometimes form a loose ring near the thick end. Hair-like lines are not often seen. Some of the eggs are of a light reddish or brownish fleshy ground-colour, but all are light sea-green if held against the light. They measure 64 by 47.5, 66 by 46.5, 66 by 46, 64 by 45, 60 by 44.5 mm., and so on.

## GENUS STERNA L.

*Sterna*, Linnaeus, *Syst. Nat.* 1. p. 437 (1758).

Cosmopolitan.

1. *Sterna fuliginosa* Gm.

*Sterna fuliginosa*, Gmelin, *Syst. Nat.* I. p. 605 (1788).

Not yet recorded from the Galapagos Islands, and found on Culpepper and Wenman Islands only.

With every desire to distinguish them from *S. fuliginosa fuliginosa*, we are not able to find satisfactory characters for separation.

The Galapagos specimens seemed smaller, the wings reaching from 275 to 296 mm. generally, but one *male* from Wenman Island has them fully 310 mm. long. This latter measurement is a large average measurement for *S. fuliginosa* from other islands, which have the wings from 292 to 315 mm. long, the largest being mostly those from the islands round New Zealand. The lateral greatly elongated rectrices are only fully developed in one of our Galapagos specimens, but then they are moulting in many of the others. The outer web of these "streamers" is generally darker in the Galapagos birds, but in some it is as light as in examples from other regions, while it varies equally in the latter. The loreal black streak is narrower in many of the Galapageian birds, but it is quite variable and perfectly matched by some from other countries.

*Sterna fuliginosa*, together with *S. anaetheta* and *S. lunata*, forms a very natural group of terns by its aberrant coloration and certain habits, laying, for example, only one egg at a time. Should a generic separation be found to be possible, the name of the genus would be *Omychoprion* Wagler, 1832, but Saunders, "with every desire to separate them generically, was unable to find any structural differences which would warrant such a proceeding."

## GENUS ANOUS Steph.

*Anous*, Stephens in Shaw's *Gen. Zool.* XIII. p. 139 (1826).

Tropical and juxta-tropical seas in general.

1. *Anous stolidus galapagensis* Sharpe.

*Megalopterus stolidus*, Gould in Darwin's *Jour. Beagle*, III. Birds, p. 146 (1841).

*Anous stolidus*, Sundevall in *Proc. Zool. Soc. Lond.* 1871, p. 125; Salvin in *Trans. Zool. Soc. Lond.* IX. p. 504 (1876); Ridgway in *Proc. U.S. Nat. Mus.* XII. p. 116 (1889).

*Anous galapagensis*, Sharpe in *Philos. Trans.* CLXVIII. p. 469 (1879); Saunders, *Cat. B. Brit. Mus.* XXV. p. 143 (1896); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 642.

The noddy inhabiting the Galapagos Archipelago was formerly united with *A. stolidus stolidus* by Gould, Sundevall, Salvin; and even Ridgway (*l.c.*) mistook an adult bird for the common wide-spread species. In 1879 Sharpe separated it as *A. galapagensis*, but the characters assigned to it are those of the young birds only, while the adult Galapagos form is very similar to adult *A. stolidus stolidus*. They are by no means so distinct as Ridgway believes them to be (*l.c.*). We have specimens from several places, but especially from the Carolines and Pelew Islands, which are hardly separable from *galapagensis*. The only differences we can appreciate are the following:—

In *A. stolidus galapagensis* the grey of the crown does not reach so far down towards the neck, and, while hardly darker in freshly moulted birds, never becomes so pale as we find it frequently in *A. stolidus stolidus*. The entire plumage, while often not a shade darker than in *A. stolidus stolidus*, never becomes so pale-brown

as in the latter. The young bird of *galapagensis* has the whitish streak above the lores not distinctly marked.

Under these circumstances this tern must be recognised as a subspecies of *A. stolidus*. It is spread all over the archipelago, from Culpepper and Wenman to Charles and Hood Islands. It is somewhat peculiar that dark-crowned birds, in the plumage of the immature ones, are found also during the breeding season.

A large breeding-place was found on July 27th and July 29th on Culpepper Island. This tern has always one egg only, placed in a small nest composed of a few small sticks among the rocks. The eggs resemble those of other species of *Anous*. They are mostly very beautifully marked, and vary very much. The ground-colour is a dead white, if held up against the light and looked through the hole it is a light greenish yellow. A few eggs have a warm fleshy tinge. The markings are paler or darker reddish brown, or deep brown patches on the thick end, or small roundish spots of the same colour, and all have more or less visible pale mauve underlying spots. They measure 51.5 by 35.5, 50 by 36, 49.5 by 35, 45 by 34.3 mm., and so on.

#### GENUS STERCORARIUS Briss.

*Stercorarius*, Brisson, *Orn.* VI. pp. 149, 150 (1760).

Breeding in Arctic and sub-Arctic regions, wandering south in winter, reaching occasionally Peru and New Zealand.

##### 1. *Stercorarius pomarinus* (Temm.).

*Leistris pomarina*, Temminck, *Mon. d'Orn.* p. 514 (1815).

*Stercorarius pomatorhinus*, Saunders, *Cat. B. Brit. Mus.* XXV. p. 322 (1896).

One *female* was shot by R. H. Beck off North Albemarle on December 15th, 1897. It is evidently not mature. The upper parts are sooty brown, the feathers of the back and the scapulars have brownish buff tips. Foreneck and jugulum deep sooty brown with narrow whitish tips to the feathers. Remainder of underside is white, here and there sparsely speckled with deep brown. Tail feathers deep brown, not barred, under and upper tail-coverts barred blackish brown and white. Wing 360 mm.

#### GENUS DIOMEDEA L.

*Diomedea*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 132 (1758).

Principally the Southern Ocean, but ranging as far north as the Hawaiian Islands and Japan in the Pacific, and, exceptionally, as far north as the British Islands in the Atlantic Ocean.

##### 1. *Diomedea irrorata* Salv.

*Diomedea exulans*, Wolf, *Ein Besuch auf den Galapagos Inseln*, p. 13 (1879).

*Two kinds of Albatrosses*, Habel in *Trans. Zool. Soc. Lond.* IX. p. 458 (? partim).

? *Diom. exulans* and *nigripes*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 646

*Diom. irrorata*, Rothschild in *Bull. B. O. Club*, VII. p. 51 (1898).

*D. irrorata*, Salvin in *P. Z. S.* 1883, p. 430, and in *Cat. B. Brit. Mus.* XXV. p. 415 Pl. VIII.

Habel was the first to call attention to the fact of albatrosses occurring in the Galapagos Archipelago. In 1876 (cf. *Trans. Zool. Soc. Lond.* Vol. IX. p. 458) we learn that there are on Hood Island "two kinds of albatrosses; one had a dark blackish breast and a white band crossing the head from one eye to the other; the

breast of the other was grey, and the head black. Whether they were the sexes of one species, or two distinct ones, I am unable to decide."

In 1879 Wolf writes (translated, cf. Ridgway) : " I would mention as a curious zoological fact that the albatross of Hood Island, and only on that island, occurs in such abundance, that the entire camp of Orchilla collectors (more than sixty men) lived for a month chiefly upon its eggs, although each *female* lays but one egg. It is evidently the widespread albatross from the Cape of Good Hope (*D. exulans*), which is also very abundant about Cape Horn."

Harris' party was specially instructed to look out for the albatrosses, and they found a large breeding colony on Hood Island, and many forsaken eggs in the latter week of October. It is somewhat strange that so large a bird with such a power of flight has never been got elsewhere in the archipelago, although the type was taken off the Peruvian coast. It seems to breed only on Hood Island. All the specimens received from there are *D. irrorata*, Salv. We do not think that two species are likely to breed on the Galapagos Islands. Dr. Habel's descriptions may possibly or partly refer to young birds, for neither of them describes the adult *D. irrorata*. Mr. Ridgway suggests that the one with the " dark blackish breast and a white band crossing the head " might have been *D. nigripes* Aud., but the home of that species is so far away from the Galapagos Islands, that we think it is more probable that the bird described by Habel and a black bird with white head seen by the Harris party on Indefatigable, are either the *D. irrorata* in its unknown juvenile plumage, or an unknown species. Young individuals in the first plumage were seen, but unfortunately not collected. Undetermined albatrosses were also observed near Duncan and Albemarle.

This species in breeding plumage agrees in general with Salvin's description. The neck is white, the forehead also white: but the crown, from between the eyes, and the hind neck, are strongly washed with buffy yellow, not only "slightly tinged." The back and wings are deep sooty brown, almost black, the primaries paler towards the base of the inner webs, the shafts of all of them light straw-yellow. The dark grey and white mottling is much coarser on the vent and under tail-coverts, in sharp contrast to the almost uniform dark grey lower abdomen and flanks. It is gradually lost on the foreneck. "The iris is brown, the bill yellow, the tarsi and feet lead-colour, lead-blue, or greenish lead-colour." The total length (as taken in the flesh by the collectors) is about 36—40 in., extent 93—99 in. The bill, measured in a straight line from base to tip, along the mandible, is 126—140 mm. long, the tarsus 85—100, wing 535—560 mm. The *female* is like the *male*, and not much smaller. The plate in *Cat. B. Brit. Mus.* gives a very wrong idea, being too brown above, and the bill and feet being coloured with a fleshy pink tint, although on p. 445 the bill is described as yellowish, the feet as dark.

The albatross was so plentiful on Hood Island that the collectors computed their number at several thousands. Antea, p. 125, in the diary, some notes on the habits of this bird are given. The eggs vary in shape from elliptical ovate to elliptical oval and even to perfectly oval (see Ridgway's Nomencl. Col. Pl. XVI.). They are of a dead white colour and entirely without gloss, and of the same structure as other albatrosses' eggs. The majority are without spots, but some show more or less small underlying patches of a pale mauve colour, generally confined to the thick end, but in one of our thirty-one specimens spread all over the surface. They measure 117.5 by 70, 107 by 64.5, 112 by 69, 96.5 by 72, 103.5 by 72, 105 by 66, 106 by 66 mm., and so on.

The eggs seemed to be dropped at random between the rocks and bushes, and each "clutch" consisted of one single egg only, but all that were found were addled.

It is remarkable that Dr. Baur, who stayed on Hood Island from July 5th to 11th, did not come across any albatrosses, nor does he mention having seen any at all.

#### GENUS PUFFINUS Briss.

*Puffinus* Brisson, *Ouv.* VI. p. 131 (1760).

Generally distributed over the seas of the world.

#### 1. *Puffinus obscurus subalaris* Ridgw. (ex Townsend MS.).

*Puffinus tenebrosus*? (non Pelzeln), Townsend in *Proc. U.S. Nat. Mus.* XIII. p. 142 (1890), and in *Bull. Mus. Comp. Zool.* XXVII. p. 126 (1895).

*Puffinus obscurus*, Salvin in *Proc. Zool. Soc. Lond.* p. 431 (1883); Salvin in *Cat. B. Brit. Mus.* XXV. p. 882 (partim).

*Puffinus subalaris*, Ridgway (ex Townsend's MS.) in *Proc. U.S. Nat. Mus.* XIX. p. 650.

In determining the shearwater of the Galapagos Islands, we were obliged to study the entire group of little shearwaters, to which this form belongs; and we have come to the result, that they were not fully understood by Salvin, when he wrote the "Puffinidae" in Vol. XXV. of the *Catalogue of Birds*. They are a difficult group, and material from many places is wanted, but we believe that it may be possible for the present to distinguish the following forms.

#### a. *Puffinus obscurus obscurus* (Gm.).

*Dusky Petrel*, Latham, *Gen. Syn.* III. p. 416 (1785) (Christmas Island in the Pacific Ocean).

*Procellaria obscura*, Gmelin, *Syst. Nat.* I. p. 559 (1788) (ex Latham).

*Puffinus obscurus*, Salvin, *Cat. B. Brit. Mus.* XXV. p. 382 (partim, specimens *d* to *n* only, *u!*).

*Puffinus dichrous*, Hartlaub & Finsch in *Proc. Zool. Soc. Lond.* 1872 p. 108 (Pelew Islands).

*Puffinus opisthomelas var. minor*, Hartlaub in *Proc. Zool. Soc.* 1867 p. 382, H. & F. in t.c. 1868, pp. 9 and 371. Finsch in *J. F. O.* 1870, p. 371.

*P. tenebrosus* Pelzeln (ex Natterer) in *Ibis* p. 47 (1873). Cf. Finsch in *Journ. Mus. Gad.* VIII. p. 45 (1875).

This is the Pacific form, inhabiting the central portions of the Pacific Ocean, the Fanning group (Christmas Island), Pelew Islands, Carolines (a series from Ruk in the Tring Museum), probably down to the New Hebrides and Samoa.

This form is distinctly **brownish** slate above, not in the least bluish. The brownish slaty colour reaches to the base of the bill, covering the lores and running from there along the sides of the head under the eye, to the ear-coverts, but being slightly mottled with whitish under the eyes, on the ear-coverts and sides of the neck. This colour also encroaches on the sides of the chest, where it forms a distinct patch. The primaries are dusky black, the inner webs, except near the shaft, deep smoky brown, but not in the least whitish. Axillaries white. Under wing-coverts white, except a very marked blackish line round the outer margin. Under tail-coverts blackish smoky-brown, the shorter central bunch white, the next ones varied, nearly all the longer ones with narrow white tips.

There can be no doubt that *P. tenebrosus* Pelz. is the same as our *P. obscurus*. (See also Finsch, *l.c.*)

*b. Puffinus obscurus auduboni* Finsch.

*Puffinus obscurus auduboni* Finsch, in *Proc. Zool. Soc. Lond.*, p. 3 (1872); Baird, Brewer & Ridgway, *Water Birds N. America*, II, p. 386 (1884); Ridgway in *Proc. U.S. Nat. Mus.*, XIX, p. 651.  
*Puffinus obscurus auctorum multorum, partim*; *Cat. B. Brit. Mus.*, XXV, p. 382, partim.

*P. auduboni* is the form found along the east coast of the United States of North America, from New Jersey to Florida, and nesting on the Bahamas, as also probably among the West Indian Islands and on the Bermudas.

This form is most closely allied to *P. obscurus*, being **brownish** slate-black above, having white axillaries (sometimes the longest with tiny dusky tips), white under wing-coverts with even a less distinctly blackish margin round the edges. While in *P. obscurus* the whole loreal region behind the upper jaw is dark, the lower part of the lores is here white, there is less blackish under the eyes, the region behind the eye is lighter, being rather white, mottled with dusky, instead of dusky black mottled with whitish. The bill in *P. auduboni* is slightly longer and stronger, the wing generally distinctly longer, the whole bird a little larger, the patch on the sides of the chest lighter dusky brown.

Under tail-coverts as in *P. obscurus* or with more white. Fig. 2 in *Ibis*, 1873, p. 50 (there called *P. obscurus*) represents the shape of the bill of *P. auduboni*, while fig. 1 on the same page (there called *P. tenchrasus*) shows that of the true *P. obscurus*. The figure in Baird, Brewer & Ridgway's *Water Birds*, Vol. II, p. 387, has the amount of white rather a little exaggerated, judging from the material at our disposal. More details about the distribution of this form would be welcome.

*c. Puffinus obscurus subalaris* Ridgw. (ex Townsend MS.).

(Synonymy see above.)

The Galapagos birds seem to us to be nearest allied to the form of the central Pacific, from which they differ in the following points.

There is distinctly more dusky on the flanks, which are evidently always pure white in *P. obscurus*. The under wing-coverts agree with those of *P. auduboni* in having no distinct broad dusky line round the outer margin, but they are more or less clouded with dusky. In most specimens of our large series this latter character is very conspicuous, but in a few the dusky tinge is almost obsolete. The axillaries, which are apparently always white in *P. obscurus*, are generally more or less clouded with dusky, seldom quite white. In some specimens the whole of the under wing-coverts and axillaries are dark dusky brown. The under tail-coverts are generally wholly dark, but sometimes approach those of *P. obscurus* in the amount of whitish near the belly. The lores are dark, only white on their lower portion, the ear-coverts dusky, not mottled with whitish, but bordered with white on their lower margin, the line between the white and the brownish slate-colour being generally more sharply defined than in *P. obscurus*, and very distinctly more marked than in *P. auduboni*.

The dusky colour does not at all encroach upon the sides of the chest, which are purely white.

The most obvious differences between *P. subalaris* and *P. auduboni* are the dusky clouding on the flanks, under wing-coverts and axillaries, and the more purely dark under tail-coverts, which have always less white than in *P. auduboni*.

We have received *P. subalaris* from Culpepper, Wenman, Albemarle, Narborough, Jervis and Kicker Rock, near Chatham Island. The "bill is black above, bluish slate

below, feet bluish white, the outer toe black, tarsi bluish white, blackish along the back and on the lower portion of the outside. Iris light blue."

During the last days of July a great many eggs were found on Culpepper Island in holes under rocks, among sea-weeds. The number of eggs is only one. They are pure white, without gloss but smooth; if held against the light they look either almost pure white or light green. They measure 54 by 35, 53.5 by 35, 47 by 34.5 mm., and so on.

#### *d. Puffinus obscurus bailloni* Bp.

*Puffinus bailloni*, Bonaparte in *Compt. Rend. Ac. Sc. XLI*, p. 8, tabl. XI. Longip. p. 23, sp. 80 (1856);

id. *Cons-p. Av.* II, p. 205 (1857).

*Puffinus obscurus* of many authors from the Atlantic Ocean, Madagascar, Mauritius, Réunion.

*Nectris gamma* (non Bonaparte), Hartlaub, *Madagascar*, p. 84 (exclus. Synon.).

*Puffinus assimilis* (non Gould !), Salvin, *Cat. B. Brit. Mus.* XXV, p. 384 (partim : specimens *a* to *w*).

(?) *Puffinus elegans*, Giglioli & Salvadori in *Ibis*, 1869, p. 68; Salvin, *Cat. B. Brit. Mus.* XXV, p. 385 (literature); id. in Rowley's *Orn. Misc.* I, p. 256, Pl. XXXIV.

This form seems to be found round the coasts of Africa, from Madeira (Desertas, Porto Santo), the Canary Islands, the Cape Verd Islands, round the Cape of Good Hope to Madagascar, the Seychelles, Mauritius, etc. If the former should be found to be separable, they would require a new name. We cannot, however, with the meagre material available, discover any differences constant enough for the separation of the Atlantic form from that of the Seychelles (etc.).

*P. bailloni* is most poorly diagnosed, but in the words "nigro-plumbens" (sc. *supra*) used by Bonaparte for his *P. nugax* (ex Australia) and "nigricans" (sc. *supra*) for his *P. bailloni* (ex Insula Francia), together with the locality, sufficient reason may be found to accept *bailloni* rather than create a name for the bird under consideration.

*P. elegans*, shot at lat. 43° 54' S., long. 9° 20' E., may be the young of *P. bailloni*.

We have still to ask "Quid *Procellaria munda* Kuhl?" as Bonaparte did in 1857, Giglioli & Salvadori in 1869. In Vol. XXV. of the *Catalogue of Birds*, where one would have expected an explanation, we do not find this name even mentioned, nor one or two other hitherto unidentified *Procellariidae*.

*P. bailloni* differs very little from *P. obscurus* and our forms *a, b, c*. There is, however, generally a distinctly pronounced bluish tint above, more slaty, not so brown as in *a, b, c*, but the birds are mostly not quite so bluish as *P. assimilis*. The sides of the head are not sharply separated in black and white, as in *P. subalaris*, but more or less mottled, the demarcation line between the two colours being not very well defined. Sides of chest with dusky patch, as in forms *a* and *b*. Under tail-coverts variable, sometimes almost or pure white, sometimes with as much dusky black as in forms *a* and *b*. The bill is slightly shorter than in *P. obscurus*. The inner webs of the primaries are paler than in *a, b, c*, sometimes not much so, but often nearly as light, but not quite so clear white, and the colours evidently not so sharply defined as in *P. assimilis*.

There is nothing peculiar in the distribution of *P. bailloni* as accepted here, petrels of course, in spite of their pelagic life, being bound to coasts and islands for nesting purposes, and seldom being seen far away from land. On the other hand, further studies are required to confirm—as we hope—our present view on these forms.



*e. Puffinus obscurus assimilis* Gould.

*Puffinus assimilis*, Gould in *Proc. Zool. Soc.* 1837. p. 156; id. *Birds Australia*, VII. Pl. LIX. (1848);

Salvin, *Cat. B. Brit. Mus.* XXV. p. 384 (partim, specimens *z* to *d*<sup>1</sup>).

*P. nugar.*, Bonaparte *Consp. Av.* II. p. 205 (1857) (ex Solander MS.).

This form inhabits the New Zealand and Australian seas; but we do not yet know exactly where its limits are in the north, towards the seas inhabited by the true *P. obscurus*. The forehead is very light. Its under tail-coverts are **invariably pure white**. The outer webs and about 3 or 4 mm. of the inner webs of the first primaries are dark, the rest of the inner web mostly **pure white**, this colour sharply defined against the blackish brown. Above with a rather bluish tint. Sides of head as in *P. bulloni*. This form is very distinct, and we have before us twenty skins from the New Zealand seas.

In the literature on all these forms we find the most correct remarks from Messrs. Finsch & Hartlaub, but unfortunately they applied the name *P. obscurus* to the Atlantic and Indian Ocean form, mistaking Christmas Island near the Fanning group for Christmas Island south of Java! The want of knowledge or scarcity of wit shown in using names which are already used elsewhere for islands, towns or lauds, have often caused similar errors. The American writers (Ridgway chiefly) have also distinguished between the various forms of these *Puffini*, but they have never given a review including all of them. Salvin's treatment in the *Catalogue of Birds* cannot be followed in our opinion. The distribution he ascribes to *P. assimilis*—viz. Australian and New Zealand seas and North Atlantic Ocean, while he allows *P. obscurus* to occur between these countries, at Bourbon, the Seychelles, and again on the coasts of Great Britain, the West Indies and Pacific Ocean—would be a most peculiar one. The material in the British Museum does seem to lead to Salvin's view, but we are not prepared to accept it. While the skins from near Madeira and the Canary Islands in the British Museum have a great deal of white on the inner webs of the primaries and most closely resemble the true *P. assimilis*, we do not think that they agree in all the characters alluded to above, and we have some from the Canary Islands which are so dark on the inner webs of the primaries that they would be better united with *P. obscurus* than with *P. assimilis*, while those from the Cape Verd group are all much darker on the primaries than any *P. assimilis*. Those from the Madagascar region (Réunion, etc.), are more like *P. obscurus* than like *P. assimilis*, but we think they belong to neither of the two forms strictly, and we have provisionally united with them the North Atlantic form (see *ante*).

*f. Puffinus auricularis* Townsend,

of which we have received an adult *female* caught by R. H. Beck in the Pacific Ocean at lat. 21° 10', long. 115° 38', differs from all these forms at a glance by its much larger size.

*g. Puffinus opisthomelas* Coues,

of which we have in the Tring Museum a fine adult *male* from Monterey, California, is still much larger than *P. auricularis*, and the axillaries are blackish towards their tips and tipped narrowly with white.

These two latter forms we consider worthy of specific rank, while all the others cannot be looked upon as more than slightly separated subspecies.

## GENUS AESTRELATA Bp.

*Aestrelata*, Bonaparte, *Consp. Av.* II. p. 188 (1856).

Almost cosmopolitan (pelagic).

1. *Aestrelata phaeopygia* Salv.

*Aestrelata phaeopygia*, Salvin in *Trans. Zool. Soc. Lond.* IX. p. 507 (1876), Pl. LXXXVIII. figs. 1, 3;

Wilson, *Aves Hawaiianes*, Part V. (1894); Salvin, *Cat. B. Brit. Mus.* XXV. p. 407 (1896).

*Aestrelata phaeopygia*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 648.

This species is only known from the Galapagos Archipelago, but according to Salvin the specimens described under the name of *Aestrelata sandwicensis* from the Sandwich Islands (Ridgway in Baird, Brewer, and Ridgway's *Water Birds N. Amer.* II. p. 395 (1884) are not separable from it, while Ridgway, after first uniting them, is now doubtful about their identity.

We have received *Ae. phaeopygia* from Albemarle, Wenman, and Indefatigable Islands, and from between Barrington and Indefatigable Islands. It is also on record from Charles Island. An adult *male* caught off Wenman, on August 3rd, 1897, had a length of 15.50 in., an extent of 39.50 in. "The bill is black, feet light bluish flesh colour, lower portion about half of webs and toes black, this colour extending along the outer toe and one fourth of an inch up on the tarsus. Iris brown."

## GENUS OCEANODROMA Rehb.

*Oceanodroma*, Reichenbach, *Syst. Av.* p. 4 (1852).

1. *Oceanodroma cryptoleucura* (Ridgw.).

*Cymochorea cryptoleucura*, Ridgway in *Proc. U.S. Nat. Mus.* IV. p. 337 (1882).

*Oceanodroma cryptoleucura*, Townsend in *Bull. Mus. Comp. Zool.* XXVII. p. 125; Wilson, *Aves*

*Hawaiianes*, Pl. IV. plate and text (1893); Rothschild, *Acridium of Laysan*, pt. I. p. 53 (1893); Salvin, *Cat. B. Brit. Mus.* XXV. 350.

This petrel was for the first time described from Kauai, one of the Sandwich Islands in the North Pacific Ocean, and Mr. Townsend procured it off Wenman Island and off Albemarle Island. We have no skins whatever from the Galapagos group of islands. This petrel is also found in the Atlantic Ocean from St. Helena to Madeira, and on the Cape Verd Islands. A comparison of a larger material from the Hawaiian, Galapagos, and Atlantic islands is desirable, as it is quite possible that some slight differences between specimens from the various oceans might be found.

## GENUS OCEANITES Keys. &amp; Blas.

*Oceanites*, Keyserling & Blasius, *Wörterb. Europ.* II. p. xciii. (1840).

Seas of greater part of world.

1. *Oceanites gracilis* (Elliot).

*Thalassidroma gracilis*, Elliot in *Ibis*, p. 391 (1859).

*Oceanites gracilis*, Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 658; Salvin, *Cat. B. Brit. Mus.* XXV. p. 361

The greyish white edges to the greater wing-coverts, white middle of abdomen, entirely different dimensions, and other characters, serve to distinguish this species

at a glance from *O. oceanicus*. It is so far only known from the coast of Chili and the Galapagos Archipelago, where it evidently breeds. We have a large series from Albemarle, Narborough, Chatham, James, Charles, Abingdon, and Bindloe Islands, and the surrounding waters. It was generally observed more frequently in the southern portion of the archipelago than *Procellaria tethys*, and rarely farther from shore than about one mile.

#### GENUS PROCELLARIA L.

*Procellaria*, Linnaeus, *Syst. Nat.* ed. 10, I. p. 131 (1758).

Atlantic Ocean and Galapagos Archipelago.

(The genera *Procellaria*, *Halocyptena*, and *Oceanodroma* are so closely allied that they hardly require generic separation, but the characters mentioned in *Cat. B. Brit. Mus.* XXV. p. 343 can serve to distinguish them.)

##### 1. *Procellaria tethys* Bp.

*Procellaria tethys*, Bonaparte in *J. f. Orn.* p. 47 (1853), and in *Compt. Rend.* XXXVIII. p. 662 (1854); *op. cit.* XLII. fig. 769 (1856); Salvin in *Trans. Zool. Soc. Lond.* IX. p. 507, Pl. LXXXVIII. fig. 2 (1876); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 656; Salvin, *Cat. B. Brit. Mus.* XXV. p. 346.

This little petrel is only known from the Galapagos Archipelago and contiguous waters. Townsend found it at lat. 4° 22' north, long. 82° 32' west, and about 400 and 600 miles east of the Galapagos Islands. We have received it from the sea round Wenman, Onlepper, Albemarle, and Tower Islands. It was seen far more abundant in the northern portion of the archipelago and generally far out to sea.

#### GENUS SPHENISCUS Briss.

*Spheniscus*, Brisson, *Orn.* VI. p. 96 (1760).

Southern seas, north to the Galapagos Islands and South Brazil.

##### 1. *Spheniscus mendiculus* Sund.

*Spheniscus mendiculus*, Sundevall in *Proc. Zool. Soc.* pp. 126, 129 (1871); Salvin in *Trans. Zool. Soc.* IX. p. 508, Pl. LXXXIX.; Wolf, *Besuch. a. d. Galapagos Ins.* p. 42 (1879); Ridgway in *Proc. U.S. Nat. Mus.* XIX. p. 660; Grant, *Cat. B. Brit. Mus.* XXVI. p. 653 (1898).

Nearest to *S. magellanicus*, but with longer and more slender bill, and smaller in size. Chin and upper part of the throat white; superciliary line narrower; the flippers have no trace of a white margin on the inner edge; the dusky band across the fore-neck is not well defined.

The plumage of the adult bird is well described by the authors quoted above. The *female* differs from the *male* at a glance in being much smaller. The immature bird has no white superciliary line, all the area below where it runs in the adult bird, right across the throat being white, shaded with grey on the sides of the head. The foreneck is blackish grey, somewhat mottled with white. The adult bird, in both sexes, has the iris reddish brown, the bill black, basal two-thirds of mandible flesh-colour, feet black, sometimes more or less spotted on the toes or webs with light pinkish creamy buff, but there is no record or note on any of our labels of a well-defined orange fore-parts of the webs as shown on the plate in the *Transactions Zool. Soc.* IX.

We have received a large series from Albemarle Island, and a few from Duncan and Brattle.



## GENUS CERTHIDEA.

- ! 13. *C. olivacea olivacea* . . . . Central group.  
 ! 14. *C. olivacea lateola* . . . . Chatham Island.  
 ! 15. *C. olivacea ridgwayi* . . . . Charles Island.  
 ! 16. *C. olivacea becki* . . . . Wenman Island.  
 \* ! 17. *C. olivacea drounei* . . . . Culpepper Island.  
 ! 18. *C. olivacea mentalis* . . . . Tower Island.  
 ! 19. *C. olivacea fusca* . . . . Abingdon and Bindloe Islands.  
 ! 20. *C. cinerascens cinerascens* . . . . Hood Island.  
 ! 21. *C. cinerascens bifasciata* . . . . Barrington Island.

## GENUS PROGNE.

- ! 22. *P. concolor* . . . . . Most islands.

## GENUS HIRUNDO.

23. *H. rustica erythrogastra* . . . . (Migrant).

## GENUS GEOSPIZA.

- \* ! 24. *G. magnirostris* . . . . ? Charles Island.  
 ! 25. *G. strenua* . . . . . Most islands.  
 ! 26. *G. darwini* . . . . . Culpepper Island.  
 ! 27. *G. conirostris conirostris* . . . . Hood Island.  
 ! 28. *G. conirostris brevirostris* . . . . Charles Island.  
 ! 29. *G. conirostris propinqua* . . . . Tower Island.  
 \* ! 30. *G. conirostris* subsp. ? . . . . Culpepper Island.  
 \* ! 31. *G. conirostris* subsp. ? . . . . Indefatigable Island.  
 ! 32. *G. dubia dubia* . . . . . Chatham (Barrington, Duncan ?).  
 ! 33. *G. dubia albemarlei* . . . . . Albemarle, Narborough Islands.  
 ! 34. *G. dubia bauri* . . . . . James Island.  
 ! 35. *G. dubia simillima* . . . . . Charles Island.  
 ! 36. *G. fortis fortis* . . . . . Most central and southern islands.  
 ! 37. *G. fortis fratercula* . . . . . Abingdon and Bindloe Islands.  
 ! 38. *G. fuliginosa fuliginosa* . . . . . Central and southern islands.  
 ! 39. *G. fuliginosa minor* . . . . . Abingdon, Bindloe Islands.  
 ! 40. *G. acutirostris* . . . . . Tower Island.  
 \* ! 41. *G. dentirostris* . . . . . ? Charles Island.  
 \* ! 42. *G. sp. inc.* . . . . . Chatham Island.  
 ! 43. *G. scandens scandens* . . . . . James Island.  
 ! 44. *G. scandens intermedia* . . . . . Charles Island.  
 ! 45. *G. scandens fatigata* . . . . . Central group.  
 ! 46. *G. scandens abingdoni* . . . . . Abingdon, Bindloe Islands.  
 ! 47. *G. scandens septentrionalis* . . . . . Wenman, Culpepper Islands.  
 ! 48. *G. pallida* . . . . . Central group.  
 ! 49. *G. crassirostris* . . . . . Most islands.  
 ! 50. *G. psittacula psittacula* . . . . . Most central islands.  
 \* ! 51. *G. psittacula townsendi* . . . . . Charles Island.  
 ! 52. *G. affinis* . . . . . Albemarle, Narborough Islands.

- ! 53. *G. incerta* . . . . . James Island, ? Duucan Island.  
 ! 54. *G. habeli* . . . . . Abingdon, Bindloe Islands.  
 ! 55. *G. paupera* . . . . . Charles Island.  
 ! 56. *G. salcini* . . . . . Chatham Island.  
 ! 57. *G. prothemelas* . . . . . Most islands.

## GENUS DOLICHONYX.

58. *D. oryzivorus* . . . . . Irregular visitor.

## GENUS MYIARCHIUS.

- ! 59. *M. magnirostris* . . . . . All islands.

## GENUS PYROCEPHALUS.

- ! 60. *P. nanus* . . . . . Nearly the whole group.  
 ! 61. *P. dubius* . . . . . Chatham Island.

## GENUS COCCYZUS.

62. *C. melanocoryphus* . . . . . ? Visitor (several islands).

## GENUS BUTEO.

- ! 63. *B. galapagoensis* . . . . . Generally distributed.

## GENUS STRIX.

- ! 64. *S. panetlatissima* . . . . . Probably several islands. (Not found recently.)

## GENUS ASIO.

- ! 65. *A. galapagoensis* . . . . . Generally distributed.

## GENUS FREGATA.

66. *F. aquila* . . . . . (Sea-bird. Breeding.)

## GENUS PELECANUS.

67. *P. fuscus californicus* . . . . . (Sea-bird. Breeding.)

## GENUS SULA.

68. *S. piscatrice websteri* . . . . . (Sea-bird. Breeding.)  
 (?) 69. *S. variegata* . . . . . (Sea-bird. Breeding.)  
 70. *S. nebouxi* . . . . . (Sea-bird. Breeding.)  
 \* 71. *S. brewsteri* . . . . . (Occurrence doubtful.)

## GENUS PHALACROCORAX.

- ! 72. *P. harrisi* . . . . . Narborough Island.

GENUS PHAËTHON.

73. *P. aethereus* . . . . (Sea-bird. Breeding.)

GENUS ARDEA.

74. *A. herodias* . . . . Breeds on several islands.

GENUS HERODIAS.

75. *H. egretta* . . . . Albemarle Island.

GENUS BUTORIDES.

- ! 76. *B. plumbeus* . . . . Generally distributed.

GENUS NYCTANASSA.

77. *N. violacea* . . . . Generally distributed.

GENUS PHOENICOPTERUS.

78. *P. ruber* . . . . Most islands. Breeding on 2 or 3 islands.

GENUS POECILONETTA.

- ! 79. *P. bahamensis galapagensis* . Generally distributed.

GENUS QUERQUEDULA.

- \* 80. *Q. versicolor* . . . . (Once, acc. to Sundevall.)

GENUS NESOPELIA.

- ! 81. *N. galapagoensis galapagoensis* . Nearly the whole group.

- ! 82. *N. galapagoensis casal* . . . . Wenman, Culpepper Islands.

GENUS CRECISCUS.

- ! 83. *C. spilonotus* . . . . James Island.

- ! 84. *C. sharpei* . . . . Indefatigable Island.

GENUS GALLINULA.

85. *G. guleata* . . . . (Occasional.)

GENUS HAEMATOPUS.

- ! 86. *H. galapagensis* . . . . Most islands.

GENUS AEGIALITIS.

87. *A. semipalmata* . . . . (Migrant.)

GENUS CALIDRIS.

88. *C. arenaria* . . . . (Migrant.)

GENUS ARENARIA.

89. *A. interpres* . . . . (Migrant.)

GENUS SQUATAROLA.

90. *S. squatarola* . . . . (Migrant.)

GENUS HETEROPYGIA.

91. *H. bairdi* . . . . (Migrant.)

GENUS TRINGA.

92. *T. minutilla* . . . . (Migrant.)

GENUS HETERACTITIS.

93. *H. incanus* . . . . (Migrant.)

GENUS HELODROMAS.

94. *H. solitarius* . . . . (Migrant.)

GENUS NUMENIUS.

95. *N. hudsonicus* . . . . (Migrant.)

GENUS HIMANTOPUS.

96. *H. mexicanus* . . . . Several of the islands.

GENUS LARUS.

! 97. *L. fuliginosus* . . . . Generally distributed.

GENUS XEMA.

! 98. *X. fuscata* . . . . Generally distributed and on Cocos Island.

GENUS STERNA.

99. *S. fuliginosa* . . . . Wenman, Culpepper. (Breeding.)

GENUS ANOUS.

! 100. *A. stolidus galapagensis* . . . . Generally distributed.

GENUS STERCORARIUS.

101. *S. pomarinus* . . . . (Accidental.)



GENUS DIOMEDEA.

- ! 102. *D. irrorata* . . . . . Hood Island.

GENUS PUFFINUS.

- ! 103. *P. obscurus subalaris* . . . . . Generally distributed.

GENUS AESTRELATA.

104. *A. phaeopygia* . . . . . Sea-bird. Probably most islands.

GENUS OCEANODROMA.

105. *O. cryptoleucura* . . . . . Procured once.  
! 106. *O. gracilis* . . . . . Most islands and coast of Chili.

GENUS PROCELLARIA.

- ! 106. *P. tethys* . . . . . Near most islands.

GENUS SPHENISCUS.

- ! 108. *S. mendiculus* . . . . . Most islands.

In this list the forms which are only known from the Galapagos Islands and the sea close by, are marked with a !, those which are of doubtful validity or of doubtful occurrence are marked with a \*. The exact distribution in the archipelago is given where it is of special interest. For details the discussion on the different species may be consulted.

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## ON THE BIRDS COLLECTED BY MR. MEEK ON ST. AIGNAN ISLAND IN THE LOUISIADÉ ARCHIPELAGO.

By ERNST HARTERT.

IN Vol. V. of this JOURNAL, pp. 521—532, I have given a list of the birds collected by Mr. Albert Meek on Sudest Island, and on pp. 76—84 of this volume a list of those found on Rossel Island in the same archipelago. From Sudest Island I was able to enumerate 42 species and subspecies: from Rossel 36. The present list of St. Aignan will show that the ornithology differs in many cases from that of the other islands of the group.

Although it is possible that a few species of birds are overlooked on St. Aignan, there can be no doubt that we may now claim to possess a very good knowledge of the ornithology of St. Aignan as well as of that of Rossel and Sudest Islands.

St. Aignan, or **Misima**, as its proper native name is, lies north-west of Tagula or Sudest Island. It is long and narrow, and about 25 miles long from east to west, and the high mountains, rising to about 3300 feet, are thickly covered with forest. The island is inhabited by friendly natives, and recently by some gold-diggers, who by very hard work are able to make some money.

Our previous knowledge of birds from Misima (St. Aignan) is very scanty. The "Rattlesnake" did not visit it. Canon Tristram, in the *Ibis* for 1899, described *Cinnyris christianae* from St. Aignan, and mentioned a few other species. In 1892, in an official Report, Mr. De Vis mentions "*Monarcha gutturalis*," "*M. chalybeocephalus*," "*Pachycephala melanura*" (my *P. rosseliana*), and *Myzomela nigrita* as being found in Misima.

In another such Report, for 1889, the following species were mentioned:—*Lorius hypococheus* (not sent by Meek), *Halecyon sanctus*, *Eurystomus crassirostris*, *Collocalia fuciphaga*, ? *Rhipidura setosa* (my *Rh. s. nigromentalis*), *Lalage kuru*, *Myzomela nigrita*, *Calornis metallica*, *Ptilopus ricolii* (recte *Ptilinopus strophium*!), ? *Macropygia nigrorostri* (*M. doreya cunctata* subsp. nov.).

Mr. Meek sent 64 species and the nests and eggs of some of them.

### 1. *Corvus orru* Bp.

One *male*. "Iris dirty white." Wing 337 mm.

### 2. *Calornis metallica* (Temm.).

Two *males* and a *female*, shot in August and September, are in splendid plumage. The *female* is coloured like the *male*, but a little smaller.

These birds breed, as we know, in holes of trees. Mr. Meek sent several clutches, consisting of three eggs each, but he does not say if this is the full number. The eggs are like those of the same species from Queensland and the Trobriand Islands.

### 3. *Aplonis cantoroides* (Gray).

St. Aignan and "small island off St. Aignan," September and December 1897. The *male* does not differ from the *female*, except that the latter is distinctly smaller.

The iris in the adult birds, as well as in the young ones, is described on the labels as "orange" or "cadmium," the bill and feet as "black."

These birds breed also in holes of trees, like *Calornis*. The eggs closely resemble those of *Calornis metallica*, but the three before me are slightly paler and the brown spots darker and somewhat more defined, also generally not so large. These differences may be individual or have specific value. The three eggs of *Aplonis cantorooides* before me measure 26.5 by 20, 27 by 20.2, and 28 by 18.5 mm. No statement is made whether they belong to one clutch or not.

#### 4. *Pachycephala rosseliana* Hart.

Descr. origin in *Bull. B. O. Club*, Oct. Meeting, 1898 (no. LVI.), p. 8; descr. accur. in Nov. Zool. VI. p. 76 (*antei*).

A good series from St. Aignan. These birds are not separable from those from Rossel Island, whence it was originally received and described.

Several nests were found in November and December 1897. They are built of small twiglets and stems of weeds, strongly interwoven and outside more or less covered with dead and sometimes almost decayed leaves, inside only lined with rootlets and tiny twiglets. They stand in bushes, and are somewhat flat, the cup being only about 3 cm. deep. They measure outside about 8 to 12 cm. across, the cup about 6 to 7 cm. across. Mr. Meek sent four nests and six eggs. Unfortunately they are not so labelled as to show how many and which belong to one nest, but two and two belong evidently together, so that each nest seemed to contain only two eggs. The eggs are rather short and thick, and may be called "short ovate." They somewhat resemble the waxwing's eggs in colour, being vinaceous buff, or very pale greyish vinaceous, and frequently spotted with dark liver brown and underlying pale purplish grey or "mauve" patches. They measure 25 by 13.3, 23.6 by 14.8, 23.5 by 14.6 mm.

#### 5. *Edoliosoma amboinense tagulanum* Hart.

See Nov. Zool. V. p. 524, where this form is described from Sudest Island.

There are now before me four *males* and two *females* from St. Aignan. They seem to belong to the same form as the Sudest bird, but the *females* are rather lighter, and one of the *males* has the outer margins of the outer webs of the secondaries lighter, another has the throat darker, more blackish. Only two *males* and one *female* having been sent from Sudest Island, a larger material would be welcome, but I do not think that the Sudest and St. Aignan birds will be separable.

This form closely resembles *E. a. tenuirostre*, but the *male* is darker, more bluish.

#### 6. *Lalage karu* (subsp.?).

See Nov. Zool. V. p. 524 (1898), where I discussed several forms of *Lalage karu*, and mentioned that the specimens from St. Aignan were very similar to *L. karu karu*, but seemed to be generally paler on the abdomen.

#### 7. *Graucalus melanops* (Lath.).

One adult *male* and several *females* and immature *males*. "Iris dark brown."

8. **Monarcha inornatus** (Garn.).

Evidently not rare on St. Aignan.

9. **Monarcha chalybeocephalus lucidus** (Gray).

*Monarcha chalybeocephalus* is evidently separable into several subspecies:—

a. **Monarcha chalybeocephalus chalybeocephalus** (Garn.).

Type from New Ireland. Probably extending all over New Guinea to the D'Entrecasteaux Islands. Specimens from the latter, however, seem often to have rather large beaks, thus pointing towards *M. c. lucidus*.

b. **Monarcha chalybeocephalus nitens** (Gray)??

Specimens from the northern Moluccas, Batjan, and Halmabera, seem to be generally smaller than typical *M. c. chalybeocephalus*, but a large material should be examined before "nitens" can be established as a valid form.

c. **Monarcha chalybeocephalus lucidus** (Gray).

Lonisiade Archipelago—Sudest and St. Aignan. The bill is decidedly larger in both sexes in this form.

d. **Monarcha chalybeocephalus nitidus** (Gould).

The bill is much narrower and less hooked in the birds from Queensland, and the *females* have the hindneck somewhat darker.

e. **Monarcha chalybeocephalus rufolateralis** (Gray)??

The birds from the Aru Islands have been united by Sharpe and Salvadori with *M. c. nitidus* of Queensland. They seem to me to stand somewhat between *M. c. nitidus* and *M. c. chalybeocephalus* in the form of the bill, and the *female* may be still darker on the back than that of either of the other two forms, but the Aru birds are doubtless nearer to *M. c. nitidus*, and more material is required to establish its validity as a separate form.

10. **Monarcha melanopterus** Gray.

(*cf.* Nov. Zool. VI. p. 78 (*anteà*)).

Of this rare bird Meek sent four *males* and one *female* from St. Aignan. These birds agree with those from Rossel Island and the type from Round Island in the British Museum. The *male* has the "iris brown, feet and bill bluish slate-colour": the *female* has the "bill bluish slate-colour with a black tip."

A nest and one egg were found on St. Aignan. The nest is fixed in a fork of a twig, has a deep cup, and is composed of grasses, fibres, and rootlets, lined with grasses and fibres, and covered outside with pieces of bark, dry leaves, and silk from cocoons. The egg is like that of the following species, but very much smaller, measuring only 19.8 by 12.7 mm.

11. **Monarcha guttula** (Garn.).

*Monarcha guttatus* (errore) in Nov. Zool. V. p. 525, *Monarcha guttulatatus* Salvadori, *Orn. Pap.* II. p. 22, sed *Muscivapa guttula* Garnot in Voy. Coquille Zool. I. p. 591, tab. 16, fig. 2, (deser. origin.), itaque nunc: *Monarcha guttula*!

Specimens from St. Aignan agree with those from other countries. Their bills are certainly not smaller.

Two eggs from St. Aignan are creamy white, thickly covered with brownish red spots and some deeper-lying mauve spots. They measure 21.6 by 15.8 and 22 by 15.5 mm. (cf. *Nov. Zool.* III, p. 242).

#### 12. *Rhipidura setosa nigromentalis* Hart.

Cf. *Nov. Zool.* V, p. 526.

A good series from St. Aignan bears out the characters mentioned *loc.* An immature specimen has rusty buff tips to the wing-coverts, feathers of the rump and upper tail-coverts.

#### 13. *Rhipidura louisiadensis* Hart.

Cf. *anteà*, p. 78, where I described this new species from Rossel Island. A series from St. Aignan agrees perfectly with the Rossel specimens.

An egg belonging to this species agrees with those described above (p. 79), and measures 17.8 by 14 mm.

#### 14. *Myiagra plumbea* Vig. & Horsf.

Evidently not rare on St. Aignan Island. The adult *males* are giants, the wing of one measuring 83 mm., that of the other 81 mm., while those of adult *males* from Rossel Island have the wings only 73, 75, and 76 mm. in length. I find, however, no differences between the *females* from the two islands.

#### 15. *Myiagra nupta* Hart.

*Myiagra nupta* sp. nov. in *Nov. Zool.* V, p. 526, Rossel Island.

We have received three specimens of this new species from St. Aignan. Two are adult *males*. They agree with the type, except that they are somewhat larger, their wings measuring 90 and 91 mm., the tails 79 and 82 mm. The third is a young *male*. It resembles the *female* (deser. *loc.*), but the chest is darker, and some steel-blue feathers make their appearance.

#### 16. *Gerygone rosseliana onerosa* subsp. nov.

♂ ad. Upperside greenish olive, not so much greenish and more brown than in *G. rosseliana rosseliana*. Rectrices olive brown, crossed by a black bar, about 8 mm. in width, and about 7 mm. from the tip. Hardly an indication of a lighter spot on the tip of the inner web. Underside brownish buff, with an indication of a yellow wash darker on the sides and chest, lightest on the middle of the abdomen, almost white on the throat. "Bill black, feet dark brown, iris brown." Total length of type (in skin) about 110, wing 58, tail 47, tarsus 18, exposed portion of culmen 11 mm. Besides the type there is one *female*, and another specimen marked "male," but I am of opinion that it is also a *female*. The real *female* differs from the *male* in being a shade paler above and smaller. It measures as follows:—Wing 55, tail 43, bill 10 mm. The other specimen, which I consider to be also a *female*, has the wing 55, tail 43, bill 10.3 mm. in length.

This form differs from *G. rosseliana rosseliana* (*anteà*, p. 79) in being larger, almost without yellow below, where it is brownish, not yellow, and in being slightly browner, not so greenish on the upperside. The two forms are evidently representative subspecies.

17. *Myzomela pallidior* Hart.

Descr. origin. in *Bull. B. O. Club*, No. LVIII. p. 21, December meeting, 1898.

This interesting species resembles the *female* of *M. albigula* Hart. (cf. *antea*, p. 79) from Rossel Island, but it is slightly more brownish above, lighter and more brownish below, the breast is not so dark and hardly in contrast with the abdomen. There are indistinct red tips to the feathers of the forehead and crown. The red streak along the middle of the throat is very distinct in the adult *male*, but apparently indistinct in the *female*. The *female* does not differ from the *male* in coloration, but is very much smaller. The *males* measure:—Wing 72—74, tail 57—60, tarsus about 20, exposed portion of culmen about 18—19 mm. The *female* measures:—Wing about 67 (rather worn), tail 51 or 52, tarsus 19, culmen 18.5 mm. “Iris brown, bill black, feet bluish slate-colour.”

This bird seems not to be rare on St. Aignan, a good series of *males* and a *female* having been sent.

18. *Myzomela nigrita louisiadensis* Hart.

(cf. Nov. Zool. V. p. 527, where this form is described from Sudest Island. Four *males* and one *female* from St. Aignan do not differ from the typical birds from Sudest Island.

19. *Zosterops aignani* sp. aut subsp. nov.

Similar to *Z. pallidipes* Vis (*antea*, p. 80), but differs in being smaller, in being lighter above, lighter and more yellow below, and in having the feet and legs of a dark, brownish black colour, and the bill not blackish brown, but pale olive brown (in skin). “The iris is light brown, the feet smoky brown, blackish, or slate colour, the bill flesh-colour, tinted with brown, or very light brown” (Meek). In *Z. pallidipes* the iris is said to be “brown, the feet dark dirty yellow, the bill above dark brown.” *Z. aignani* is evidently closely allied to *Z. pallidipes*, and perhaps only a subspecies of the latter, though very distinct. The coloration of the feet and the smaller size are very evident even in skins. *Z. aignani* has the following measurements:—♂ : Wing 62.5—64, tail 46, exposed portion of culmen 13—14, tarsus about 18 mm. ♀ : Wing 61.5—62, tail about 46, culmen 13—14, tarsus about 18 mm.

A number of nests and eggs are sent. The nests hang in the fork of a twig, and are loosely woven together of rootlets, fibres and fine grasses, not specially lined, but sparsely covered outside with small pieces of wool, bark or parts of insects' cocoons. The eggs are very pale blue, without gloss and without markings. They measure 19 by 13, 17.3 by 13.3, 19.6 by 13.1, 18 by 14 or 19 by 13.1 mm.

This *Zosterops* seems to represent *Z. pallidipes*, from which it is quite distinct, on St. Aignan.

*Z. griseitincta* (Gray in *Proc. Zool. Soc. Lond.* 1858, p. 175, *Cat. B. Brit. Mus.* IX. p. 189), from an unknown island in the Louisiade group, differs very much from *Z. aignani*, being much more coloured like *Z. pallidipes*. It differs from *Z. pallidipes* in being paler on the flanks and abdomen, the tarsus is about 1 or 2 mm. shorter, and the feet are probably blackish in life, although this is not to be seen with certainty in the skin. I believe, therefore, that *Z. griseitincta* is a third form, probably from Teste or one of the other small islands. As Macgillivray, its

discoverer, did not land on St. Aignan, it cannot be the St. Aignan form, and for the reasons given above I do not think that it is *Z. pallidipes*.

### 20. *Cinnyris christianae* Tristr.

This sun-bird, which we have also received from the D'Entrecasteaux Islands, and from Sudest Island, was first described from St. Aignan, where Meek found it tolerably common.

### 21. *Dicaeum nitidum* Tristr.

This pretty little flowerpecker was first described from Sudest Island, but we have received also a good series from Rossel (*antea*, p. 80), and St. Aignan. "On the labels the iris is given as "brown," bill and feet as "black."

### 22. *Collocalia esculenta* (L.).

Evidently common, and breeding on St. Aignan. The nests are composed of small grasses and fibres, fixed to the rocks with saliva, and loosely held together by the same material. They are all of a light colour. The eggs measure 15.6 by 10.6, 16 by 10.5, and 16 by 10.6 mm.

### 23. *Collocalia fuciphaga* (Thunb.).

The brown swiftlet of St. Aignan is no doubt *C. fuciphaga*, but it must be said that they all have the tarsus quite bare, and that they are rather light below. Specimens from Borneo and Java are generally darker, more smoky on the under-side, but others from the Philippines and the Timor region are just as light on the underparts.

The nests of *C. fuciphaga* are, as a rule, "edible," *i.e.*, consisting of saliva alone. Three nests sent from St. Aignan are not at all "edible," being composed of almost only one kind of long, wiry fibre, of a dark colour, but strongly agglutinated and fastened to the upper surface of some rocks, *viz.*, resting on the rock, not hanging on the sides of the rock, as *Collocalia*-nests usually do.

If we suppose that I had made a mistake in uniting (*Cat. B. Brit. Mus.* XVI. p. 498, and *Tierreich*, No. 1, p. 67), the *C. fuciphaga* from the islands of the Malayan and Papuan Islands, then we would be obliged to unite those from the Timor group of islands with those from the Louisiades, separating them from the darker birds from Java, Borneo, etc., which have generally also feathered tarsi. In the Philippine archipelago we find light birds with feathered and with unfeathered tarsi, while Pacific birds are rather dark below, and small. The nests from Borneo, Java, and the Timor group are "edible," or interwoven with feathers and bits of grass, but not entirely built of grass and fibres like those from St. Aignan. Thus the nest-building habits do not coincide with slight differences of colour. It has been said that the same species of swiftlets build very different nests, but more evidence is desirable.

It is possible that more subspecies can be distinguished than I admitted in my latest work on the swifts, but more material and exact observations about the nesting-habits are necessary, and no hasty conclusion should be formed on this somewhat difficult subject.

The eggs from St. Aignan measure 20.5 by 13.5, 20.6 by 13.3, 22.7 by 14, 22 by 14, 18.7 by 13.7 mm.

24. **Eurystomus crassirostris** Sel.

Both sexes in good plumage.

25. **Merops ornatus** Lath.

Common. In good plumage by the end of August.

26. **Halcyon saurophaga** Gould.

Evidently common on St. Aignau Island. "Iris brown, feet dark slate-colour, bill black, whitish at the base of the mandible."

Eggs were found on December 5th. They are short oval, white, with very little gloss, and measure 27 by 23 and 28.5 by 23 mm.

27. **Halcyon sordida colonus** Hart.

There is a very fine series of this bird from St. Aignau. It had also been received from Rossel Island (*anted*, p. 81).

There is a great amount of variation in this subspecies. The *male* is above less greenish olive and more bluish green, the wings are more blue outside, and the bill generally, but not always, larger. A young *male* has a very short bill, narrow black edges to the tips of the feathers on the sides of the chest, the frontal feathers margined with rusty buff, the loreal patch and the collar rusty buff, some of the wing-coverts tipped with buff, the under wing-coverts, sides of the breast and of the abdomen tinged with buff. Wing in *males* 89—93, in *females* 86—93 mm. "The iris is dark brown, the feet dark slate-colour, the bill black, whitish towards the base of the mandible."

28. **Halcyon sancta** Vig. & Horsf.

Common on St. Aignau.

29. **Halcyon macleayi** Jard. & Selby.

Common on St. Aignau.

30. **Alcedo ispida moluccana** Less.

Common on St. Aignau. (See Nov. Zool. V. p. 529, *anted*, p. 81.)

31. **Urodynamis taitiensis** (Sparrm).

One *male* (?) was shot on St. Aignau on September 10th, 1897. "The iris is dark yellow, feet black, bill brown."

This occurrence extends the area of distribution of this species.

32. **Chrysococcyx plagosus** (Lath.).

One *female*, St. Aignau, August 28th, 1897. "Iris light hazel, feet and bill black."

33. **Nasiterna pusio** Sel.

A fine series from St. Aignau, like those from Sudest. (Nov. Zool. V. p. 531.)



34. **Geoffroyus aruensis sudestiensis** Vis.

A good series of *Geoffroyus* from St. Aignan are quite like those from Sudest Island, while on Rossel Island it is represented by the very different *G. a. cyanicarpus*. (See Vol. V. p. 531, Vol. VI. p. 81, *anteâ.*)

35. **Trichoglossus massena** Bp.

Not uncommon on St. Aignan. "The iris is bright red, feet dark slate, bill orange."

36. **Cacatua triton trobriandi** Finseh.

Five fine skins from St. Aignan agree with those from Fergusson (Nov. Zool. III. p. 246), Sudest (Nov. Zool. V. p. 531), and Rossel Island (*anteâ*, p. 82) in the shortness of their wings, but the beaks of the adult *males* are fully as big as they are in some *males* from New Guinea. Nevertheless I think, from what I have before me now from Fergusson, Sudest, Rossel and St. Aignan, that they all can be united as one subspecies.

37. **Astur etorques** (Salvad.).

A fine series of adult and immature *males* and *females*. "Iris in all bright yellow, feet bright orange, cere orange, bill black."

38. **Astur poliocephalus** (Gray).

Two beautiful adult *males*. Wings 193—195 mm. "Iris plum-colour (?), feet orange, cere orange, bill black."

39. **Ptilinopus strophium** Gould.

Common. (See Vol. V. p. 82.)

A number of eggs, two in a clutch, were found in September and December. The eggs are rather longitudinal and without gloss, measuring 34.5 by 23.4, 35 by 24.2, 35.6 by 24.1, 34.2 by 24 mm., and so on.

40. **Ptilinopus superbus** (Temm.).

Common on St. Aignan.

41. **Carpophaga vanwycki** Cass.

One adult *male*, September 11th, 1897. "Iris red, feet red, bill dark bluish slate-colour."

This pigeon was formerly not known to reach so far to the south.

42. **Carpophaga salvadorii** Tristr.

An adult pair from St. Aignan are like those from Fergusson and Rossel Islands, except that they are rather deep rosy on the mantle. A young *female* has the head and mantle greyish, the chest grey with vinous edges to the feathers.

43. **Carpophaga zoeae** (Less).

One *male*, July 25th, 1897. "Iris yellowish white, feet dark red, bill dark slate-colour."

44. **Myristicivora spilorrhoea** (Gray).

One *female* sent. Eggs were found in numbers early in December. They measure 44 by 31.5, 47.5 by 33, 42.5 by 31.6, 48.6 by 31.3 mm.

45. **Columba albicularis** (Bp.).

One *female*. "Iris: inner circle light yellow, outer circle darker, feet red."

46. **Macropygia doreya cunctata** subsp. nov.

(See *antè*, p. 83.)

The long-tailed pigeon from the Louisiade group Rossel (type), Sudest, and St. Aignau Islands seems nearest to *M. doreya cinereiceps*, but differs in its distinctly barred breast and a longer wing, ranging in the adult *male* as far as 170 and 176 mm. The feathers of the hind-neck are widely bordered with metallic green, the forehead is greyish white, usually more or less stained with brown, the crown is slaty grey, the under tail-coverts uniform bright rufous.

Young birds have the crown brownish red, the hind-neck barred.

47. **Chalcophaps chrysochlora** Gould.

Very common.

48. **Caloenas nicobarica** (L.).

Three skins.

49. **Megapodius macgillivrayi** Gray.

Two *females* from St. Aignau are a little paler on the back than the three from Rossel Island mentioned on p. 83.

50. **Porphyrio smaragdinus** Temm.

One *male*, one *female*, and one without a label. The *female* differs from the *male* in having the fore-neck, chest and breast uniform purplish blue, while in the *male* there is a large blue chest-patch in the middle of the purplish blue surroundings. The patch of lesser upper wing-coverts is purplish blue in the *female*, light blue in the *male*. The birds being a fully adult pair, it seems to be certain that these differences are sexual. Two eggs were found, belonging to this pair, on August 21st, 1897. They are similar to those of other species of *Porphyrio*, resembling the eggs of *Gallinula*, but, of course, larger, though very small for the size of the birds. They have a fairly strong shell, are very pale brown, marked with patches and spots of rufous brown, and underlying ones of a kind of purplish grey or mauve. They measure 50 by 35 and 49.5 by 34.6 mm.

51. **Esacus magnirostris** (Vieill.).

Three skins. "Iris in both sexes chrome yellow, feet greenish slate, bill black."

52. **Haematopus longirostris** Vieill.

One *female*. "Iris and bill light red, feet pink."

53. *Charadrius dominicus fulvus* Gm.

Common in September and December.

54. *Heteropygia acuminata* (Horsf.).

Two *females* were shot in December. Their wings measure only 130 and 132 mm.

55. *Limonites ruficollis* (Pall.).

November 27th, 1897.

56. *Tringoides hypoleucus* (L.).

Very common.

57. *Heteractitis brevipes* (Vicill.).

One *male*, November 29th, 1897.

58. *Numenius phaeopus variegatus* (Scop.).

Shot in August.

59. *Himantopus leucocephalus* Gould.

One *female*. This is apparently adult, but it still has the grey crown.

60. *Anas superciliosa* Gm.

One pair was shot in September.

61. *Dupetor nesophilus* Sharpe.

(Cf. Sharpe, *Bull. B. O. Club*, V. No. XXXI, p. 22 (1895), and *Cat. B. Brit. Mus.* XXVI, p. 251, Pl. III, fig. 1.)

One *female*, December 28th, 1897. "Iris light fawn-colour, feet black, bill raw umber." Wing 209 mm.

(Of this species we have also received a skin from **Expedition Bay, New Hanover**, shot in March 1897.)

62. *Demigretta sacra* (Gm.).

Of this heron we have received adult individuals in grey and in pure white plumage.

63. *Sterna bergii* Licht.

One *male*, December.

Also from **Sudest Island**, both sexes, shot in April.

64. *Sterna anaetheta* Scop.

One *male*, December.

The following birds are now known to inhabit the three large islands of the Louisiade group:—

ST. AIGNAN (MISIMA).	SUDEST I. (TAGULA).	ROSSEL I.
(Antea, pp. 206—215.)	(Vol. V, pp. 521—532.)	(Antea, pp. 76—84.)
<ol style="list-style-type: none"> <li>1. <i>Corvus orru</i>.</li> <li>2. <i>Calornis metallica</i>.</li> <li>3. <i>Aplonis cantoroides</i>.</li> <li>* 4. <i>Pachycephala rosseliana</i>.</li> <li>* 5. <i>Edoliosoma amboinense tagulanium</i>.</li> <li>6. <i>Lalage karu</i>.</li> <li>7. <i>Graucalus melanops</i>.</li> <li>8. <i>Monarcha inornatus</i>.</li> <li>* 9. <i>M. chalybeocephalus lucidus</i>.</li> <li>* 10. <i>M. melanopterus</i>.</li> <li>11. <i>M. guttula</i>.</li> <li>* 12. <i>Rhipidura setosa nigromentalis</i>.</li> <li>* 13. <i>Rh. louisiadensis</i>.</li> <li>11. <i>Myiagra plumbea</i>.</li> <li>* 15. <i>M. nupta</i>.</li> <li>* 16. <i>Gerygone rosseliana onerosa</i>.</li> <li>* 17. <i>Myzomela pallidior</i>.</li> <li>* 18. <i>M. nigrita louisiadensis</i>.</li> <li>* 19. <i>Zosterops aignanii</i>.</li> <li>20. <i>Cinnyris christiana</i>.</li> <li>* 21. <i>Dicaeum nitidum</i>.</li> <li>22. <i>Collocalia esculenta</i>.</li> <li>23. <i>C. fuciphaga</i>.</li> <li>24. <i>Eurystomus crassirostris</i>.</li> <li>25. <i>Merops ornatus</i>.</li> <li>26. <i>Haleyon saurophaga</i>.</li> <li>27. <i>H. sordida colonus</i>.</li> <li>28. <i>H. sancta</i>.</li> <li>29. <i>B. maculayi</i>.</li> <li>30. <i>Alcedo ispida moluccana</i>.</li> <li>31. <i>Urodynamis taitiensis</i>.</li> <li>32. <i>Chrysococcyx plagiatus</i>.</li> <li>33. <i>Nasiterna pusio</i>.</li> <li>34. <i>Lorius hypoenochrous</i>.</li> <li>* 35. <i>Geoffroyus aruensis sudestiensis</i>.</li> <li>36. <i>Trichoglossus nassena</i>.</li> <li>37. <i>Cacatua triton trobriandi</i>.</li> <li>38. <i>Astur etorques</i>.</li> <li>39. <i>A. poliocephalus</i>.</li> <li>40. <i>Ptilinopus superbus</i>.</li> <li>41. <i>Pt. strophium</i>.</li> <li>42. <i>Carpophaga vanwycki</i>.</li> <li>43. <i>C. salvadorii</i>.</li> <li>44. <i>C. zoeae</i>.</li> <li>45. <i>Myristicivora spilorrhoea</i>.</li> <li>46. <i>Columba albigularis</i>.</li> <li>* 47. <i>Macropygia doreya cunctata</i>.</li> <li>48. <i>Chalcophaps chrysochlora</i>.</li> <li>49. <i>Caloenas nicobarica</i>.</li> <li>* 50. <i>Megapodius macgillivrayi</i>.</li> <li>51. <i>Porphyrio melanotus</i>.</li> <li>52. <i>Esacus magnirostris</i>.</li> <li>53. <i>Haematopus longirostris</i>.</li> <li>54. <i>Charadrius dominicus fulvus</i>.</li> <li>55. <i>Heteropogon acuminata</i>.</li> <li>56. <i>Limonites ruficollis</i>.</li> <li>57. <i>Tringoides hypoleucus</i>.</li> <li>58. <i>Heteractitis brevipes</i>.</li> <li>59. <i>Numenius phaeopus variegatus</i>.</li> <li>60. <i>Himantopus leucocephalus</i>.</li> <li>61. <i>Anas superciliosa</i>.</li> <li>62. <i>Pupator nesophilus</i>.</li> <li>63. <i>Demipectia sacra</i>.</li> <li>64. <i>Sterna bergii</i>.</li> <li>65. <i>S. anaetheta</i>.</li> </ol>	<ol style="list-style-type: none"> <li>1. <i>Manucodia atra</i>.</li> <li>2. <i>Chlamydera cerviniventris</i> (teste De Vis).</li> <li>3. <i>Corvus orru</i>.</li> <li>* 4. <i>Chibia carbonaria dejecta</i>.</li> <li>5. <i>Calornis metallica</i>.</li> <li>* 6. <i>Craictus louisiadensis</i>.</li> <li>7. <i>Pachycephala fortis</i>.</li> <li>* 8. <i>P. alberti</i>.</li> <li>* 9. <i>Graucalus hypoleucus louisiadensis</i>.</li> <li>* 10. <i>Edoliosoma amboinense tagulanium</i>.</li> <li>11. <i>Lalage karu</i>.</li> <li>12. <i>Monarcha inornatus</i>.</li> <li>13. <i>M. melanopsis</i>.</li> <li>* 11. <i>M. chalybeocephalus lucidus</i>.</li> <li>15. <i>M. guttula</i>.</li> <li>* 16. <i>Rhipidura setosa nigromentalis</i>.</li> <li>17. <i>Myiagra plumbea</i>.</li> <li>* 18. <i>M. nupta</i>.</li> <li>* 19. <i>Ptilotis notata</i>.</li> <li>* 20. <i>Myzomela nigrita louisiadensis</i>.</li> <li>* 21. <i>Zosterops meeki</i>.</li> <li>22. <i>Cinnyris christiana</i>.</li> <li>* 23. <i>Dicaeum nitidum</i>.</li> <li>24. <i>Collocalia fuciphaga</i>.</li> <li>* 25. <i>Podargus meeki</i>.</li> <li>26. <i>Caprimulgus macrurus</i>.</li> <li>27. <i>Eurystomus crassirostris</i>.</li> <li>28. <i>Merops ornatus</i>.</li> <li>29. <i>Alcedo ispida moluccana</i>.</li> <li>30. <i>Haleyon sancta</i>.</li> <li>* 31. <i>Cyclopsittacus inseparabilis</i>.</li> <li>32. <i>Lorius hypoenochrous</i>.</li> <li>33. <i>Electus pectoralis</i>.</li> <li>34. <i>Nasiterna pusio</i>.</li> <li>* 35. <i>Geoffroyus aruensis sudestiensis</i>.</li> <li>36. <i>Cacatua triton trobriandi</i>.</li> <li>* 37. <i>Ninox goldiei rosseliana</i>.</li> <li>38. <i>Astur etorques</i> (?).</li> <li>39. <i>Ptilinopus superbus</i>.</li> <li>40. <i>Pt. strophium</i>.</li> <li>* 41. <i>Macropygia doreya cunctata</i>.</li> <li>42. <i>Myristicivora spilorrhoea</i>.</li> <li>43. <i>Tringoides hypoleucus</i>.</li> <li>44. <i>Sterna bergii</i>.</li> <li>45. <i>St. longipennis</i>.</li> <li>* 46. <i>Eopsaltria sudestiensis</i> De Vis, 1892. Cf. Nov. Zool. V, p. 523. (<i>Colluricincla discolor</i> De Vis, probably = <i>Pachycephala fortis</i>, l.c. p. 522.)</li> </ol>	<ol style="list-style-type: none"> <li>1. <i>Calornis metallica</i>.</li> <li>* 2. <i>Pachycephala rosseliana</i>.</li> <li>* 3. <i>P. meeki</i>.</li> <li>* 4. <i>Edoliosoma rostratum</i>.</li> <li>5. <i>Monarcha inornatus</i>.</li> <li>* 6. <i>M. melanopterus</i>.</li> <li>* 7. <i>Rhipidura louisiadensis</i>.</li> <li>* 8. <i>Myiagra plumbea</i>.</li> <li>* 9. <i>Gerygone rosseliana</i>.</li> <li>* 10. <i>Myzomela albigula</i>.</li> <li>* 11. <i>Zosterops pallidipes</i>.</li> <li>* 12. <i>Dicaeum nitidum</i>.</li> <li>* 13. <i>Pitta meeki</i>.</li> <li>14. <i>Eurystomus crassirostris</i>.</li> <li>15. <i>Alcedo ispida moluccana</i>.</li> <li>16. <i>Haleyon sordida colonus</i>.</li> <li>17. <i>H. sancta</i>.</li> <li>* 18. <i>Tanyptera rosseliana</i>. (T. galatea apud De Vis 1889.)</li> <li>* 19. <i>Geoffroyus aruensis cyaniceps</i>.</li> <li>20. <i>Cacatua triton trobriandi</i>.</li> <li>* 21. <i>Ninox goldiei rosseliana</i>.</li> <li>22. <i>Accipiter</i> sp. inc.</li> <li>23. <i>Ptilinopus strophium</i>.</li> <li>24. <i>Carpophaga salvadorii</i>.</li> <li>25. <i>Myristicivora spilorrhoea</i>.</li> <li>* 26. <i>Macropygia doreya cunctata</i>.</li> <li>27. <i>Chalcophaps chrysochlora</i>.</li> <li>28. <i>Caloenas nicobarica</i>.</li> <li>* 29. <i>Megapodius macgillivrayi</i>.</li> <li>30. <i>Charadrius dominicus fulvus</i>.</li> <li>31. <i>Ochthodromus geoffroyi</i>.</li> <li>32. <i>O. mongolus</i>.</li> <li>33. <i>Heteractitis brevipes</i>.</li> <li>34. <i>Tringoides hypoleucus</i>.</li> <li>35. <i>Limosa haponica novaezealandiae</i>.</li> <li>36. <i>Numenius phaeopus variegatus</i>.</li> <li>37. <i>Sterna bergii</i>.</li> </ol>





The species and subspecies which, according to our present knowledge, are confined to the Louisiade Islands are marked with an asterisk. They are not less than thirty-two! To these must be added *Zosterops griseilineata* (antea, p. 210), probably from one of the smaller islands in the group.

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*DENDROLAGUS MAXIMUS.*

By Hon. WALTER ROTHSCHILD, Ph.D.

(Plate I.)

THIS plate shows the interesting new tree kangaroo, described by my brother and myself in Vol. V. of this journal, pp. 511 and 512, under the name of *Dendrolagus maximus*.

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## ON SOME RARE BIRDS FROM NEW GUINEA AND THE SULA ISLANDS.

By Hon. WALTER ROTHSCHILD, Ph D.

(Plates II. and III.).

PLATE II., fig. 1, is taken from the type of the curious parrot described by me in the *Bull. B. O. Club*, Vol. VII. (No. LIV.), p. 54, May 1898, under the name of *Charmosyna atrata*. When I first saw this bird, which was shot on Mount Scratchley, in British New Guinea, I thought it might be a melanistic specimen of *Charmosyna stellae*, but when examining it closer I did not think that this assumption could be justified. I have since received another skin from Mount Gaivara, near Mount Victoria in British New Guinea, shot between 2000 and 9000 feet. It agrees with the type of *C. atrata*, except that the lower back, rump and sides of the belly are not carmine, but green, the blue patch thus being surrounded by green and not by red. One of the longest rectrices is present. It measures 234 mm., and is dark green, brownish towards the tip, dirty yellowish at the tip.

Unfortunately both specimens are not sexed, and it is therefore impossible to say whether they are *males* or *females*. I fancy, however, that the second specimen, without the red on the rump, is the *female*, the type the *male*. If it were certain that the two specimens are *male* and *female*, I should consider *C. atrata* to be an established species. The second specimen has one single red feather beneath the eye.

It must be mentioned that the primaries are as emarginated as they are in *C. stellae*, but Mr. Keulemans did not show this in the otherwise most accurate and fine figure.

Fig. 2 on Pl. II. is *Oreostruthus fuliginosus* De Vis, described in the *Ibis* for 1897, and again in the Official Report on New Guinea for 1897 (printed in 1898). In the first place the new generic name *Oreoospiza* was proposed for the genus, but this being preoccupied, was afterwards substituted by *Oreostruthus*.

The types were shot on the Wharton Range, at an altitude of 11,100 feet. We have received a good series from an altitude of about 11,000 feet on Mount Knutsford, south of Mount Scratchley and the Wharton Range. I think that the *females* are lighter brown. The wing measures 70—72 mm. in the adult *male* and *female*. Young birds do not have the red on the under surface.

Fig. 1 on Pl. III. represents a most remarkable Passerine bird from British New Guinea, which evidently belongs to the group united as *Timeliidae* in the *Catalogue of Birds*, Vol. VII. In the *Bull. B. O. Club*, Vol. VII. (No. LIV.), p. 53 (May 1898), I have described this bird as *Iyrita coronata*, gen. et spec. nov.

The specimen described there had been said to come from the low country east of Port Moresby, but this information is evidently erroneous, as we have now received five skins of the same bird shot by Mr. Anthony on Mount Knutsford, 11,000 feet high. Three agree with the type, and two of these are marked "♂," but two others are marked "♀," and these latter have the elongated white patch of feathers behind the eye replaced by a rusty buff one. The iris is said to be dark brown, the bill black, feet dark green.





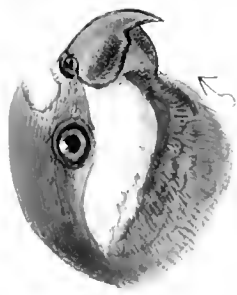
1. *TACHYTHALPUS STRAUSSEI* (REINHOLD)  
2. *TACHYTHALPUS STRAUSSEI* (REINHOLD)



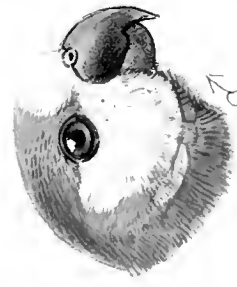


THE BIRD OF THE YEAR





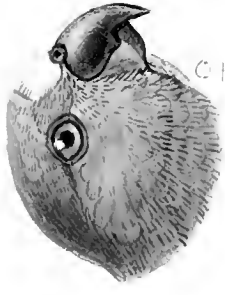
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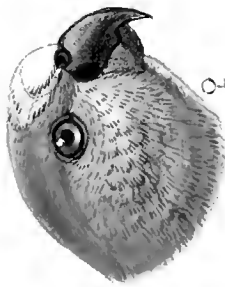
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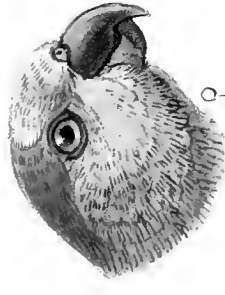
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2



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6



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8



9

Illustrations of the bird

1. P. L. PEITA MACLEAYANA. 3. 4. VIEAU. 5. 6. C. ARUENSIS. 7. 8. P. AKAFILLIS. 9. P. PTILINOPUS HYOGASTER. P. PTILINOPUS GRANULIFRONS.

Museum, Br. 1899



Fig. 2 on Pl. III. is the *Pitta doherlyi*, described in *Bull. B. O. Club*, Vol. VII. (No. LI.), February 1898, and in Vol. V. of this journal, p. 130. It is one of the prettiest ornithological discoveries of Mr. Doherty, who obtained one adult *male*, one *female*, and one young *male* on Sula Mangoli.

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## ON SOME SPECIES OF THE GENERA *CYCLOPSITTA* AND *PTILINOPUS*.

By ERNST HARTERT.

(Plate IV.)

FIGURES 1, 2, 3, 4, 5, 6 and 7 of Pl. IV. show the heads of four allied species of the genus *Cyclopsitta*.

Figures 1 and 2 are the *male* and *female* of *C. macleayana*, described by Ramsay in the *Sydney Morning Herald* of November 15th, 1874. The name *macleayana* has been substituted in the *Catalogue of Birds*, XX. p. 95, by *C. maccoyi* Gould, 1875, while McCoy himself described it again as *C. leadbeateri* in the same year (1875). This bird is only known from North Queensland, where Mr. Meek collected some for the Tring Museum.

Figures 3 and 4 are *male* and *female* of *C. rivago*, described by me from Fergusson Island, where Meek discovered it some years ago. He afterwards found it also on Goodenough Island.

Figures 5 and 6 are *C. aruensis*, distributed over the Aru Islands and southern New Guinea. The figures are from Aru specimens, collected by Capt. C. Webster.

Figure 7 is *C. inseparabilis*, in which the sexes are practically alike and resemble the *females* of *C. rivago* and others, while in *C. rivago*, *aruensis* and *macleayana*, they are very differently coloured. (See Nov. Zool. V. p. 530.)

Figure 9 shows *Ptilinopus granallifrons*, a little green pigeon from Obi Mayor, in the Moluccas, which closely resembles *P. hypogaster* from Halmahera and Batjan, except for the granuliform mass of fleshy knobs on the forehead, and a more yellowish green plumage. It is described in *Bull. B. O. Club*, VII. p. 35 (1898).

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## A MONOGRAPH OF *CHARAXES* AND THE ALLIED PRIONOPTEROUS GENERA.

BY THE HON. WALTER ROTHSCHILD, Ph.D., AND K. JORDAN, Ph.D.

GENUS *EULEPIS* (continued from Vol. V. p. 601).

- H. Forewing below with cell-bar 3 separated into dots, or absent (l. see Vol. V. p. 564).
- C. Cell-bar 4 of forewing below and submedian and median bars of both wings arranged in two nearly continuous lines which form the border of a narrow, yellowish brown or tawny, band.
- c. Postdiscal and submarginal bars of forewing below curved, forming together kidney- or half-moon-shaped markings.
- c<sup>1</sup>. Forewing below with median bar R<sup>2</sup>—R<sup>3</sup> well marked, the yellowish brown or tawny band between submedian and median bars not extending distad to discal bars between R<sup>1</sup> and R<sup>2</sup>.

### 8. *Eulepis schreiber* (Vol. V. t. XII, f. l. 2 ; and Fig. 39).

*Nymphalis schreiber* Godart, *Ent. Meth.* IX. Suppl. p. 825 (1823) (Java).

*Charaxes schreiberi*, Nicéville, *Bull. of Ind.* II, p. 274, n. 567 (1886) (Assam, South India, Malacca, Billiton, Java, Borneo).

♂ ♀. *Body* above dark olive, head and pronotum slightly russet, with the usual white dots as in *pyrrhus*: underside of palpi and middle of sterna creamy buff, sides of sterna more whitish buff; abdomen beneath buff in ♂, brownish black in ♀; oblique lateral stripes on sterna underneath the femora black; anterior legs creamy buff, sometimes almost white, with the tibiae all black in front; middle and hinder femora black, with buffish scaling, tibiae and tarsi buff-colour.

♂ ♀. *Wings, above* purplish black, base steel-blue in side-light, ♀ paler than ♂.—*Forewing*: a white discal band, widest in middle, mostly extending from R<sup>3</sup> to internal margin, with one or two separate spots in front of R<sup>2</sup> and R<sup>1</sup>, sometimes these spots as well as a third before R<sup>3</sup> continuous (or almost so) with the main portion of the band: inner edge of band from R<sup>3</sup> to SM<sup>2</sup> almost straight, then oblique between SM<sup>2</sup> and internal margin; a few glaucous blue scales at basal side of band, while there is a broad pale blue border to the band at distal side, widest near SM<sup>2</sup>, extending from internal margin to M<sup>2</sup> or beyond; a white submarginal dot before R<sup>1</sup> often absent.—*Hindwing*: white discal band tapering behind, of variable length, mostly reaching M<sup>2</sup>, its inner edge slightly convex, often nearly straight, outer edge somewhat concave; a narrow basal border and a much wider outer border to the band pale blue; the discal pale blue scaling of ♂ concave between veins, widest between R<sup>3</sup> and M<sup>2</sup>, extending to anal angle, forming here a lunule that is joined to the anal admarginal yellow spot, this scaling much less extended in ♀ and more violet; between C<sup>1</sup> and Sc<sup>2</sup> there is seldom discal pale blue scaling; a complete series of small white submarginal, more or less transverse, dots, followed by ochraceous, mostly rather ill-defined, admarginal,



transverse spots, of which the posterior ones are covered at the veins with pale blue scaling, this scaling forming triangular markings, of which those at veins  $R^3$  and  $M^2$  extend far into the tails : anal admarginal spot brighter yellow : abdominal fold buffish grey, hairs near fold olivaceous black, a whitish spot beyond tip of  $SM^2$ , often obsolete : tails triangular, more pointed in ♂ than in ♀ : in ♂ first  $5\frac{1}{2}$ , second 4 mm., in ♀ first 10, second 7 mm., but slightly variable in length.

*Underside* from base to submedian lines of bars white, silvery at bars, often with vinaceous tint.—Forewing : middle bar of cell represented by one or two black dots, the posterior one often absent, sometimes separated into minute speckles ; upper cell-bar very oblique, straight, continuous with submedian bars, forming a straight line that crosses  $M$  half-way between  $M^1$  and  $M^2$  ; disco-cellular bar thin behind ; submedian bar ( $M^2$ — $SM^1$ ) joining median bar at  $SM^1$  ; median bars  $R^2$ — $SM^2$  also continuous, crossing  $R^3$  at or a little beyond angle of cell ; interspace between the two lines of bars varying from cinnamon to dark olive-buff, the triangle between bars  $D$  and median bar  $R^2$ — $R^3$  partly silvery white ; median bar  $R^1$ — $R^2$  variable in position, more distal in ♂ than in ♀, bar  $SC^5$ — $R^1$  often absent ; discal white band as above, but somewhat broader ; white spots at outside of median bars  $SC^5$ — $R^2$  variable, often absent ; a discal patch between  $R^2$  and  $M^1$  chocolate, tawny, greenish cinnamon, or hazel, not always present ; discal bars thin, arched, except the upper three, which are mostly not well marked ; postdiscal and submarginal bars strongly curved, fused at the ends, forming the edge of white half-moons, except bars  $SC^5$ — $R^1$ , which form nearly a ring ; marginal area varying in shade of colour from chestnut-drab to dark olive-buff, deepest in tint at edge of wing, of nearly even width from  $SC^5$  to  $M^2$  ; ground colour between this darker marginal area and black discal lunules and anteriorly down to cell more or less silvery white, sometimes vinaceous white, the white colour occasionally restricted to white patches standing at the distal side of the submarginal black lunules ; internal angle with a black patch.—Hindwing : submedian bars continuous, forming a straight, or slightly concave, line that stops at  $M$  or crosses it at origin of  $M^2$  ; median bars also arranged in an almost straight line, slightly broken at the veins, parallel to the first, extending beyond  $M^2$ , then interrupted, the last median bar at right angles to  $SM^1$ , touching (or almost) the last discal luniform bar ; interspace between the two lines as on forewing ; white discal band longer than above, posteriorly mostly broader : discal bars all arched, as in *pyrrhus*, followed by red half-moons, from which they are separated by white resp. bluish white lunules, upper one and last three red half-moons bordered with black externally, often also the fourth, the second and third with white ; submarginal interspace  $SC^5$ — $R^1$  more or less extended white ; dark greenish olive submarginal bars, at the proximal side of which there are ill-defined white spots which are mostly fused to a narrow white band ; admarginal interspaces occupied by yellow transverse spots, which are separated from submarginal spots by thin white lines ; pale blue scaling at the veins near tips, this scaling extending into tails, marginal line dark greenish olive : in specimens which were killed soon after emergence from chrysalis marginal line and submarginal spots dark plumbeous.

Tenth abdominal tergite of ♂ triangular with the sides rounded, tip simple, rather acute.

For larva, pupa, and habits see *E. schreiberi wardi*. The imago is fond of sweet bananas, which can successfully be used as baits (see *schreiberi malajicus*).

*Hab.* South India, Assam, Burma to Java and Borneo. It is not a common

insect anywhere, and is in most places of its range even very rare. We recognise six geographical races, of which that inhabiting South India is the most conspicuously different. The pattern of this South Indian form seems to us to be the most typical in so far as the discal band of the forewing is more complete than in the other races, the chestnut discal patches of the underside of forewing, which represent certainly a specialisation in the pattern, are here absent or just faintly indicated, the upper median bar is much less distal than in the Malayan races, and the discal, postdiscal and submedian bars of the forewing below are more distinctly marked, especially in the costal region of the wing.

*a. E. schreiber wardi* (Nov. Zool. V. t. XII. f. 2, ♂).

*Charaxes schreiberi*, Nicéville, *Bull. of Ind.* II. p. 274. n. 567 (1886) (pt.; Travancore; Wynaad; Fergus., *Journ. Bombay N. H. Soc.* VI. p. 440. n. 79 (1891) (Travancore; Pirmerd; Davids. Bell & Aitk., *ibid.* X. p. 257. n. 64 (1896) (Canara: habits, metam.).

*Eulipis wardi*, Moore, *Lep. Ind.* II. p. 262. t. 188. f. 2. 2a. b., ♂, larva, pupa (1896) (Karwar, type; Calicut; Pirmerd; Wynaad; Anjirucady, near Tellichery); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 404 note (1896).

♂. *Wings, upperside*.—Forewing: median band narrower than in Javan examples, closer to cell, patches  $R^3$ — $M^2$  concave outwardly, a spot 3 to 4 mm. in length before vein  $R^3$ , spot  $R^2$ — $R^3$  a little smaller, close to the former, less distal than in the other races, with a small spot in front; discal pale blue scaling much extended.—Hindwing: band narrow, not clearly defined beyond cell, being posteriorly much shaded over with blue scaling; blue area more extended than in any other form of *schreiber*, about 4 mm. wide at  $SC^2$ , deeply sinuate between the veins; admarginal tawny spots obsolete, blue ones heavy; subanal abdominal triangular patch creamy buff, well marked.

*Underside*.—Forewing: submedian and median black lines parallel, median bar  $R^2$ — $R^3$  at lower angle of cell, bars  $SC^5$ — $R^2$  only  $4\frac{1}{2}$  and  $3\frac{1}{2}$  mm. resp. from cell; discal bars all well marked: postdiscal and submarginal bars longer, forming larger half-moons than in the five other races: no reddish tawny discal patches between  $R^2$  and  $M^1$ .—Hindwing: discal band less triangular than in the other forms, nearly even in width from  $R^1$ — $M^2$ , measuring 4 mm. at  $SC^2$ ,  $1\frac{1}{3}$  at  $R^2$ ,  $1\frac{3}{4}$  at  $R^3$ .

♀. *Wings above*.—Forewing: white band continuous from  $SC^5$  to internal margin, two uppermost spots 6 and 7 mm. long, a little more distal than the following ones, last patch comparatively narrower than in the Javan form, all concave outwardly; a small, indistinct, white, submarginal spot behind  $SC^5$ .—Hindwing: white band nearly as in ♂, the blue scaling not quite so extended; admarginal ochraceous spots as in the Javan form: subanal abdominal patch creamy white.

*Underside*.—Forewing: black lines as in ♂; discal arched bars  $R^2$ — $M^1$  heavier than in ♂, with a slight trace of the reddish brown patches found in the other races.—Hindwing: white band distally concave from  $C$ — $R^3$ , thence subtriangular.

*Hab.* South India: Karwar, 1 ♂, 1 ♀; Calicut; Travancore; Pirmerd; Canara; Wynaad; Anjirucady, near Tellichery.

Messrs. Davidson, Bell & Aitken, *l.c.*, say of *wardi*:

"This splendid species is certainly one of our rarest and most beautiful butterflies. The *males* have the habit, common to all the genus, of basking during

the hottest hours of the day on chosen trees about certain rocky peaks, and as one of these basking points lies within a few miles of Karwar, we have secured a certain number of specimens, mostly much broken. But *females* cannot be got in this way. . . . The flight of the butterfly is very powerful, as might be inferred from the robustness of the thorax.

"The larva feeds on 'wagati' (*Wagatea spicata*), but this plant is much commoner than *C. schreiberi*, and is, moreover, so villainously thorny that the chance of finding larvae is not proportionate to the travail of looking for them. The creature has an alternative food, *Rourea santaloides*, also too common by half.

"The larva is very like that of *C. imma* Butler, but the white semicircle on the back of the latter is replaced by a yellowish crescent. The pupa is just like that of *C. imma*. . . . We have observed before that robust butterflies grow slowly, and this is borne out by the present species. A larva, which emerged from the egg on October 25th, did not become a pupa till January 26th, and no part of this time was passed in hibernation."

The colour of the larva of *C. imma* is described by these authors (*l.c.* V. p. 278. n. 40. t. A. f. 4. 4a) as being "rich, dark green, with . . . a yellow lateral line; horns and sides of face rusty brown."

Fergusson says of this insect in his list of the butterflies of Travancore, *l.c.* :

"Very rare. I have only once seen what I believe to be this butterfly, and Mr. T. F. Bourdillon sent me a single forewing that he picked up on the hills. Mr. Murray has taken it on Pirmerd at an elevation of 3700 feet."

*b. E. schreiber assamensis* Rothsch., subsp. nov. (Fig. 39, ♂).

*Charaxes schreiberi*, Nicéville, *Bull. of Ind.* II. p. 274. n. 567 (1886) (pt. ; Jorehat, Assam) ; *Bull. Journ. Linn. Soc. Lond.* XXV. p. 386. n. 99 (1896) (pt. ; Assam).  
*Eutepis schreiberi*, Moore, *Lep. Ind.* II. p. 261. t. 188. f. 1. 1a. ♂. ♀ (1896) (pt. ; Assam ; Naga Hills).

♂ ♀. *Wings, upperside*.—Forewing : discal band closer to cell than in the Malayan races, patches  $R^2$ — $M^2$  concave outwardly, patch  $R^3$ — $M^1$  longer than in Javan *schreiber*, in ♂ a spot before  $R^3$  as in ♀ of *schreiber schreiber*.—Hindwing : band and subanal abdominal patch as in Javan *schreiber* ; white submarginal dots rather smaller in ♂, fawny admarginal spots visible in ♂ but small : discal blue scaling more deeply sinuate in ♂.

*Underside*.—Forewing : submedian and median lines of bars parallel, not divergent costal ; and median bar  $R^2$ — $R^3$  closer to cell than in the following forms ; discal reddish-brown patches  $R^2$ — $M^1$  mostly very small ; discal bars  $Sc^6$ — $R^2$  more proximal than in *schreiber schreiber* ; discal, postdiscal, and submarginal arched bars nearly as in *wardi*, better marked than in the forms described hereafter.—Hindwing : submedian and median lines rather closer together, especially in front, than in the Malayan races.

*Hab.* Assam : Khasia Hills (*type*), 2 ♂♂ ; Jaintia Hills, 1 ♂ ; Shillong (♀ in Mr. Philip Crowley's coll.) ; Cherra Punji ; Naga Hills (coll. Crowley) ; Jorehat.

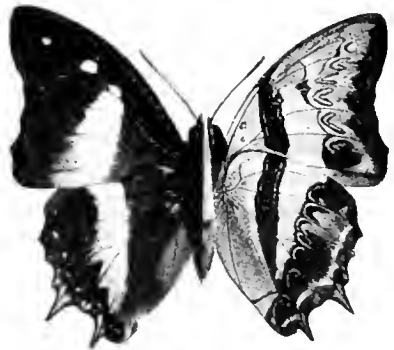


FIG. 39.

The insect is rare in collections.

Whether the specimens recorded from Burma belong to this or the following form we do not know; they are very likely intermediate between *assamensis* and *malayicus*, just as the former leads over to *wardi*.

c. **E. schreiber malayicus** Rothsch., subsp. nov. (Nov. Zool. V. t. XII. f. 1, ♂, Borneo).

*Charaxes schreiberi*, Godman & Salvin, *P. Z. S.* p. 640, n. 22 (1878) (Billiton); Dist., *Rhop. Mal.* p. 104, n. 2, t. 13, f. 2, ♂ (1883) (pt.); Nicév., *Bull. of Ind.* II. p. 274, n. 567 (1886) (pt.; Malacca; Borneo); Elwes, *P. Z. S.* p. 283 (1891) (Toungoo); Hagen, *Iris* IX. p. 183, n. 240 (1896) (Sumatra; Banka); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 386, n. 99 (1896) (pt.; Malacca; Sumatra; Labuan).

♂. *Wings, above*.—Forewing: last patch of white band much narrower than the submedian one, oblique,  $2\frac{1}{3}$  mm. broad; submedian patch narrower than in the Javan form.—Hindwing: white band posteriorly overshadowed with blue, the white colour stopping at  $R^3$ ; buffish subanal abdominal patch very faint, well marked only at edge of wing.

*Underside*.—Silvery scaling of both wings more extended distally than in the Javan subspecies.—Forewing: tawny discal patches larger than the white ones at their proximal side; olivaceous marginal area narrower than in *schreiber schreiber*.

♀. *Wings, upperside*.—Forewing: last patch of white band much smaller than in the Javan race, measuring in front 5, behind  $3\frac{1}{2}$  mm., oblique, with a purplish blue patch at its outside; submedian patch concave outwardly; spot  $R^2$ — $R^3$  small or absent; discal spot  $Sc^{(5)}$ — $R^1$  absent or faint.—Hindwing: white band overshadowed with violet from  $R^3$ ; violet discal scaling rather heavier than in Javan examples of *schreiber*; no reddish tawny spot at distal side of blue anal lunule; buffish subanal abdominal patch as in ♂.

*Underside* as silvery as in ♂; distal tawny spots of forewing larger than in *schreiber schreiber*.

*Hab.* Borneo, 2 ♂♂, 2 ♀♀: Baram R., October 1891 (*type*, A. Everett); Lawas (A. Everett); Kina Balu. Burma (this form?). Malay Peninsula and Penang, 4 ♂♂, 4 ♀♀; Sumatra: Gayoe, January 1891 (Dr. Hagen), 1 ♂; Banka (Dr. Hagen), 2 ♂♂; Billiton; Riouw.

In the single Sumatran specimen that is known to science the silvery scaling on the underside of the forewing, in the outer region, is not more extended than in the Javan race, the tawny discal spots are also not larger than in that form. The triangular buffish patch at the abdominal edge of the hindwing above is in the specimens from Banka well indicated, though it is also here smaller than in the individuals from Java. Whether the Burmese specimens of *E. schreiber* belong to this or the preceding subspecies we cannot say, as we have not had an opportunity of examining examples from that country, where it is evidently very rare. "Doherty picked up a tattered *male* of this insect in the streets of Toungoo," says Elwes, *l.c.* Mr. Curtis obtained a number of specimens of both sexes on Penang, in traps baited with bananas, in January 1899.

#### d. **E. schreiber schreiber**.

*Nymphalis schreiber* Godart, *Enc. Méth.* IX. Suppl. p. 825 (1826) (Java).

*Paphia schreibers*, Horsfield, *Cat. Lep. E. I. C.* t. 6. f. 3, 3a, ♀ (1829) (Java).

*Nymphalis schreibers*, Doubl., Westw. & Hew., *Genera Diurn. Lep.* II. p. 309, n. 30 (1850) (Java); Horsf. & Moore, *Cat. Lep. E. I. C.* I. p. 205, n. 418 (1857) (Java); Kirby, *Cat. Diurn. Lep.* p. 271, n. 41 (1875) (Java).

*Charaxes schreiberi*, Butler, *P. Z. S.* p. 633, n. 43 (1865) (Java); Druce, *P. Z. S.* p. 346 (1873) (Java); Piepers, *Tijdschr. v. Ent.* XIX. p. 147, n. 20 (1876) (Batavia: caterpillar on *Cyamometra cauliflora*); Stand., *Exot. Taaf.* p. 173 (1886) (pt.; Java); Nicéw., *Bull. of Ind.* II. p. 274, n. 567 (1886) (pt.; Java); Suell., *Tijdschr. v. Ent.* XXX. Versl. p. 99 (1887) (larva and pupa from Batavia noticed); id., *l.c.* XXXIII. p. 282 (1890) (Java); Pagenst., *Jahrb. Nass. Ver. Nat.* XLIII. p. 97, n. 61 (1890) (East Java).

*Eulepis schreiberi*, Moore, *Lep. Ind.* II. p. 261 (1896) (pt.).

♂. *Wings, above*.—Forewing: last patch of white band as white behind as in front (4 mm.), much less oblique than in the preceding subspecies; patch  $M^2$ — $SM^2$  less concave outwardly; a small white spot before  $R^3$ , mostly absent.—Hindwing: white band extending to  $M^2$ , much clearer white behind than in *malayicus*; triangular buffish abdominal patch rather conspicuous.

*Underside*.—Forewing: reddish tawny discal spots smaller than the white ones which stand at their proximal side; the olivaceous tawny median band widening much in front.

♀. *Wings, above*.—Forewing: last patch of white band about as broad behind as in front (5–6 mm.); two discal spots  $SC^6$ — $R^2$ , the upper one often very small or obscurely marked; less violet-blue scaling at edge of band than in *malayicus*.—Hindwing: band clearly defined to  $M^2$ ; blue scaling much reduced; at distal side of the blue anal lunule there is generally an obvious brownish red spot; subanal abdominal buffish patch well marked.

*Underside*.—Forewing: reddish brown discal spots forming together a triangular patch which is pointed behind.

*Hab.* Java, 4 ♂♂, 9 ♀♀: Batavia; Mt. Gede, 4000 feet, October 1893 (H. Fruhstorfer); East Java.

#### e. *E. schreiber niasicus*.

*Charaxes niasicus* Butler, *Ent. Monthly Mag.* XX. p. 50 (1883) (Nias); id., *Jour. Linn. Soc. Lond.* XXV. p. 386, n. 100 (1896) (Nias).

♂. *Upperside*.—Forewing: band as in Bornean specimens, with greenish blue patch of scales at outer side posteriorly; discal detached spot small.—Hindwing: band extending a little beyond  $R^3$ , with heavy glaucous blue scaling at proximal side in cell; discal glaucous blue scaling heavier than in Bornean *schreiber*.

*Underside*: discal patch of forewing between  $R^2$  and  $M^1$  not brown but greenish, as is also the band between submedian and median lines of bars; discal spots of hindwing pale.

*Hab.* Nias Island.

#### f. *E. schreiber luzonicus* Rothsch., subsp. nov.

*Charaxes schreiberi*, Semper, *Taaf. d. Philipp.* p. 78, n. 97 (1887) (*syn. excl.*; Mariveles, Luzon, 1 ♂).

*Wings, upperside*.—Forewing: band as in Bornean examples of *schreiber*, last patch less oblique, with pale blue scaling along its proximal edge; pale blue scaling at outer edge of band more extended than in any other form of *schreiber*, reaching  $M^1$ , with some blue scales also in front of this vein; detached discal spot  $R^1$ — $R^2$  larger than in *malayicus*; submarginal dot present.—Hindwing: discal band very narrow, extending to  $M^2$ ; pale blue scaling at its basal side from  $C$  to beyond  $M$ , rather heavy in cell; pale blue discal scaling very extended, reaching  $SC^2$ ; admarginal spots heavily shaded with blue, except upper three.

*Underside*: interspace between submedian and median bars greenish cinnamon, wider than in the other races.—Forewing: upper cell-dot minute, second absent; cell-bar quite straight, continuous with submedian bars  $M^1$ —( $SM^1$ ), these also quite straight; discal patch  $R^2$ — $M^1$  of the same greenish cinnamon-colour as median band, large.—Hindwing: submedian and median lines of bars wider apart than in the other forms of *schreiber*, hence greenish cinnamon median very broad, 5 mm. in front; white discal band narrow, measuring  $2\frac{3}{4}$  mm. at  $SC^2$ ; black discal lunules conspicuous; brownish red half-moons  $C$ — $SC^2$  and  $R^3$ — $M^2$  heavy; yellow admarginal spots much broader than in *malajicus* and *schreiber*: upper tail longer than in those races (anal region of hindwing with second tail not preserved).

*Hab.* Mariveles, Luzon; one battered *male* in Georg Semper's collection.

We are much indebted to Herr Semper for having lent us the only Philippine specimen known. It is very interesting that both in this Philippine form and the Nias form the discal patch  $R^2$ — $M^1$  of the underside of the forewing is of the same colour as the median band, while in the races which are geographically intermediate the patch varies from chocolate to hazel brown, being here always much more reddish than the median band.

*d*<sup>1</sup>. Forewing below with median bar  $R^2$ — $R^3$  absent or feebly marked, always distant from apex of cell, median band extending distad to discal bars in front of  $R^3$ .

The five species\* of *Eulepis* (*hebe*, *moori*, *arja*, *athamas*, *jalyssus*) dealt with in the following pages has been a puzzle to lepidopterists. Some authors were and are inclined to regard *E. jalyssus*, *moori*, *hebe*, and *arja* as doubtfully distinct from *athamas*, while others divided the five insects up into a greater number of "distinct species." Mr. de Nicéville, who of all lepidopterists knows the names of the Indo-Malayan butterflies best, was, in 1895, not satisfied that *E. hebe*, *moori*, and *jalyssus* are specifically distinct. He says (*Journ. As. Soc. Beng.* LXIV. p. 435. n. 259), under *E. jalyssus*: "We have here to do with three very difficult species [namely, *moori*, *hebe*, *jalyssus*], or perhaps we may say two, as *E. jalyssus* appears to be fairly constant, though I am not at all sure that it will not hereafter be found to gradually merge into the two previously-named species." Mr. de Nicéville then proceeds to give some differential characters between *moori* and *hebe*, which, however, do not hold good. In 1898 he seems to have come to another conclusion as to the number of "species" in the present group of *Eulepis*, for he records, in co-operation with Mr. Elwes, *l.c.* LXVI. p. 691, from Lombok, "142. *Charaxes* (*Eulepis*) *athamas*, 143. *Ch. (E.) butavianus*, 144. *Ch. (E.) alphius*, 145. *Ch. (E.) fallax*," and from Bali, "146. *Ch. (E.) moori*, 147. *Ch. (E.) hebe*." Of these six "species" the first three are all the same thing, namely the Lombok form of *athamas*; the true *fallax* is the Java form of *E. hebe*, and with this Java form the insect recorded under No. 147 as *hebe* is identical, while the Lombok form (No. 145) is somewhat different. Whether No. 146 is really *moori* we cannot tell, but we suspect it to be *E. hebe fallax*, as the specimens kindly submitted to us for examination by Mr. Elwes were

\* The explanation of Pl. XII. in Vol. V. should read:—  
 Fig. 6. N. Borneo.  
 .. 7. Java.  
 .. 8. Nias.  
 .. 9. Singapore.

all *fallax*, not *moori*; the habitat Sumba quoted for *moori* under No. 146 from Dr. Pagenstecher's papers on the lepidoptera of Sumba is erroneous; Dr. Pagenstecher's specimen is not *moori*, but a form of *hebe*.

Dr. Butler, *Journ. Linn. Soc. Lond.* XXV. pp. 382—385 (1896), divides our five species up into nine, treating as distinct species the North Indian spring and early summer broods of *E. athamas*, namely, our f. temp. *hamasta* and f. temp. *bharata*, the Timor race of *E. athamas*, which gradually merges into the ordinary Java race, and the Java race of *E. hebe*, which is also completely connected by intergradations with the forms of *E. hebe* from other localities.

Herr Röber, up to 1895, recognised sixteen species, giving the local and seasonal varieties specific rank, at least nomenclatorially; he, at that time, did not know, respectively recognise, the six forms described later by Herr Fruhstorfer, and the two forms described (as distinct species) by Colonel Swinhoe.

Herr Fruhstorfer, *Ent. Nachr.* XXIV. p. 56 (1898), tried to unravel the connection between the various forms, but succeeded only in making confusion worse confounded. He says, *loc.*: "According to the size of the median band of the hindwing below I am inclined to group the species (*sic!*) of *Charaxes* (*sic!*) here dealt with as follows:—

	" In my collection from :
" <i>Eulepis jalysus</i> Feld. . . . .	Sumatra, Borneo.
" <i>attalus sandakanus</i> Fruhst. . . . .	N. Borneo.
" <i>attalus kaba</i> Kheil. . . . .	Nias, ♂ ♀.
" <i>attalus moori</i> Dist. . . . .	S. Borneo.
" <i>attalus javanus</i> Röber . . . . .	Java, S. Borneo.
" <i>attalus attalus</i> Feld. ( <i>fallax</i> Röber) . . . . .	Java.
" <i>attalus lombokianus</i> Fruhst. . . . .	Lombok, Sumba (?).
" <i>attalus fallacides</i> Fruhst. . . . .	Nias.
" <i>attalus chersonesus</i> Fruhst. . . . .	Singapore, Perak, 2 ♂♂
" <i>attalus hebe</i> Butl. ( <i>albanus</i> Röb.) . . . . .	Sumatra.
" <i>attalus gangmedes</i> Stögr. . . . .	N. and S. Borneo.
" <i>attalus plautus</i> Fruhst. . . . .	Singapore."

We have quoted this list fully, since it serves as a good illustration of the confusion in the "*athamas* group."

Our study of the present group of species has shown to us that there are no structural differences in either sex which are absolutely reliable in the discrimination of the species; but our researches have also convinced us that *E. athamas*, *hebe*, *moori*, and *jalysus* are distinct species, the first three having developed into a great number of geographical races, besides seasonal forms in the case of *E. athamas*. We keep in this monograph a fifth species, *E. arja*, separate from *E. athamas*, but are not quite satisfied that it is distinct; in fact, we treat the insect as distinct chiefly because we hope that, if the insect is kept separate from *athamas*, some future investigator into the biology of the North Indian Lepidoptera (of whom entomology is sadly in want) will give a separate record of the life history of *arja* and not mix up the biology of this form with that of *athamas*. The difference between *E. arja* and *athamas*, which consists chiefly in the tint of the discal band, which in *arja* is white and in *athamas* green (in fresh specimens according to de Nicéville), is no convincing evidence of specific distinctness, in spite of the absence of intergradations; the other characters of *athamas* and *arja* are almost the same, and the variation,

individual and seasonal, is also the same. But in *arja* the white submarginal spots of the hindwing above are on the whole larger, the bluish white scaling at the outer edge of the discal band of the hindwing above is in the spring form of *arja* more extended than in the equally wide-banded spring form of *athamias*, and the Sikkimese specimens of *arja* caught in September and October have the discal band rather wider than the Sikkimese individuals of *athamias* of the same months. *E. athamias* and *arja* occur together, but the range of *arja* is very restricted, the insect being found only from N. India to Tenasserim. It is possible that we have to do only with one, locally dichromatic, species.

The distinguishing characters of the other four insects are as follows :—

1. *Eulepis athamias*.—Discal band of forewing above exactly as wide as below, no white scaling at the outer side of the band ; on hindwing the band above also as wide as below, with indistinct bluish white lunules at the outer edge in the palest specimens; abdomen above olivaceous black, sides seldom greyish.

2. *Eulepis jalysus*.—Resembling somewhat the specimens of *E. athamias* with very broad discal band ; wings broader, admarginal yellow spots of hindwing above strongly marked, discal band of hindwing above with a bluish white border of about 1 to 2 mm. width ; *underside* silvery, brownish red, postdiscal, luniform, spots of the hindwing much larger than in the wide-banded *athamias* specimens, all of nearly the same size, the fourth only being shorter owing to veins  $R^2$  and  $R^3$  being closer together than the other veins, outer edge of discal band, taken as a whole, about parallel to outer margin of wing, crossing  $R^3$  8 to 11 mm. from origin of  $M^1$ ; white submarginal spots fused with the white border of the admarginal spots to form a white band in which the black submarginal spots are situated.

3. *Eulepis moori*.—Forewing *above* with bluish white scaling at the outer edge of the discal band, this scaling and the band concave between  $M^2$  and  $SM^2$ , partition  $R^3-M^1$  of band obliquely sinuate, band of ♀ extending costad a little beyond  $R^3$ . Hindwing : discal band with bluish white (or white) scaling at outer side, at least from  $R^1$  to  $SM^2$ , hence the white area of the upperside much wider than the discal band of the underside, the outer edge of the latter showing through ; mostly the black marginal area much wider in front than in middle : admarginal spots often partly fused with the white discal area, spots  $SC^{(2)}-R^3$  heavier and clearer marked than spots  $R^3-M^2$ . On the *underside* the median bar  $R^3-M^1$  of the forewing often situated (or partly) in cell ; postdiscal and submarginal, thin, bars, which form the reniform postdisco-submarginal markings, more or less black, almost unicolorous ; outer edge of discal band of hindwing crossing  $R^3$  at or beyond the bent of this vein ; cell-bar of forewing abbreviated in front; abdomen white above.

4. *Eulepis hebe*.—*Upperside* with bluish white scaling at the outside of the discal band of both wings; edge of this scaling on forewing either entire or bisinuate between  $M^2$  and  $SM^2$ ; admarginal spots  $SC^{(2)}-R^3$  of hindwing not obviously heavier than the spots  $R^3-M^2$ . *Underside* : cell-bar of forewing reaching close to disco-cellular spot, median bar  $R^3-M^1$  never entering cell, discal band of ♀ not crossing  $R^3$ , postdisco-submarginal, reniform, spots obviously bicolorous, their proximal borders being ferruginous; outer edge of discal band of hindwing crossing  $R^3$  before (seldom at) the bent of this vein; abdomen more or less white above.

The differences between the four insects, as will be seen from the characters mentioned above, are certainly not very considerable. If we consider them merely quantitatively, the differences are not greater than those between the spring and summer forms of North Indian *E. athamias*, or amount scarcely to so much. It



would, however, be entirely wrong to measure the value of the differential characters by the quantitative amount of difference only. The great significance of the characters will be recognised from other considerations. The first important circumstance that goes far to prove the distinctness of the four insects is the fact that, though the four insects occur together in the Malay Peninsula, Sumatra, and Borneo, there are no intergradations between them; they are recognisable at a glance. The second and still more important point is that the geographical variation shows remarkable discordance in the four insects.

*Eulepis jalysus* occurs in Burma, Tenasserim, the Malay Peninsula, Sumatra and Borneo, and has **not** developed into geographical races; the insect is remarkably constant. *Eulepis athamas*, which has the widest range of the four insects, is in the countries where the wide-banded *jalysus* occurs always narrow-banded. The Burmese specimens are slightly different from those from Sumatra and Borneo, not identical, while the Sumatra and Borneo races of *E. hebe* and *moori* are conspicuously different. The area inhabited by *Eulepis hebe* extends from the Malay Peninsula to Borneo and Sumba, while *moori* is found from Assam to Borneo and Java. Whereas the Sumatran races, both of *E. moori* and *E. hebe*, are whiter than the Javan races, the Sumatran *athamas* are, on the contrary, darker than the *athamas* from Java. Further, *E. hebe* from Java is conspicuously different from the forms of *hebe* from Sumatra and Borneo, while the specimens of *E. moori* from these countries come very close to one another or are even identical; in the Javanese form of *E. hebe* the white postdiscal scaling of the upperside of the hindwing is more extended than in the Bornean form, whereas in the respective forms of *E. moori* the reverse is the case. The specimens of *E. moori* from the Malay Peninsula and those from Java are not separable subspecifically, while *E. hebe* from Java differs constantly and considerably from the form of *E. hebe* from the Malay Peninsula. The Javanese examples of *E. hebe* have the discal band of the underside considerably broader than the specimens from Sumatra, Malacca, and Borneo, while there is no obvious, constant, difference in the width of the discal band between the forms of *E. moori* from those localities. In *E. moori* the discal band of the hindwing below extends always beyond  $M^2$ , while in some forms of *E. hebe* it stops short at that vein.

We did not find any difficulty in discriminating the five species, but it was a hard task to assign the right names to the numerous forms, which were mostly described as distinct species. Fortunately we have seen the types, resp. typical specimens, of nearly all the forms, and are therefore convinced that we have not made a serious error in identification.

$r^2$ . Discal band of upperside with white or bluish white scaling at outside, hence white colour more extended above than below.

#### 9. *Eulepis hebe* (Nov. Zool. V. t. XII. f. 8—12 and VI. t. VII. f. 1—3.

*Charaxes hebe* Butler, P. Z. S. p. 634 n. 46. t. 37 f. 39 (1865) (Sumatra).

♂ ♀. Head, pronotum and anterior part of mesonotum blackish olive, with the usual white markings, rest of upperside olivaceous grey or almost white; palpi below buff or cream colour, middle of prosternum, upper and outer side of anterior femora, all tarsi, and middle and hinder tibiae of the same colour, or more clayish, rest of underside (except black stripes underneath the legs) clayish buff, abdomen of ♀ blackish or blackish tawny beneath.

*Wings: upperside* purplish black, with a creamy white, broad, discal band on both wings, which appears to occupy the greater part of the wings, as the basal and the outer regions of the wings are more or less extensively scaled white.—*Forewing*: the bluish white scaling at outside of band is much restricted at  $M^1$ , or here even absent, widening out behind, widest at  $M^2$  and  $SM^2$ , where it often approaches outer margin of wing, the edge of this scaling either almost entire, or sinuated twice between  $M^2$  and  $SM^2$ : the outline of the sinuations resembling the letter M, sometimes the sinuses are separated from the black area by admarginal white scaling which extends from  $M^2$  to  $SM^2$ ; white scaling at base and in cell variable in extent: discal band never reaching across  $R^3$  as in ♀ of *E. moori*: discal spot  $R^1-R^2$  variable in size in all subspecies, larger in ♀ than in ♂; in many ♀♀ there is a vestige of the submarginal dot  $SC^{15}-R^1$  (present in most *E. athamus*).—*Hindwing*: base bluish white, abdominal fold generally white at base, blackish grey beyond middle, and white before anal angle, or almost entirely blackish, or nearly all white: bluish white discal scaling often so much reduced that there remains a black border to the wing of 7 or 8 mm. width, or that scaling more extended, often fused with the admarginal spots, separating the black area into patches; admarginal spots in the black-bordered forms generally very obscure, in the whiter forms more obvious, sometimes all white or bluish white, and fused together; the spots  $SC^2-R^3$  not, or very little, more prominent than the others, anal one yellow, often shaded with white or pale blue; tails with pale blue streaks.

*Underside*: russet fawn colour, glossy, except a darker marginal band on forewing and the submarginal area of hindwing, somewhat vinaceous in side light, interspace between submedian and median bars of both wings pale chestnut; interspace of discal band of forewing and  $R^1$  and outer border to band on both wings reddish chestnut, sometimes that border more ferruginous; submedian bars distally and median bars proximally very thinly edged with glossy scales (these glossy lines are thinner than in *E. moori*).—*Forewing*: cell with one or (seldom) two dots; cell-bar approaching disco-cellular spot; discal band wider in ♀ than in ♂, about as broad at  $M^2$  as dark outer area of wing, or broader, its outer edge not concave between  $M^2$  and  $SM^2$ ; postdisco-submarginal spots well-marked, their proximal borders (postdiscal bars) ferruginous, with the exception of the whole, or part of, the last spot, the outer borders of these spots (submarginal bars) either black or also more or less ferruginous; the glossy scaling at distal side of these bicolorous spots not or little broader than the spots themselves, often forming small patches; median bar  $R^1-R^2$  sometimes vestigial.—*Hindwing*: discal band varying in width in the different subspecies, either extending beyond  $M^2$  or just reaching it, its outer edge sometimes nearly straight, but mostly concave down to  $R^3$ , crossing  $R^3$  1—5 mm. from origin of  $M^1$  in ♂,  $1\frac{1}{2}$ —7 mm. in ♀; costal discal black bar marked; ferruginous red postdiscal spots and submarginal markings as in the allied species.

Length of forewing, ♂ 30—38 mm.

„ „ ♀ 33—40 „

*Hab.* Borneo; Malay Peninsula; Sumatra; Nias; Java; Bali; Lombok; Sumba (and most likely the other islands situated within this area).

Sumatra is, as in the case of *E. moori*, inhabited by the form that is the whitest on the upperside, while the band of the underside is broadest in the Java and Sumba forms. The darkest form is that which Herr Fruhstorfer described from Singapore, and which probably inhabits the islands off the extremity of the Malay Peninsula. The differences in the extent of the bluish white postdiscal scaling on

the upperside of both wings, and the breadth and length of the discal bands of the underside of fore and hindwing, serve especially to distinguish the various geographical races. According to the width of bluish white sealing at the distal side of the band of the forewing, and the breadth of the bands of the underside, one can arrange the various subspecies into two groups: (1) a western group, including the forms from the Malay Peninsula, Sumatra, Nias, Borneo, and Singapore, having the band of the underside narrow and the postdiscal sealing of the upperside of the forewing extended; and (2) an eastern group, in which the postdiscal bluish white sealing of the forewing above is restricted, and the band of the underside wide. The differences between the two groups are, however, completely overbridged: as (1) the Singapore subspecies has the postdiscal sealing of the forewing sometimes not wider than it is in certain eastern specimens, and sometimes as wide as in certain Malaccan individuals; as (2) the Nias form has the postdiscal sealing of the forewing much extended, but the band of the underside broad; and as (3) the Lombok form, though agreeing on the upperside with the Javan form, has the band of the hindwing below not broader than it is in many western specimens. It would be quite arbitrary to regard one or the other of these insects as specifically distinct.

The early stages of *E. hebe* are not known; they are most likely not essentially different from those of *E. athamas*.

The habits of the imago are the same as those of *E. moori*, but very little is known of either of the two.

*α. E. hebe chersonesus* (Nov. Zool. VI. t. VII. f. 1, ♂).

*Charax hebe*, Butler (*non* Butler 1865), *Tr. Linn. Soc. Lond.* (II.), Zool. I. p. 539. n. 2 (1877) (Malacca); Dist., *Rhop. Mal.* p. 107. n. 5. t. 15. f. 2 ♂ (1883) (pt.: Malay Pen., Prov. Wellesley, Malacca); Nicév., *Bull. of Ind.* II. p. 277 note (1886) (pt.); Staud., *Exot. Tagl.* p. 172 (1886) (Malacca); Röber, *Ent. Nachr.* XX. pp. 291, 292 (1894) (pt.: Malacca); Moore, *Lep. Ind.* II. p. 263 (1896) (pt.).

*Charaxes attalus chersonesus* Fruhstorfer, *Ent. Nachr.* XXIV. p. 55 (1898) (Perak; Singapore *loc. err.?*).

*Eulipis attalus chersonesus* id., *l.c.* p. 56 (1898) (Singapore *loc. err.?*; Perak).

Though the characters by which Herr Fruhstorfer differentiated this form from the Sumatran *E. hebe hebe* are by no means constant, there occurring specimens in the Malay Peninsula which have the black postdiscal spots of the upperside of the hindwings considerably smaller than certain Sumatran individuals, the greater proportion of the specimens from the Malay Peninsula is nevertheless readily distinguishable by the generally less extended bluish white sealing on the forewing at the outside of the discal band proper, the larger, often confluent, postdiscal black patches of the hindwing, or, if these patches are small, by the presence of two such patches proximally of the white submarginal spot  $Sc^2-R^1$ , by the more distinctly blue sealing near the black patches, and the less white admarginal spots. In our single ♀ (from Batang Padang) those black postdiscal spots are longer and much better marked than in our single ♀ from the western end of Sumatra (Setinjau, W. Sumatra), but smaller than in the 2 ♀♀ from the eastern end of the island (Palembang district and S.W. Sumatra) we have compared.

Herr Fruhstorfer gives, besides Perak, Singapore as a locality where this form occurs; that is most likely incorrect, as "Singapore" is said by Herr Fruhstorfer to be inhabited by *E. hebe plantus*; Herr Fruhstorfer received the specimens from the Museum at Singapore, and labelled them "ex Museo Singapore."

*Hab.* Malay Peninsula, 12 ♂♂, 1 ♀ : Theiping, Gunong Ijan, Batang Padang (Adams), Perak, Penang (coll. H. G. Smith), Prov. Wellesley (acc. to Distant), Malacca (acc. to Distant).

*b. E. hebe plautus* (Nov. Zool. V. t. XII. f. 9, ♂).

*Charaxes plautus* Fruhstorfer, *Ent. Nachr.* XXIV. p. 54 (1898) (Singapore, ♂ ♀).

*Eulipis attalus plautus* id. *l.c.* p. 56 (1898).

♂ ♀. One of the darkest of all forms of *E. hebe* as regards the upperside.

*Upperside*.—Forewing: the pale blue scaling at the outside of the discal band proper only  $2\frac{1}{2}$ —3 mm. wide at  $SM^2$ , the white area from  $M^1$  to midway to  $M^2$  not broader than below, its outer edge from  $M^1$ — $SM^2$  very slightly irregular.—Hindwing: black marginal area almost of even width (taken as a whole), not interrupted, 5 mm. wide at  $R^2$ , narrower at anal angle; the white discal area sinuate between all the veins, especially obviously so between  $C$  and  $R^1$ ; admarginal spots (except anal one) all very obscure, with few bluish white scales, in ♀ slightly more obvious, yellowish.

*Underside*.—Forewing: discal band of ♂ at  $M^2$  about as broad as dark outer region, in ♀  $1\frac{1}{2}$  mm. wider: black median bar bordering detached white spot  $R^1$ — $R^2$  heavy, sometimes joining discal bar which stands at the outside of that spot.—Hindwing: discal band (which in ♀ reaches a little beyond  $M^2$ ) 1 mm. narrower at costal margin than dark outer area measured along  $C$ , its outer edge from  $C$  to  $R^3$  almost straight, crossing  $M^2$   $1\frac{1}{2}$  (♂) or 2 (♀) mm. from base of  $M^2$ ; discal and post-discal black bars heavier than in Java form, especially the post-discal bars  $C$ — $SC^2$  and  $R^2$ — $R^3$ .

Anterior tarsus black above at base.

*Hab.* Singapore, 3 ♂♂, 1 ♀ (received from Herr Fruhstorfer).

It must be stated that the specimens from which this peculiar form was described were obtained by Herr Fruhstorfer from the Museum at Singapore; it is, therefore, not quite beyond all doubt that the habitat of this form is Singapore (compare also *E. hebe chersonesus*).

Easily distinguished from the forms inhabiting Sumatra and the Malay Peninsula by the broad black marginal area of the hindwing; it comes in this character closest to the specimens of *E. hebe* from Bali, but in these the white area of the hindwing above is not deeply sinuate between the veins, and the discal band of the underside is considerably broader both on fore- and hindwing. From the Bornean *E. hebe ganymedes* it differs, *inter alia*, in the much less extended white scaling of the forewing above from  $M^2$  to internal margin, in the broader black marginal area of the hindwing, and the almost straight upper portion ( $C$ — $R^3$ ) of the outer edge of the discal band of the hindwing below.

*c. E. hebe ganymedes* (Nov. Zool. VI. t. VII. f. 2, ♂).

*Charaxes hebe*, Staudinger (*non* Butler, 1865). *Exot. Tafel*. p. 172 (1886) (pt.: Borneo).

*Charaxes ganymedes* Staudinger, *l.c.* p. 173 (1886) (Borneo); Rober, *Ent. Nachr.* XX. pp. 291, 292 (1894) (Borneo); id. *l.c.* XXI. p. 67 (1895) ("Ceylon," *loc. cit.*).

*Charaxes hebe* Rober, *l.c.* p. 291 (1894) (pt.: Borneo).

*Eulipis ganymedes* Moore, *Lep. Ind.* II. p. 263 (1896).

*Charaxes moorei*, Butler, *Journ. Linn. Soc. Lond.* XXV. p. 385, n. 96 (1896) (pt.: Borneo).

*Charaxes ganymedes*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 54 (1898) (Borneo).

*Eulipis attalus ganymedes*, id. *l.c.* p. 56 (1898).

♂ ♀. *Upperside*.—Forewing: bluish white scaling beyond discal band proper

much extended, often very wide already before and at  $M^1$ , coming close to outer margin at  $M^2$  and  $SM^2$ , in many individuals filling up the cellule  $M^2-SM^2$ , except a narrow marginal border of 1 mm. breadth, the blue white scaling surrounds rather often two large black submarginal patches; discal spot  $R^1-R^2$  in ♀ much larger than in ♂, in our ♀ with suffused white scaling at distal side, variable in ♂.—Hindwing: black marginal area not completely separated into patches, the bluish white discal scaling, though well extending along the veins—the bluish white scaling hence appearing deeply concave between the veins—not reaching the admarginal spots, or only some of them; the black area measures in front of  $SC^2$  from tip of this vein to bluish white discal scaling 9 to 10 mm., the upper two or three black patches are generally much larger than the others, but in a ♂ from the Kina Balu the difference in size is not considerable; admarginal spots yellowish or creamy, obscure, or more or less heavily shaded with pale blue scaling and then conspicuous, this pale blue scaling always present at  $M^2$  and in tails.

*Underside*.—Black submedian and median bars heavy.—Forewing: discal band at  $M^2$  about as wide as the dark outer region of wing (10 mm.), but in ♀ 2 mm. wider; discal black bars heavy, well-marked from  $SC^1$  to  $SM^2$ , separated from the ferruginous postdiscal bars—which form together with the submarginal bars conspicuous kidney-shaped or luniform spots—by white interspaces which are heavier than in the other races of *E. hebe*.—Hindwing: discal band extending beyond  $M^2$ , deeply concave outwardly down to  $R^3$ , in ♂ at costal margin 8 to 9 mm. wide, narrower than the dark outer area of wing at C (10 to 11 mm. wide), in ♀ the measurements are both 10 mm.; ferruginous red postdiscal spots large; admarginal yellow bars  $C^1-M^1$  with conspicuous white proximal borders.

*Hab.* Borneo, 8 ♂♂, 1 ♀: Limbang R. (January 1892, A. Everett); Lawas (April 1892, A. Everett); Mt. Mulu (Hose); Kina Balu (J. Waterstradt); S.E. Borneo.

Differs from those individuals of *E. hebe chersonesus* from the Malay Peninsula which have the black patches of the hindwing well developed, and which, on superficial examination, could be confounded with *E. hebe gangneides*, in the bluish white postdiscal scaling of the forewing being more extended, in the discal black bars  $SC^1-R^1$  of the forewing below being conspicuously marked, in the discal band of the hindwing being continued beyond  $M^2$ , and being, moreover, more deeply concave between C and  $R^3$ , and in other characters mentioned in the description.

*d. E. hebe hebe* (Nov. Zool. V. t. XII. f. 10, ♂).

*Charaxes hebe* Butler, *P. Z. S.* p. 634. n. 46. t. 37. f. 3. ♀ (1865) (Sumatra); Druce, *P. Z. S.* p. 346 (1873) (Sumatra); Röber, *Ent. Nachr.* XX. p. 291 (1894) (pt.; Sumatra); Hagen, *Iris* IX. p. 186. n. 244 (1896) (N.E. Sumatra).

*Charaxes albanus* Röber, *l.c.* XXI. p. 66 (1895) (Deli, Sumatra).

*Charaxes (Eulepis) hebe*, Nicolson & Martin, *Journ. As. Soc. Beng.* LXIV. ii. p. 435. n. 257 (1895) (N.E. Sumatra).

*Charaxes hebe*, Frühstorfer, *Ent. Nachr.* XXIV. p. 54 (1898) (*albanus* = *hebe*).

*Eulepis attalus hebe*, Frühstorfer, *l.c.* p. 56 (1898) (Sumatra).

♂. *Upperside*.—Forewing, white area posteriorly approaching internal angle of wing, the pale bluish white scaling at the outside of the discal band proper being much extended.—Hindwing: postdiscal black spots, which stand at the proximal side of the **white** submarginal spots, well separated from one another by the white discal scaling extending along the veins to the admarginal spots, small, either

forming together with the **black** submarginal spots subrotundate or bell-shaped patches in which the white submarginal spots are situated, or standing separate from the black submarginal spots : these black postdiscal spots are often altogether absent, or are, at least, so much overshadowed with white scaling that mere vestiges of the black colour remain visible : sometimes, in the whitest individuals, the white submarginal spots are fused with the white discal scaling : there are very seldom two black spots in cellule  $SC^2-R^1$  proximally of the white submarginal spot : admarginal spots always marked, more or less white, those between tails often less shaded white ; pale blue streaks in tails fused with admarginal spots, or separated from them (often only partly) by a dark transverse line : black marginal border not thicker than black submarginal linear spots.

*Underside*.—Forewing : discal band at  $M^2$  almost exactly as wide (10 mm.) as outer region of the wing.—Hindwing : discal band  $8\frac{1}{2}$  to  $9\frac{1}{2}$  mm. broad at costal margin, its outer edge crossing  $M^1$   $1\frac{1}{2}$  to 3 mm. from point of origin of this vein : the band seldom extends a little beyond  $M^2$ .

♀. *Upperside* as white as in the whitest ♂ : discal spot  $R^1-R^2$  larger than in ♂ : the hindwing has only a feeble trace of the postdiscal black spots. On the underside the discal band of both wings is much wider than in ♂, that of forewing measuring  $13\frac{1}{2}$  mm. at  $M^2$ , that of hindwing 12 mm. broad at costal margin, its outer edge crossing  $M^2$   $3\frac{1}{2}$  mm. from origin of this vein.

Two ♀♀ from S.E. and S.W. Sumatra we have examined have the postdiscal black spots of the hindwing longer than the darkest ♂ from N.E. Sumatra, the admarginal spots are also less white, and the discal band of the hindwing below is also a trifle narrower : ♂♂ from the eastern end of Sumatra we have not seen.

*Hab.* Sumatra, 10 ♂♂, 2 ♀♀ : Gayoe country (January and May 1893, Dr. Martin) ; Selessch (May, July, August, September 1893, Dr. Martin) ; Bekantschan (September 1893, Dr. Martin) ; Upper Palembang district (♀, Völeker) ; Setinjak (W. Sumatra, June 1898, Ericsson) ; Palang Sidempoean (W. Sumatra, Ericsson).

*e. E. hebe fallacides* (Nov. Zool. V. t. XII. f. 8, ♂).

*Charaxes kuber*, Rüber (non Kheil, 1889), *Ent. Nachr.* XXI. pp. 65, 67 (1895) (Nias, ♂, non ♀).  
*Charaxes fallacides* Fruhstorfer, *ibid.* p. 170 (1895) (Nias) ; *id.*, *l.c.* XXIV. p. 55 (1898) (Nias).  
*Eulypis attalus fallacides*, *id. l.c.* XXIV. p. 56 (1898).

♂. *Upperside*.—Forewing : bluish white scaling between  $M^1$  and internal margin of wing as much extended as in *hebe hebe*, mostly not bisinuate between  $M^2$  and  $SM^2$ .—Hindwing : bluish white postdiscal scaling more or less extended along the veins (except  $C^1$  and  $SC^2$ ), separating the black outer area of the wing into spots which, together with the **black** submarginal bars, form rounded patches, upper patches  $C^1-R^1$  the largest, the black area measuring from tip of  $SC^2$  to white discal scaling in front of  $SC^2$  6 to  $7\frac{1}{2}$  mm. : admarginal bars bluish white, inclusive of the anal one, the yellowish colour seldom coming through ; bars  $SC^2-R^2$  obscure, ill-defined ; white submarginal spots heavier than in the Java form (*E. hebe fallax*).

*Underside*.—Forewing : discal band at  $M^2$  half as wide again (11 to 12 mm.) as the dark outer area of the wing ; discal bars  $SC^5-SM^2$  heavy, bar  $SC^4-SC^5$  not marked, or very faint ; median bar  $R^1-R^2$  (at proximal side of white discal spot) heavy, in two examples a black dot before  $R^1$  indicating median bar  $SC^5-R^1$ .—Hindwing : discal band nearly half as wide again at costal margin (10 mm.)

as darker outer area at  $SC^2$ , extending beyond  $M^2$ , its outer edge less angled at  $R^3$  (the posterior portion of the band being broader) than in *hebe hebe*, crossing  $M^2$   $3\frac{1}{2}$  mm. from base of that vein; white scaling around second and third brownish red postdiscal spots conspicuous; black discal and postdiscal bars also heavy.

*Hab.* Nias, 6 ♂♂.

Resembling *E. hebe fallax* from Java in the width of the discal band of the underside, but easily distinguished, *inter alia*, by the much more extended bluish white scaling in the marginal region of the upperside of both wings.

*f. E. hebe fallax* (Nov. Zool. V. t. XII. 11, ♂, Bali; 12, ♀, Java).

*Jasia athama*, Swainson (non *athamas* Drury, 1775), *Zool. Illustr.* II. t. 90 (1833) (Java).

*Charaxes fallax* Rober, *Ent. Nachr.* XX. pp. 291, 293, 294 (1894) (Java); Butler, *Journ. Linn. Soc.*

*Lond.* XXV. p. 385. n. 95 (1896) (syn. pro parte; Java).

*Eulepis sacerdis* Moore (Felder manusc.), *Lep. Ind.* II. p. 263 (1896) (Java; syn. pro parte; *nomen nud. superfluum*!).

*Charaxes fallax*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 53 (1898) (*fallax* = *attalus* ex errore!).

*Eulepis attalus attalus*, id. *l.c.* p. 56 (1898).

*Charaxes (Eulepis) hebe*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXVI. ii. p. 692. n. 147 (1898) (Bali).

(?) *Charaxes (Eulepis) moori*, id., *l.c.* n. 146 (1898) (pt.: Bali, this insect?).

Though Swainson says that he adopts "the original specific name of Cramer," he nevertheless changed that name *athamas* into *athama*. That Swainson confounded the present insect with *E. athamas* cannot be wondered at, since even such a specialist as Mr. de Nicéville expresses, in *Journ. As. Soc. Beng.* LXIV. ii. p. 436 (1895), doubts about the specific distinctness of *E. hebe*, *moori*, and *athamas*.

Dr. Butler, *l.c.*, treats the present form of *hebe* as a distinct species, while he regards the Bornean form of *hebe* as "a slight melanism of the type form." *E. hebe fallax* would, accordingly, be a stronger "melanism" of the "type form"—*i.e.* of the first described form—which is the least typical of all.

♂ ♀. *Upperside*.—Forewing: bluish or yellowish white scaling at the outer side of the discal band proper only  $2\frac{1}{2}$  mm. (or less) wide before and behind  $SM^2$ , its outer edge straight or nearly so, agreeing in this respect with *E. hebe lombokianus* and *plautus*; cell in ♂ with very little white scaling; discal spot  $R^1-R^2$  varying in ♂ from  $1\frac{1}{2}$  to 4 mm., in ♀ about 5 mm. long.—Hindwing: black outer area entire or nearly so, seldom somewhat broken up into patches (in palest ♀ ♀), somewhat narrower from  $R^1-R^3$  than anteriorly and between  $R^3$  and  $M^2$ , or of nearly even width, measuring in front of  $SC^2$   $6\frac{1}{2}$  to 7 mm. in ♂, often a little less in ♀; the bluish white postdiscal scaling not conspicuously concave between veins, its outer edge sometimes almost entire, the scaling often more or less extended along radial veins, forming very thin rays; admarginal spots very obscure as a rule, seldom whitish yellow and well visible; blue streaks in tails thin.

*Underside* similar to that of *E. hebe hebe*, but discal bands much wider, the postdiscal ferruginous red spots of the hindwing smaller.—Forewing: discal band in ♂ nearly half as wide again, in ♀ more than twice as wide, as the darker outer region of wing measured along  $M^2$ .—Hindwing: discal band extending beyond  $M^2$  in both sexes, less angled outwardly before  $R^3$  than in the Bornean race, upper portion less concave; at costal margin in ♂ nearly or fully twice, in ♀ more than twice, as wide as dark outer area of wing measured along  $C'$ ; its outer edge crossing  $M^2$  in ♂ 4 to 6 mm., in ♀ 6 to 7 mm., from base of that vein.

*Hub.* Java, 16 ♂♂, 4 ♀♀: Mt. Gede (Prillwitz; August 1892, 4000 feet, H. Fruhstorfer); "Java" (coll. Felder, ex coll. Eindhoven): Bali, 4 ♂♂ (April 1896, low country, W. Doherty).

In this form the discal band of the underside is wider than in any other race of *E. hebe*.

The Bali examples, which we did not refer to in the above description, agree on the upperside with the darkest Javan specimens; on the underside they approach partly the Lombok form of *E. hebe* in the width of the band; the measurements of the band of the forewing and the dark outer area of the wing at M<sup>2</sup> are in our four specimens: 10: 8½ mm., 10: 8½ mm., 10: 7 mm., 10½: 8 mm.; the width of the band of the hindwing at costal margin and that of the dark outer region at C is respectively: 7½: 7 mm., 10½: 6 mm., 9½: 7½ mm., 9: 6¾ mm.

*g. E. hebe lombokianus* (Nov. Zool. VI. t. VII. f. 3, ♂).

*Charaxes fallax*, Fruhstorfer (non Röber, 1894), *Berl. Ent. Zeitschr.* XLI. p. 389 (1896) (Lombok).

*Charaxes attalus*, id. (non Fekler, 1867), *l.c.* XLII. p. 6 (1897) (Lombok, Sapit, 2000 feet).

*Charaxes attalus lombokianus* Fruhstorfer, *Ent. Nachr.* XXIV. p. 56 (1898) (Lombok).

*Charaxes (Eulepis) fallax*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXVI. ii. p. 691. n. 145 (1898) (Lombok).

♂. *Upperside* as in the specimens of *E. hebe fallax*, the admarginal, more or less fulvous, spots SC<sup>2</sup>—M<sup>1</sup> of the hindwing generally better marked. On the *underside* the ferruginous lunules of the kidney-shaped markings of the forewing rather heavier than in *fallax*; the band of the forewing slightly narrower than in that form; the band of the hindwing more obviously narrower, more strongly concave, 9 mm. wide at costal margin, the darker outer border of the wing measuring 7 to 8 mm. at C; outer edge of band crossing M<sup>2</sup> 2½ to 3 mm. from base of M<sup>2</sup>; ferruginous red postdiscal spots heavier than in most Java examples of *E. hebe*.

♀. Unknown.

*Hub.* Lombok, 4 ♂♂: Sawela (June 1896, W. Doherty); Sapit (May to June 1896, 2000 feet, H. Fruhstorfer).

*h. E. hebe arnoldi* Rothschi., subsp. nov.

*Charaxes moorei*, Pagenstecher (non *moorei* Distant, 1883), *Jahrb. Nass. Ver. Nat.* XLVII. p. 56 (1894) (Sumba; *moorei* ex err. loco *moorei*): id. *l.c.* XLIX. p. 149. n. 84 (1896) (Sumba).

*Charaxes attalus lombokianus* (?) Fruhstorfer, *Ent. Nachr.* XXIV. p. 56 (1898) (Sumba, queried as *lombokianus*).

*Eulepis attalus lombokianus* (?) Fruhstorfer, *l.c.* p. 56 (1898) (pt.: Sumba?).

*Charaxes (Eulepis) moorei*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXVI. p. 692. n. 146 (1898) (Sumba).

♂. The unique specimen recorded by Dr. Pagenstecher has been lent to us for examination. It represents a form of *hebe*, not of *moorei*. On the *upperside* it agrees with the Java and Lombok specimens in the extent of the white scaling on the forewing, but the black outer area of the hindwing is more restricted, the black patches R<sup>1</sup>—M<sup>2</sup> being smaller than in whitish Java examples (♂♂) we have seen. On the *underside* the band of the forewing is fully as broad as in the wide-banded Java ♂♂, while the band of the hindwing is broader, measuring 13 mm. at costal margin—the dark outer border of wing is only 6 mm. wide at C—the outer edge of the band crosses M<sup>1</sup> 5 mm. from origin of that vein; the cell of the forewing has



two black dots instead of one, a character observed but in very few specimens of *E. lebe* from other localities ; the underside of the palpi and the upperside of the abdomen are whiter in colour than in *E. lebe fallax*.

*Hab.* Sumba, 1 ♂ in Dr. Pagenstecher's collection.

#### 10. *Eulepis moori* (Nov. Zool. V. t. XII. f. 3 to 7).

*Charaxes moori* Distant, *Rhop. Mal.* p. 108. n. 6. t. 13. f. 3, ♂ (1883) (Malay Pen.).

♂ ♀. Head above, pronotum and tegulae olive-bistre, with white dots as in *athamas* ; mesonotum olive, greyish white behind, more white in ♀ than in ♂ ; metanotum almost white ; upperside of abdomen white or whitish pearl-grey. Palpi above, femora and anterior tibia brownish black ; underside of palpi, middle of pro- and mesosternum, middle and hinder tibiae and all tarsi buff-colour, the palpi indistinctly edged with white ; sterna dark russet, blackish under the femora ; underside of abdomen varying in ♂ from fawn-colour to isabella-colour, blackish brown in ♀.

♂. *Wings* above purplish black, the greater part occupied by a white or yellowish white discal area.—Forewing : discal area at  $SM^2$  4 or 5 mm. distant from base : it does not quite reach the base of  $M^2$ , while it entirely fills up the angle between  $M^1$  and  $R^3$  ; the base of the wing overshadowed with white scaling which occupies also the posterior portion of the cell ; this scaling has a bluish appearance as it forms the cover of black scales ; its density varies much individually, the greater part of the cell being sometimes white, while in other examples there are scarcely any white scales in the cell ; outer edge of white area obliquely sinuate between  $R^3$  and  $M^1$ , sinuate between  $M^1$  and  $M^2$ ,  $M^2$  and  $SM^2$  ; there is always white scaling at outer edge of area at and between  $M^1$  and  $SM^2$ , especially upon and behind the latter nervule, this white scaling often almost reaching internal angle ; discal spot  $R^1-R^2$  slightly varying in size, 10 to 11 mm. distant from upper angle of cell ; no submarginal dot.—Hindwing, at least two-thirds yellowish white ; basal area up to base of  $R^1$  and abdominal fold milky white, the latter often clay-colour or drab beyond middle ; outer edge of discal area irregularly concave between costal margin and  $R^2$ , with a bluish or greenish tint from  $R^1$  to  $SM^2$  ; in the specimens with the white scaling restricted there appear some separate pale bluish white lunules outside the discal area between  $R^2$  and abdominal margin, in most cases these lunules are entirely merged together with the discal area, the white scaling being much extended ; mostly the white scaling extends along veins  $R^1$  and  $R^2$ , connecting the admarginal spots with the discal area ; it extends often also along  $R^3$  and  $M^1$  to near edge of wing : in such cases the margini-submarginal black area is reduced to a patch of variable size occupying the upper angle of the wing, and a series of more or less rounded, partly confluent, black spots which include the white submarginal spots, and a black marginal line which is heaviest between the tails ; admarginal spots  $SC^{12}-R^3$  transverse, mostly heavy, conspicuous, white, seldom slightly tawny, especially often the last of the three, always clearer marked than the admarginal spots  $R^3-M^2$  ; admarginal spot  $C-SC^{12}$  seldom indicated ; tails black, sometimes slightly metallic, in the whitish specimens with pale blue scales.

*Underside* : russet fawn-colour, glossy in side light, except a darker marginal band of forewing ; discal area white with a faint tint of yellowish green ; interspace

between the submedian and median lines of bars of both wings, the prolongation of this band-like interspace along  $M^2$  of the hindwing, and the interspace between discal area of forewing and  $R^1$  chestnut.—Forewing: cell with one or no dot, the second always absent, cell-bar reaching  $M$  generally about 1 mm. before origin of  $M^2$ , the same in position as in the South Indian *E. athamas agrarius* f. temp. *agrarius*, its upper end being at least 2 mm. distant from the discocellular spot, mostly the upper portion of the bar obliterated; sometimes the cell-dot fused with the bar, the latter being in such cases more basal than usual; discal bar  $M^1$ — $M^2$  reaching  $M$  before origin of  $M^1$ , bar  $R^3$ — $M^1$  close to  $D^1$ , following the curve of  $R^3$ , very often pushed basad beyond  $D^1$  into the cell where it appears as a longitudinal line along  $D^1$ , a remnant only, so to speak, of the bar being left in the angle  $D^1$ — $M^1$ ; median bar  $R^2$ — $R^3$  seldom quite absent, sometimes bordered white distally,  $2\frac{1}{2}$  to  $3\frac{1}{2}$  mm. distant from discocellular bar; discal area varying in width at  $M^2$  from 11 to 14 mm., partition  $R^3$ — $M^1$  obliquely sinuate outwardly between  $R^3$  and fold  $R^3$ — $M^1$ , the following partition also generally sinuate, but not always so regularly as partition  $M^1$ — $SM^2$ ; the postdiscal and submarginal arched bars, which are as in *athamas* joined together to form postdisco-submarginal reniform spots with pale centres, are very thin, the proximal border lines (postdiscal bars) of the reniform spots  $R^3$ — $M^2$  as thin and as black as the distal border lines (submarginal bars).—Hindwing: costal submedian bar along praecostal vein, generally crossing this vein before its end, often very thin; discal area 11 to 15 mm. broad at costal edge of wing, more than half as wide again as the dark marginal area, outer edge of the area crossing  $R^3$  at or beyond the bent of this vein, and  $M^2$  at a distance of 5 to  $7\frac{1}{2}$  mm. from the origin of  $M^1$ ; brownish red postdiscal luniform spots as in *athamas*; spot  $R^3$ — $M^1$  with an especially heavy, white, proximal lunule; a series of white and another of black submarginal dots, followed by ochraceous admarginal, transverse spots, of which spots  $R^3$ — $M^2$  are generally very feebly marked.

♀. Larger than ♂, the white scaling more extended, outer edge of forewing less concave, hindwing more rounded, less deeply concave between tails; discal band on underside 16 to 17 mm. broad at  $M^2$  of forewing, 15 to 17 mm. at costal margin of hindwing.

Length of forewing: ♂, 31 to 36 mm.

„ „ ♀, 38 to 40 mm.

*Hab.* Assam; Burma; Malay Peninsula; Sumatra; Nias; Natuna Islands; Borneo; Java (and Bali?).

Early stages unknown; most likely very similar to those of *E. athamas*.

In habits apparently not different from *athamas*.

A very remarkable feature of the pattern of this species is the variable position of the median bar  $R^3$ — $M^1$  of the forewing below, inasmuch as this bar in at least half the number of individuals is, in consequence of the large development of the discal band, partly or totally pushed from its normal place between  $R^3$  and  $M^1$  into the cell, thus standing partly or totally along the costal instead of the discal side of  $M$  and  $D^1$ . Sometimes this cellular line is about 1 mm. distant from  $M$  resp.  $D^1$ , and the interspace between the black line and those veins is filled up with white scaling. In *E. athamas* and *hebe* the bar never enters the cell, while we have found it situated in the cell in one specimen of *E. jalyssus*.

The geographical forms of *E. moori* run all very close; the most obviously different form is that described under *c* from Assam and Burma.

*a. E. moori heracles* (Nov. Zool. V. t. XII. f. 6, ♂).

- Charaxes moori*, Staudinger, *Erot. Taqf.* p. 173 (1886) (pt. : Borneo) ; Rober, *Ent. Nachr.* XX. p. 291 (1894) (pt. : Borneo).  
*Charaxes heracles* Rober, *l.c.* XX. pp. 291, 294 (1894) (Borneo).  
*Charaxes moori*, Butler, *Journ. Linn. Soc. Lond.* XXV. p. 385. n. 96 (1896) (pt. : Borneo).  
*Charaxes javanus*, Fruhstorfer, *ibid.* XXIV. p. 54 (1898) (pt. ; S. Borneo).  
*Charaxes moori*, *id. l.c.* (1898) (S. Borneo).  
*Eulepis attalus moori*, *id. l.c.* p. 56 (1898) (S. Borneo).  
*Eulepis attalus javanus*, *id. l.c.* (1898) (pt. ; S. Borneo).

♂. This form is characterised by the marginal black area of the hindwing above, from the costal margin to  $R^2$ , being broader, measuring along the hindside of  $Sc^{2c}$ , from the tip of this vein to the white discal sealing,  $9\frac{1}{2}$  to  $10\frac{3}{4}$  mm. The creamy white admarginal spots of the hindwing above are not often joined to the discal white area and then only along  $R^2$ , not along  $R^1$ , the black margini-submarginal area is, therefore, generally not interrupted. The white discal sealing is often so much constricted that a series of postdiscal, bluish white, more or less ill-defined, lunules becomes separated, or the separation of the lunules from the discal area is at least indicated. There is sometimes little or no white sealing in the cell of the forewing above.

♀. Not known to us.

*Hab.* Borneo, 7 ♂♂ : Kina Balu. Lawas (February 1896, A. Everett). Pengaron ; Bunguran, Natuna Islands, 1 ♂ (July to October 1895, Hose).

The Bunguran individual has the white sealing on the upperside rather more restricted than our darkest Bornean specimen ; the admarginal spots  $Sc^{2c}$ — $R^3$ , on the hindwing, are small, the last obscure, the anal admarginal yellow spot is also very small. On the underside the band of the hindwing is only  $11\frac{1}{2}$  mm. wide at the costal margin and deeply concave outwardly from the costal margin to  $R^3$ . The red postdiscal spots  $Sc^{2c}$ — $R^2$  are very thin, and the spot  $R^2$ — $R^3$  is entirely black.

*b. E. moori moori* (Nov. Zool. V. t. XII. f. 4, ♂).

- Charaxes moori* Distant, *Rhop. Mal.* p. 108. n. 6. t. 13. f. 3 ♂ (1883) (Prov. Wellesley, Mal. Pen.) ; Nicéy., *Bull. of Ind.* II. p. 277. note (1886) (Prov. Wellesley) ; Staud., *Erot. Taqf.* p. 173 (1886) (pt. : Malacca) ; Hagen, *Iris* IX. p. 186. n. 245 (1896) (N.E. Sumatra).  
*Charaxes moori* Pagenstecher, *Jahrb. Nass. Ver. Nat.* XLIII. p. 97. n. 63 (1890) (E. Java) ;  
 Butt., *Journ. Linn. Soc. Lond.* XXV. p. 385. n. 96 (1896) (pt. ; Sumatra).  
*Charaxes javanus* Rober, *Ent. Nachr.* XXI. p. 66 (1895) (Palabuan, S. Java).  
*Charaxes heracles* *id. l.c.* p. 67 (1895) (Deli, Sumatra).  
*Charaxes* (*Eulepis*) *moori*, Nicéy. & Martin, *Journ. As. Soc. Beng.* LXIV. ii. p. 435. n. 258 (1895) (Selesseh to Bekantschan, N.E. Sumatra).  
*Eulepis moori*, Moore, *Lep. Ind.* II. p. 260 (1886) (pt. ; Mal. Pen.).  
*Charaxes javanus*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 54 (1898) (pt. ; Java).  
*Charaxes heracles*, *id. l.c.* (1898) (Sumatra, Singapore).  
*Eulepis attalus javanus*, *id. l.c.* p. 56 (1898) (pt. ; Java).  
*Eulepis attalus heracles*, *id. l.c.* p. 56 (1898) (Sumatra, Singapore).  
 (?) *Charaxes* (*Eulepis*) *moori*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXVI. ii. p. 692. n. 146 (1898) (Bali ; *this species or helo* ?).

♂. The black margini-submarginal area of the hindwing above measures along  $Sc^{2c}$  from  $7\frac{1}{4}$  to  $9\frac{1}{2}$  mm. in breadth, while in the Bornean examples of *moori* the measurements vary from  $9\frac{1}{2}$  to  $10\frac{3}{4}$  mm. The admarginal spots  $Sc^{2c}$ — $R^3$  of the hindwing above are mostly joined along  $R^1$  and  $R^2$ , often also along  $R^3$ , to the white discal area, but there occur also specimens in Java, Sumatra, and the Malay

Peninsula in which the black band-like margini-submarginal area is not interrupted. The median bars (SM<sup>1</sup>)—SM<sup>3</sup> of the hindwing below stand very often at right angles to SM<sup>1</sup>, especially in Malaccan specimens.

♀. The white colour of the upperside much more extended than in ♂. Forewing: cell bluish white except upper angle, discal area extending a little beyond R<sup>3</sup>, white scaling at SM<sup>2</sup> approaching edge of wing.—Hindwing: admarginal spots C—M<sup>2</sup> all developed, fused with the white discal area, the upper portion of the black area reduced to a triangular patch at upper angle of wing, pointing backwards, not reaching R<sup>1</sup>, about 5 mm. wide at costal margin, portion Sc<sup>2</sup>—M<sup>2</sup> of the black submarginal area represented by elliptical black spots which include the linear, white, submarginal spots, and of which the upper three are the smallest, tails and margin between them, as well as the extreme edge of the rest of the distal margin of the wing, black.

*Hab.* Malay Peninsula, 6 ♂♂: Perak; Singapore (according to Fruhstorfer), Prov. Wellesley (accord. to Distant). Sumatra, 10 ♂♂: Setinjak, W. Sumatra (May 1898, Ericsson); Padang Sidempoean, W. Sumatra (Ericsson); Upper Palembang District, E. Sumatra: Gayoe country (January and February 1893, Dr. Martin); Bekantschan, Deli (March 1894, Dr. Martin). Java, 7 ♂♂, 1 ♀: Mount Gede (Prillwitz, Fruhstorfer); East Java (accord. to Pagenstecher). Bali (accord. to Nicéville & Elwes, but most likely wrongly identified).

Dr. Martin, *l.c.* p. 436, says of *moori* that it occurs, like *hebe*, at lower elevations in the Battak Mountains, N.E. Sumatra, from Selesseh to Bekantschan. Though Herr Röber has given a name to a specimen of *moori* from Java, calling it *javanus*, we cannot find any differential character that holds good in a number of individuals. The specimens of *moori* from Java and those from the Malay Peninsula approach in the extent of black on the hindwing very often individuals from Borneo (*moori heracles*), while the Sumatran individuals are generally more extended white. The black apical area of the hindwing above measures along Sc<sup>2</sup> in our specimens (♂♂) from Java from 7¼ to 9½ mm., in those from the Malay Peninsula also 7¼ to 9½ mm., while in the Sumatran examples the numbers are 7¼ and 8¾ mm. On the forewing above, the white scaling at SM<sup>2</sup> is generally a little more extended in the Sumatran than in the Javan or Malaccan examples: the discal bluish white scaling of the hindwing above penetrates more often across R<sup>1</sup> into the black apical patch in Sumatran individuals than in those from the other localities, and in the Sumatran specimens, again, the admarginal spots R<sup>3</sup>—M<sup>2</sup> of the hindwing above are more often indicated than in the specimens of *moori moori* from elsewhere. The Sumatran *moori moori* are, therefore, on the whole more different from the Bornean *moori heracles* than are the Javan and Malaccan *moori moori*.

Specimens in which the admarginal spots of the hindwing are not connected with the white discal area are comparatively rare amongst *moori moori*. We have one specimen each from Malacca, S.E. Sumatra, and W. Java (Gede), in which those spots are not joined to the discal area.

In 1894 Herr Röber differentiated the Bornean *moori* under the name of *heracles* from *moori moori*. In 1895 he said (*l.c.*) that "two ♂♂ of *heracles* from Sumatra (Deli) are not different from specimens from South Borneo." This statement is not in accordance with what we said above of Sumatran *moori*; but we have examined one of Röber's Sumatran individuals, and find that it agrees with our Sumatran specimens, hence differing from the Bornean examples in the characters mentioned above, being, in fact, more different from the Bornean specimens of *moori*

*heracles* than are the average examples of Malaccan *moori moori*. We received that Sumatran example through the kindness of Herr Fruhstorfer; the specimen is marked and labelled in Röber's handwriting "*heracles spec. type*" (!), though Herr Röber, when describing *heracles* in 1894, had only Bornean specimens. The strange labelling of that specimen misled Herr Fruhstorfer in 1898 to restrict the name of *heracles* to individuals of *E. moori* from Sumatra and Singapore, and to treat the Bornean examples of *E. moori* as *E. attalus moori* and *E. attalus javanus*.

According to Herr Fruhstorfer there occur in South Borneo two subspecies of *moori*; Herr Röber records also *moori moori* from South Borneo, and describes, besides, *moori heracles* from the same country, so that we have the strange phenomenon that three subspecies, = geographical (!) races, of one insect occur together. The solution of the riddle shows that there is, in fact, no *contradiction in terms*; for there are, as regards the countries in question, only two fairly well distinguishable "geographical" forms, as pointed out above, namely, those inhabiting Sumatra and Borneo respectively, while the individuals from the Malay Peninsula and Java partly agree with the Sumatran specimens, and partly approach, or are identical with, the least deviating Bornean examples. We have here a complete bridge from one extreme (race of Sumatra) to the other (race of Borneo); unfortunately not the two extremes have been named, but the one extreme (Bornean race) and individuals from the countries (Malay Peninsula and Java) where the specimens vary from one extreme (Sumatra race) to the lower limit of variation of the other extreme (Borneo race). As, further, these "intermediate" *moori* from Java are not different from those from the Malay Peninsula, the name *moori javanus* designates the same as *moori moori*, hence we have in South Borneo only *moori moori* (according to Röber and Fruhstorfer) and *moori heracles*; however, what Messrs. Röber and Fruhstorfer call *moori moori* are most likely those specimens of *moori heracles* in which the admarginal spots of the hindwing above are partly joined to the white discal area. This character is very variable individually, and cannot serve to characterise two subspecies of *E. moori*. As regards those Bornean individuals which exhibit the lower limit of the variation of the distinguishing character, having the black apical area of the upperside of the hindwing only  $9\frac{1}{2}$  mm. wide behind  $SC^2$ , it is quite wrong to designate them as *moori moori*, a question which will more fully be dealt with in the appendix to this monograph. In order to avoid having to allude to the same matter again under *E. hebe*, we mention here that the nomenclature of the various races not only of *E. moori*, but also of *E. hebe*, as given by Herr Fruhstorfer in *Ent. Nachr.* XXIV, p. 56 (1898), is monstrous; Herr Fruhstorfer records, for instance, from Singapore *Eulepis attalus plautus*, *E. attalus chersouesus*, and *E. attalus heracles*, treating all the forms of *E. moori* and *E. hebe* as subspecies of one species *E. attalus*.

Though Messrs. Röber and Fruhstorfer have somewhat complicated the nomenclature of the insects in question by giving too many names, and applying names wrongly, one can easily recognise from their papers that they have studied these insects more intensely than anybody before.

*c. E. moori kaba* (Nov. Zool. VI. t. VII. f. 6, ♂).

*Charaxes kaba* Kheil, *Rhop. Nias* p. 27, t. 3, f. 19 (1884) (Nias); Staud., *Exot. Tagl.* p. 173 (1886) (Nias); Röber, *Ent. Nachr.* xx, pp. 291, 292 (1894) (Nias); id. *l.c.* XXI, pp. 65, 67 (1895) (Nias ♀, not ♂).

*Charaxes moori*, Butler, *Journ. Linn. Soc. Lond.* XXV, p. 385, n. 96 (1896) (sub synonym.).

*Eulepis attalus kaba*, Fruhstorfer, *Ent. Nachr.* XXIV, p. 56 (1898) (Nias).

♂♀. The interspace between the submedian and median lines of bars of the underside of the hindwing is partly filled up with black scaling, so that the bars appear more or less confluent in and before the cell. The black postdiscal spots are very heavy and partly replace the brownish red spots. On the upperside the white area of the forewing is rather more deeply sinuate between  $R^2$  and  $M$ , and between  $M^2$  and  $SM^2$ .

*Hab.* Nias.

Herr Röber, *l.c.*, XXI., p. 67, remarks that in his ♂ the interspace between the bars is not partly black, but is normal as in *hebe*, etc. However, this ♂ is certainly not *kaba*, but a form of *hebe*, named by Herr Frühstorfer *jallacides*. Herr Röber himself, *l.c.* p. 65, says of *kaba* that it belongs to the “*hebe* group” and that the ♀ of *kaba* is an exception to the rule that the discal area of the hindwing below is longer in the *moori* than in the “*hebe* group,” hence it is obvious that what Herr Röber calls the ♂ of *kaba* is not a *moori* but a *hebe* specimen, *i.e.* is not *moori kaba*, but *hebe jallacides*, while his ♀ of *kaba* with the character of the “*moori* group” belongs really to the Nias form of *moori*, namely, *moori kaba*.

*d.* **E. moori sandakanus** (Nov. Zool. VI. t. VII. f. 4. 5, ♂).

*Eulepis moori*, Moore, *Lep. Ind.* II. p. 260 t. 187. f. 2. 2a. ♂♀ (1896) (pt.; Naga Hills; Burma).

*Charaxes moori*, Butler, *Journ. Linn. Soc. Lond.* XXV. p. 385. n. 96 (1896) (pt.; Burma).

*Eulepis attalus*, subsp. of, Frühstorfer, *Ent. Nachr.* XXIV. p. 57 (1898) (Naga Hills).

*Eulepis hebe*, subsp. of, *id. l.c.* (1898) (♀, Burma).

♂♀. Discal area of both wings paler (less yellowish) than in the other races of *E. moori*; black apical area of hindwing above 5—9 mm. wide behind  $SC^2$ . There occur two very different-looking forms in Assam, which, judging from the difference in the seasonal forms of *E. athamas* of North India, we presume to represent seasonal varieties which we introduce here as:—

*a*<sup>1</sup>. **E. moori sandakanus f. marginalis** Rothsch., f. nov. (Nov. Zool. V. t. XII., f. 3, ♂).

♂. *Upperside*: Forewing with scarcely any bluish white scaling at outside of discal area from  $M^2$  to near  $SM^2$ ; the white scaling being here not more extended than on the underside, the discal brown-black bar  $M^2$ — $SM^2$  of the underside does not show through above.—Hindwing: black margini-submarginal area not interrupted, 7—9 mm. wide behind  $SC^2$ ; bluish white scaling at edge of white area from  $R^3$ — $SM^2$  rather more bluish than in other forms of *E. moori*, often appearing as separate lunules: admarginal spots  $SC^2$ — $R^3$  separated from one another, not joined to the discal area, pale yellow, with pale blue scaling near the veins, the third spot  $R^2$ — $R^3$  larger than the first  $SC^2$ — $R^1$  (in the specimens of the other forms of *E. moori* with not interrupted black border to hindwing the third spot becomes mostly obscure, or is, at least, not better defined than the first), admarginal spot  $R^3$ — $M^1$  small, yellowish or pale blue, the following also sometimes present (pale blue); white submarginal dots small and the upper ones almost absent (*type*, Naga Hills), or (Khasia Hills) of the same size as in *moori moori*.

*Underside*: Forewing, the cell-dot is often fused with the (generally) short cell-bar.

Mr. Moore's figure of the ♂ of this form (*l.c.*) is not correct in some details,

while in one detail it is too correct, the figure showing distinctly that the hindwing of the specimen has been mended, there being a spot too much in the anal region.

♀. *Upperside*: Forewing, detached discal spot  $R^1-R^2$  about 5 mm. long; white scaling at outside of discal area as in ♀ of *moori moori*.—Hindwing, black border of wing 6 mm. wide in front of  $SC^2$ , gradually narrowing to  $R^2$ , then broken up into rounded patches by means of the pale bluish white scaling extending along the veins, this scaling not heavy at the veins: admarginal spots  $SC^2-R^3$  slightly separated, well defined, less bluish than in ♂, spot  $C^1-SC^2$  also faintly indicated, spots  $R^3-M^2$  thinner, especially the second of the two, with pale blue scaling at veins: submarginal white spots as in *moori moori*; black portion of cellule  $SC^2-R^1$  without bluish white scaling in front of  $R^1$  between discal area and admarginal spot.

*b*.<sup>1</sup> **E. moori sandakanus** f. **sandakanus** (Nov. Zool. VI. t. VII. f. 4. 5. ♂).

♂. *Upperside*: Forewing: greater part of cell with white scaling, this scaling extending in *type* of *sandakanus* beyond  $D^3$ ; white scaling at outside of discal area wide, from halfway between  $M^1$  and  $M^2$  to ( $SM^1$ ) about twice as broad as in the other forms of *moori*; discal spot  $R^1-R^2$  in *type* with some white scales in front, 3—4 mm. long.—Hindwing: discal bluish white scaling much extended, all the admarginal spots  $C^1-SM^2$  well marked, joined to discal scaling along veins  $R^1-M^2$ , separating the submarginal black band into spots; black apical area much reduced; cellule  $SC^2-R^1$  with (*type*) or without a white spot before  $R^1$  between submarginal dot and discal area.

*Underside*: blackish brown lines at the outer edge of the discal area of the forewing, and brown-red postdiscal spots of the hindwing as thin as in ♀ of *moori moori*.

♀. Differs from ♀ of *moori moori* in the bluish white scaling at the outside of the discal area of the forewing above being wider, having nearly equal width from  $M^2-SM^2$ , the discal and the submarginal curved bars of the underside shining through. The ♀ figured by Moore belongs here.

*Hab.* Sikkim, Assam and Burma.

*f. marginalis*: Naga Hills (*type*, 4 ♂♂, Sherwill): Upper Assam (♀, E. Hartert, in coll. Standinger); Garo Hills 1 ♂; "Assam" (Hamilton, ♂ in coll. Standinger); Moulmein (Brit. Museum).

*f. sandakanus*: Khasi Hills (♂, Hamilton, in coll. Standinger); Sikkim, 1 ♀; "Assam," 1 ♀; "Burma" (♀, Brit. Museum); *type* (now in Tring Mus.) from "N. Borneo."

The *type* of *E. moorei sandakanus* is labelled "Nordborneo Alverett." Alverett is a misprint for A. Everett: the label bears on the underside the letters "Swhoe," which means most likely Swinhoe (the dealer in Lepidoptera at Oxford). Herr Fruhstorfer received the duplicates of Everett's Lepidoptera after they had gone through other hands. As the unique *type*-specimen from "North Borneo" agrees so well with the individual from the Khasia Hills in Dr. Standinger's collection, we have no doubt that the locality "North Borneo" is incorrect, and that the specimen is a Khasia Hills specimen which Herr Fruhstorfer received from Mr. Swinhoe.

It is quite possible that the specimens from the Naga Hills represent a separate subspecies inhabiting the higher countries from Upper Assam to Tonkin. The

material available for examination does not admit of drawing any conclusions as to the correctness of that suggestion.

The specimens examined were all without date of capture ; hence we do not feel justified in treating the white form as representing a spring brood and the dark form as belonging to the summer broods, though that surmise may ultimately turn out to be correct.

- d*<sup>2</sup>. White or greenish white band on upperside as wide as below, no additional white scaling at the outer side of the band on forewing.

### 11. *Eulepis arja* (Nov. Zool. V. t. X. f. 6, ♂).

- Charaxes arja* Felder, *Reise Novara, Lep.* p. 438. n. 713 (1867) (Assam) ; Butl., *Tr. Ent. Soc. Lond.* p. 119. n. 4 (1870) (var. of *bharata* ?) ; Nicéy., *Bull. of Ind.* II. p. 278. n. 569 (1886) (N.E. India, Assam, Upp Tenasserim) ; Standl., *Ecol. Trop.* p. 172 (1886) (N. India) ; Elwes, *Tr. Ent. Soc. Lond.* p. 368. n. 210 (1888) (Sikkim) ; Mauders, *ibid.* p. 526 n. 91 (1890) (Shan States, common all the year round) ; Watson, *Journ. Bombay N. H. Soc.* VI. p. 42. n. 92 (1891) (Chin-Lushai) ; Rober, *Ent. Nachr.* XX. p. 291, 292, 293 (1894) (N. India) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 384. n. 94 (1896) (Sikkim, Assam, Burma, Tenasserim, "Landour" *loc. err.*).
- Nymphalis athamas* var. *c. Charaxes arja*, Kirby, *Cat. Diurn. Lep.* p. 271. sub n. 43 (1871) (Assam).
- Eulepis athamas*, Nicéville, *Journ. As. Soc. Beng.* LI. ii. p. 61 (1882) ; (pt. : Sikkim, Oct.) ; Moore, *Lep. Ind.* II. p. 255. t. 184 f. 1 c. ♂ (1896).
- Charaxes (Eulepis) arja*, Wood-Mas. & Nicéy., *Journ. As. Soc. Beng.* LV. ii. p. 363. n. 100 (1886) (Cachar, VI. to VIII.) ; Nicéy., in Risley, *Gazetteer of Sikkim* p. 147. n. 232 (1894) (Sikkim) ; Watson, *l.c.* X. p. 656. n. 120 (1896) (Chin Hills, February, 2000 ft.) ; Mackinn. & Nicéy., *Journ. Bombay N. H. Soc.* XI. p. 377. n. 122 (1898) (not seen west of Sikkim).
- Nymphalis athamas* var. *arja*, Robbe, *Ann. Soc. Ent. Belg.* XXXVI. p. 130. n. 51 (1892) (Kurseong).
- Eulepis bharata*, Swinhoe (non Felder, 1867), *Tr. Ent. Soc. Lond.* p. 289. n. 193 (1893) (Khasia Hills).
- Eulepis arja*, Moore, *Lep. Ind.* II. p. 258. t. 186. f. 1. *a-c.* ♂ ♀ (1886) ; Fruhst., *Ent. Nachr.* XXIV. p. 60 (1898) (Sikkim, Assam).

Differs from *E. athamas* in the discal band of the wings being white (pale greenish white in fresh specimens). The submarginal white spots of the hindwing are, on the whole, larger, the blue shading at the outer edge of the discal band of the hindwing above from  $R^3-M^2$  more distinct.

The submarginal dot of the forewing above is seldom absent ; sometimes (especially often in ♀) there is a second dot behind  $R^1$ . In one of our Sikkim ♀♀ the band of the forewing crosses  $R^3$  a little, there being a white patch indicated which corresponds to a white spot of the underside standing at the outside of the well-marked median bar  $R^2-R^3$ . In one of the ♂♂ from the Naga Hills there appears a black line along  $SM^3$  of the hindwing below, recalling the black lines found in *E. pyrrhus* and many *Charaxes*. The whitish, triangular patch near the end of the abdominal fold of the hindwing above is often scarcely indicated. Blue streaks in tails well developed.

Seasonal variation as in *E. athamas*.

### *a*<sup>1</sup>. *E. arja* f. temp. *vernus* Rothsch., f. nov.

Discal band very broad ; detached discal spot of forewing large, sometimes with a small spot in front ; in one of our specimens a white line behind middle of costal margin ; black bars of underside thin, submedian ones more or less obliterated,



median ones of hindwing also partly absent or only vestigial; *type* with a rather broad pale blue distal border to the band of the hindwing above.

*b*. **E. arja** f. *temp. arja*.

Band in ♂ about 9 or 10 mm. wide at M<sup>2</sup> of forewing, broader in ♀, generally wider than in the specimens of *E. athamas* of the same month. There occur individuals with the band much narrower on both wings, the blue scaling at the outer side of the band of the hindwing above rather pronounced, and the anal admarginal spot blue or nearly blue. These individuals (♂♂) are found together with ordinary examples of *arja*, and are known from Sikkim, the Khasia and Naga Hills, and from North Cachar; therefore they do not represent either a seasonal or a local race; but the appearance of such individuals may depend on climatical conditions—probably an excess of heat. A specimen of this form in the British Museum is labelled "Sikkim, May 1889, S. C. Dudgeon"; we doubt the correctness of the date, as our May individuals of *E. arja* and *E. athamas* approach the broad-banded spring race. The name under which these aberrant individuals should be known is

*a*<sup>2</sup>. **E. arja** f. *temp. arja* ab. *roeberi* (Nov. Zool. V. t. X. f. 6. ♂).

*Eulepis athamas* var., Moore, Lep. Ind., II. p. 255. t. 184. f. 1e (1896) (Khasia Hills).

*Charaxes arja roeberi* Fruhstorfer, Ent. Nachr. XXIV. p. 59 (1898) (Khasia Hills).

*Charaxes acobus* id. (Röber in litt.), *l.c.*

*Eulepis arja roeberi* id., *l.c.*, p. 60.

*Hab.* From Sikkim to Tenasserim; not found in N.W. India and in S. India.

The habits of this species are the same as those of *E. athamas*; it is in most places not quite so common as the latter, though occasionally the reverse is the case. The larva and pupa are unknown.

12. **Eulepis athamas** (Nov. Zool. V. t. X. f. 1 to 5 and 7 to 11; t. XI. f. 1 to 12).

*Papilio Eques Achilens athamas* Drury, Ill. Es. Ins. I. p. 5. t. 2. f. 4 & Index (1773) (China).

♂♀. Head and pronotum bistre brown, mesonotum more greenish olive, slightly glossy, abdomen olive brown; head with four creamy dots, and a line behind eyes; pronotum often with a vestige of a dot at each side. Palpi beneath and middle of sterna creamy buff, sides of sterna more grey, with black stripes underneath the femora; underside of abdomen pale woodbrown in ♂, often more creamy, blackish in ♀; femora black, mottled with white scales, anterior tibiae black, middle and hinder tibiae and all tarsi cream colour, extreme bases of second to fifth segments of middle and hinder tarsi brown; anterior femora above with creamy or buffish scaling.

♂. *Wings, upperside*: purplish black, slightly greenish at base, with a greenish straw-yellow discal band of variable width, occupying sometimes by far the greater portion of the wing, while it is in other forms barely 7 mm. broad at its widest point.—Forewing: distal edge more or less deeply concave, mostly dentate, but often not produced at end of veins; inner edge of discal band nearly straight or slightly convex up to M<sup>1</sup>, indented just in front of this vein, patch R<sup>3</sup>—M<sup>1</sup> being a little shorter than that behind M<sup>1</sup>, patch R<sup>3</sup>—M<sup>1</sup> rounded proximally and costally, often slightly triangular distally, its outer edge then being oblique from R<sup>3</sup> to internervular fold R<sup>3</sup>—M<sup>1</sup>; outer edge of band straight, or somewhat concave between veins, at right angles to internal margin or nearly so; extreme portion of angle

formed by veins  $R^3$  and  $M^1$  always black, even in the specimens with the band much widened; black triangular space before base of  $M^2$  at least 1 mm. (generally 2 mm.) wide at  $M^2$ ; no white or bluish white scaling at outer side of band; discal spot  $R^1-R^2$  very variable in size and shape, often with a second, smaller, spot in front; submarginal spot  $SC^5-R^1$  also variable, often absent, seldom with a spot in front or another behind; cell only in the extreme specimens of the Himalayan spring brood with pale scaling (Nov. Zool. V. t. X. f. 3), such specimens also with pale scaling at costal margin.—Hindwing: discal band triangular, reaching submedian fold, where it is mostly joined to subanal, abdominal, more or less triangular, pale patch: inner edge of band well defined in the dark forms, less so in the North Indian spring brood with extended band; outer edge concave from  $C$  to  $R^3$  and then again from  $R^3$  to  $M^2$ , or nearly evenly convex (in the specimens with extremely wide band): at distal edge of band, beyond  $M^2$ , a trace of a pale blue lunule, in extreme specimens of the spring brood (N. India) often with three very thin lunules between  $R^3$  and  $SM^2$ ; a complete series of white submarginal dots, the dot before  $SC^2$  often absent; admarginal spots tawny ochraceous, transverse, often obscure or obliterated, anal one generally better defined and varying in tint from ochraceous to buff; tails generally with bluish metallic plumbeous lines, the hinder line of second tail often continued along anal margin of wing to subanal abdominal pale patch: last two white submarginal dots mostly with pale blue scaling at outside; black submarginal spots (between the white submarginal ones and the admarginal spots) not clearly marked; fringe white at anal angle; tails pointed, varying in length.

*V underside:* discal band exactly as wide as above, but greenish white.—Forewing: middle cell-bar represented by two dots, encircled with white, the upper often wanting, the lower closer to point of origin of  $M^2$  than to base of wing, upper cell-bar very oblique, continuous with submedian bar  $M^2-(SM^1)$ , edged white proximally, somewhat bi-undulate: median bars  $M^1-(SM^1)$  also continuous, bar  $R^3-M^1$  a little more distal, mostly prolonged a little along  $R^3$ , and often not separated at  $M^1$  from point of origin of  $R^3$ ; bar D thin, heaviest in front behind  $R^2$ ; median bar  $R^2-R^1$  mostly absent, but sometimes indicated about midway between cell and discal bar, median bar  $R^1-R^2$  always present, forming the proximal border of the discal greenish white patch  $R^1-R^2$ , median bar  $SC^5-R^1$  only present in specimens which have also the respective greenish white discal spot marked: discal bars  $R^3-SM^2$  mostly forming the outer border of the discal band, but often separated from it, especially bars  $R^1-M^2$  by a rufous interspace, the bars themselves sometimes rufous, discal bar  $R^2-R^3$  rather heavier than the others, bars  $SC^4-R^2$  mostly rather thin, straight or convex, seldom slightly concave, bar  $SC^4-SC^5$  seldom marked, but always present in the specimens which have a submarginal spot between those veins: postdiscal and submarginal bars joined to form strongly arched lunules between  $R^2$  and  $(SM^1)$ , bars  $SC^4-R^2$  forming mostly rings, upper postdiscal bars often (sometimes all the discal bars) rufous; a black patch behind  $(SM^1)$  replacing the last postdisco-submarginal lunule, another patch behind  $SM^2$ : interspace between submedian and median lines of bars olivaceous, mostly more or less rufous chestnut, this chestnut, colour extended between  $R^2$  and  $R^3$  distad to discal bar, forming mostly a patch at the proximal side of that bar, sometimes also cellules  $SC^4-R^2$  more or less rufous chestnut: outer marginal area olivaceous, rest of wing vinaceous fawn colour, shining in side-light.—Hindwing: submedian line of bars just outside the praecostal vein, bordered white proximally, concave, continued a little beyond  $M$ ; median line of bars entering cell at origin of  $R^2$ , crossing  $M$  at or a little beyond origin

of  $M^2$ , interspace between the two lines of bars coloured as on forewing; discal band as above: discal bars luniform, nearly always well separated from band by rufous chestnut interspaces, bordered distally by silvery white thin lines, of which the last ones are more or less bluish, followed by a complete series of rufous red or dark rufous, more or less luniform spots; of these spots the uppermost is oblique, wider in front than behind, the third is thin, the fourth often replaced by black, all (except the second) bordered distally by the black, postdiscal, luniform bars; submarginal white spots rather ill-defined, followed distally by black transverse submarginal spots, which are separated by thin white lines from the ochraceous admarginal bars, anal admarginal bar generally paler yellow than the others; cellule  $Sc^{2+R^1}$  at outside of rufous red luniform spot more or less scaled white; base of wing and abdominal fold up to ( $SM^1$ ) pale vinaceous isabella colour, submarginal area pale olivaceous; tails with metallic plumbeous scaling, similar scaling at the black submarginal spots.

Tenth tergite rounded triangular, pointed in middle.

♀. Similar to ♂, larger, wings broader, forewing less falcate, hindwing less triangular, tails broader.

*Hab.* From Ceylon, N.W. India and S. China, to the Philippines and Timor, in a number of geographical forms.

Piepers, *Tijdschr. v. Ent.* XXI, p. 11, n. 38 (1878), records *athamas* also from Alloe, Bonthain, South Celebes.

The larva and pupa are described and figured of the races from South India and Ceylon, and Java.

The species exhibits considerable seasonal variation, especially in South and North India: for we find that the specimens obtained in March and April in North and North-West India have the discal band much widened and the underside pale, while the individuals flying in May and June have the band narrower, and those found in Sikkim from August to November have it narrowest. In South India there are two well distinguished forms, the one corresponding to the spring form of North India, but with the band less broad, and representing most likely the dry season brood, respectively a form that inhabits dry districts, and the second having the band narrower and the underside brighter in tint. In Burmah broad-banded, pale, specimens occur also, besides narrow-banded ones. The Sumatran specimens we have seen were all narrow-banded, and we have also not met with a broad-banded individual from Borneo, though we have no doubt that there occur, in the latter locality, examples that correspond in tint and pattern to the pale brood of South India. The ordinary Java *athamas* are pale, but on Mt. Arjuno occur examples that are much brighter in colour, resembling Borneo individuals. The races from the lesser Sunda Islands, Lombok to Timor, are apparently monomorphic: the examples are similar to the ordinary Java form, but the underside is often brighter. The wings are in the pale form longer than in the narrow-banded form, in all localities.

The differences exhibited by the pale and the narrow-banded forms have often been treated as being of specific value: for instance, the pale South Indian form has been described as *E. agrarius*, while the darker form is referred to as *E. sumatha*, the North Indian spring form has been designated as *E. himata*, the form flying from May to June as *E. bhavata*, and the summer form as *E. athamas*.

As the species is so susceptible to climatrical differences, it is self-evident that the individuals caught in the same month at the same locality, but in different years, are not always identical in the width of the band, and that, further, in different

localities of the same country one may meet with somewhat different forms of *athamas* in one year, and identical forms in another year. This one must bear in mind in working with the individuals of *athamas* from a certain country.

An interesting individual variation, which is observed especially in the pale forms, and which does not rarely occur in all localities (? except Sumatra), is represented by those specimens which have two submarginal spots on the forewing, there being marked, besides the ordinary spot  $SC^5-R^1$ , a second spot in front of vein  $SC^5$ , or behind  $R^1$ . We have not seen an individual in which all three spots are present.

*a. E. athamas agrarius* (Nov. Zool. V. t. X. f. 7, ♂, (Ceylon).

*Eulepis samatha*, Moore (non Moore 1878), *Lep. Cyl.* I. p. 29. t. 14. f. 2. 2a. 2b. ♂ ♀, l. p. (1881) (Ceylon).

*Charaxes athamas*, Nicéville, *Bull. of Ind.* II. p. 275. n. 568 (1882) (pt.); Aitk., *Journ. Bombay N. H. Soc.* I. p. 133. n. 25 (1886) (Ghâts from XII. to III.); Wats. *ibid.* V. p. 33. n. 56 (1890) (Mysore, November); Davids. & Aitk., *ibid.* V. p. 277. n. 38 (1890) (larva, variat., habits); Betham, *ibid.* V. p. 285. n. 49 (1890) (Central Prov.); Fergus., *ibid.* V. p. 440. n. 80 (1891) (Travancore, common up to 3000 ft.); Davids., Bell & Aitk., *ibid.* X. p. 258 n. 65 (1896) (N. Canara, everywhere and at all seasons).

*Charaxes agrarius* Swinhoe, in Nicév., *Bull. of Ind.* II. p. 277. sub n. 568 (1882) (Mhow and Assirghur in October); *ibid.*, *P. Z. S.* p. 425. n. 34 t. 40. f. 3 ♂ (1886).

*Charaxes samatha*, Swinhoe, *P. Z. S.* p. 130. n. 41 (1885) (Matheran, Dec.).

*Charaxes athamas form samatha*, Hampson, *Journ. As. Soc. Beng.* p. 355. n. 81 (1888) (Nilgheries, common, 3 to 4000 ft.).

*Eulepis athamas*, Moore, *Lep. Ind.* II. p. 252 (1896) (pt.).

*Eulepis agrarius*, Moore, *l.c.* p. 257. t. 185. f. 2. 2a. ♂ ♀ (1896) (Hills of Central India; Eastern Ghâts; not Chin Hills).

*Eulepis athamas aberratio samatha*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 60 (1898) (pt.; Ceylon).

*Eulepis athamas agrarius*, Fruhstorfer, *l.c.*

*Charaxes agrarius*, Fruhstorfer, *l.c.*

Cell-bar 4 of forewing below less oblique, its upper end farther away from upper angle of cell, than in the other geographical races.

Two forms are known, which are most probably climatic varieties. We have very scanty knowledge about the occurrence of the two forms. In most places both varieties seem to be found, but at different times of years; but it is quite possible that in the dry districts only the one form is produced, while in the localities without a pronounced cold season the other is the only one found. The pale form, which, according to the dated specimens examined by us, is most probably the dry-season form, is very interesting, being always considerably different from the North Indian pale spring form. The band of the wings becomes never so broad as in spring specimens from North-West and North India; the underside is also pale, but never so pale as in March examples from Sikkim, and the femora are always as white as the tibiae; while in Sikkim individuals of the cold-season brood the submarginal spot of the forewing above becomes often obsolete or disappears entirely, the South Indian dry-season examples have (always?) two submarginal spots. These two spots are also present in a ♀ from Deesa in Colonel Swinhoe's collection, which has the cell-bar of the forewing below like North Indian specimens, and agrees with the latter also in the size of the white submarginal dots of the hindwing above. The darker South Indian form of a warm and wet climate differs very slightly from the corresponding summer form of North India, and is sometimes not distinguishable.

*♂* **E. athamas agrarius** f. (temp. ?) **madeus** Rothsch., f. nov.

♂ ♀. White submarginal dots of the upper-side of the hindwing generally slightly larger than in North Indian individuals of the summer broods; anal admarginal spot paler, less ochraceous.

Band of wings always narrow, widest at C' of hindwing (7 to 9 mm.); submarginal spot SC<sup>5</sup>—R<sup>1</sup> of forewing above sometimes absent; submarginal, white, dots of hindwing in most individuals well marked, the posterior ones somewhat enlarged. The anal admarginal, transverse spot is mostly creamy buff, mostly with a glaucous blue tint, seldom pale ochraceous. The underside is generally somewhat paler than in North Indian examples.

The submarginal spot of the forewing above is in most specimens well marked, in others very faint, seldom quite absent.

*♂* **E. athamas agrarius** f. (temp. ?) **agrarius**.

♂ ♀. Both wings more elongate than in f. *madeus*; the bases above paler, forewing apparently always with two submarginal dots above; discal spot R<sup>1</sup>—R<sup>2</sup> large, not rounded outwardly, more or less trapeziform; discal band up to 11 mm. wide at SM<sup>2</sup> in ♀, 8 or 9 mm. in ♂.—Hindwing: discal band at SC<sup>2</sup> from 7 (♂) to 10 (♀) mm. wide, biconcave outwardly; white triangular subanal abdominal patch very distinctly marked; white submarginal spots R<sup>3</sup>—SM<sup>2</sup> more than twice the size of spots C'—R<sup>2</sup>, the last two merged together to a slightly curved bar; last admarginal spot (at anal angle) pale glaucous green, admarginal spots R<sup>3</sup>—M<sup>2</sup> creamy with a faint greenish tint, often obliterated, the other admarginal markings more ochraceous, but mostly absent or very faint; pale blue scaling in tails heavier than in preceding form.

*Underside* paler, interspace between lines of black bars much less rufous than in the supposed wet-season form; the upper end of the cell-bar of forewing 3 to 5 mm. distant from discocellular mark; upper submedian bar of hindwing (at outside of praeocostal vein) incomplete, its anterior portion only being marked; bar M—(SM<sup>1</sup>) less oblique than the submedian cell-bar, well separated from the latter.

Middle and hinder legs dirty white, femora not being more or less extended black as in the North Indian forms of *athamas*. Sterna and underside of abdomen grey.

*Hab.* Ceylon and South India as far north as the Central Provinces, 20 ♂♂, 3 ♀♀. Specimens from Deesa (in Colonel Swinhoe's collection) belong to the North Indian geographical race.

f. *madeus* in the Tring Museum from Ceylon (Kandy, *type*): Karwar, September and October; N. Canara, September; Calicut; Coorg; Kalar, June, August, September. Recorded by Swinhoe from Matheran, December.

f. *agrarius* in the Tring Museum from Bangalore, Mysore, October; Kalar, May. Recorded by Swinhoe from Mhow and Assirghur, October. Not in Ceylon.

*Desideratum*: It is much to be desired that exact observations should be published by entomologists in South India about the time, season, and localities of occurrence of each of the two forms of *agrarius*. As the form *agrarius* is apparently not so common as the form *madeus*, it is not improbable that *madeus* alone occurs during the insect "season," the monsoons, while the specimens that emerge from the chrysalis during the dry period, when comparatively very few insects are on the

wing, are *agrarius*. The larva and chrysalis are described by Moore, *Lep. Ceylon* I. p. 30: "Larva elongated, thickened in the middle, dark green: head large, wide, flattened, surmounted by four spinous processes; last segment with two short naked points: the segments with an oblique yellowish-white stripe most prominent on the seventh, ninth, and eleventh; beneath these a lateral series of small white spots. Pupa cylindrical, back and thorax convex, head truncate, pointed in front; green, streaked with white. Feeds on *Caesalpinia*."

Messrs. Davidson & Aitken, *Journ. Bombay N. H. Soc.* V. p. 277, n. 38 (1890), after citing the above description of the larva, give the following account of their observations: "This is Mr. Moore's description and is good, but we have found different specimens to vary very much in the distinctness and colour of the lateral stripes; they are always present, but sometimes very faint indeed. Another more important point, which seems hitherto to have escaped notice, is that the last pair of legs are almost obsolete, and are not used in walking. We found this from June to October on the 'Goodmohr' (*Poinciana regia*), the 'Khairee' (*Caesalpinia mimosioides*), and several other trees. The larva, like those of most wary and strong-winged butterflies, is very shy and cautious in its habits, feeding by night and remaining motionless all day; but it is much preyed on from the time it leaves the egg, and only a small proportion seem to reach maturity. The pupa is almost oval, smooth, and without irregularities; in colour green, with faint white lines more or less distinct."

The insects seem to be common in most districts, but we do not always know which of the two forms is meant by the respective authors.

Moore, *Lep. Ceylon* I. p. 30 (1881), says: "*Males* most frequently found perched high up on acacia-trees. Flight quick and strong. Common (*Wade*)."

Aitken, *Journ. Bombay N. H. S. I.* p. 133 (1886), remarks about *athamas*: "This is common enough on the Ghâts, chiefly, I think, from December to March. . . . They have a *pouchant* for certain places. In the Society's collection there are one or two old specimens of large size, with the apical spot which is wanting in the smaller form."

Davidson, Bell & Aitken, *loc. cit.* X. p. 258, n. 65 (1896), in their account of the North Canara butterflies, say that *E. athamas* "is found everywhere and at all seasons; the food plants are many—*Poinciana*, *Caesalpinia*, *Grævia*, etc."

#### b. *E. athamas athamas* (Nov. Zool. V. t. X. f. 1 to 5, 9, 10).

*Papilio Eques Achæus athamas* Drury, *Ill. Ex. Ins.* p. 5, t. 2. f. 4, & *Index* (1773) (China); Cram., *Pop. Ex.* I. p. 140, t. 89, f. c. n. (1776) (China).

*Papilio Eques Achæus pyræhus*, Fabricius, *Syst. Ent.* p. 449, n. 30 (1775) (pt.); Goeze, *Ent. Beytr.* III. I. p. 78, n. 31 (1779); Fabr., *Spec. Ins.* p. 10, n. 41 (1781) (pt.); id., *Mont. Ins.* II. p. 6, n. 45 (1787) (pt.); Gmelin, *Syst. Nat.* I. 5. p. 2234, n. 25 (1790) (pt.); Turton, *Syst. of Nat.* III 2. p. 71 (1806).

*Papilio Nymphalis pyræhus*, Fabricius, *Ent. Syst.* III, 1. p. 61, n. 192 (1793) (pt.).

*Papilio pyræhus*, Donovan, *Ins. of Ind.* t. 29, f. 3 (1800).

*Erbœca athamas*, Hubner, *Verz. bek. Schmett.* p. 47, n. 430 (1816).

*Nymphalis athamas*, Godart, *Enc. Mith.* IX. p. 353, n. 11 (1823) (pt.; China); Doubl., Westw. & Hew., *Gen. Diura, Lep.* II. p. 309, n. 29 (1850) (pt.; E. India; China); Horsk. & Moore, *Cat. Lep. E. I. C. I.* p. 205, n. 417 (1857) (pt.; N. India); Lang, *Ent. Mo. Mag.* I. p. 181 (1864) (N.W. India, habits); Kirby, *Cat. Doura, Lep.* p. 271, n. 43 (1875) (pt.); Nicévy, *Journ. As. Soc. Beng.* I. p. 58, n. 38 (1881) (Ranjit valley, common, October); Wood-Mas. & Nicévy, *loc. cit.* p. 248 (1881) (Pt. Blair); Robbe, *Ann. Soc. Ent. Belg.* XXXVI. p. 129, n. 50 (1892) (Darjeeling).

- Charaxes athamas*, Butler, *P. Z. S.* p. 634. n. 45 (1865) (pt.: India; China); id., *Cat. Diura, Lep. descr. by Fabr.* p. 51. n. 6 (1863) (pt.); Druce, *P. Z. S.* p. 345 (1873) (? China); id., *l.c.* p. 106 (1874) (Chentaboon, Siam); Moore, *ibid.* p. 271 (1874) (Cashmere); Nicéy., *Indoan Agriculturist* for January (1880) (Kolgarth, October); id., *Bull. of Ind.* II. p. 275. n. 568 (1882) (pt.); Staud., *Erot. Taqf.* p. 172. t. 59 (1886); Elwes & Moller, *Tr. Ent. Soc. Lond.* p. 367. n. 209 (1888) (Sikkim); Nicéy., *Journ. Bombay N. H. Soc.* V. p. 297. n. 49 (1890) (Chin Lushai); Manders, *Tr. Ent. Soc. Lond.* p. 526 (1890) (Shan States); Watson, *Journ. Bombay N. H. Soc.* VI. p. 41. n. 91 (1891) (Tilin, XI. II. III.); Walker, *Tr. Ent. Soc. Lond.* p. 458. n. 52 (1895) (Hong-Kong, seen).
- Charaxes samatha* Moore, *P. Z. S.* p. 831 (1878) (Moolai, 3 to 6000 feet, Upp. Tenasserim).
- Eulepis albanus*, Moore, *P. Z. S.* p. 238 (1882) (N.W. Himalayas; Kangra; Kulu, 3000 feet); Nicéy., *Journ. As. Soc. Beng.* LI. ii. p. 61 (1882) (Sikkim, October; pt.); Swinh., *Tr. Ent. Soc. Lond.* p. 289. n. 192 (1893) (Khasia Hills); Moore, *Lep. Ind.* II. p. 252. t. 184. f. 1b. 1c. 1d. (1896) (pt.).
- Charaxes athamas* var. *samatha*, Distant, *Rhop. Mal.* p. 106. n. 4 (1883) (pt.: Mal. Pen.).
- Eulepis hamata* Moore, *P. Z. S.* p. 238 (1882) (Dharmasala, 6200 ft. in March and June).
- Charaxes (Eulepis) albanus*, Wood-Mas. & Nicéy., *Journ. As. Soc. Beng.* LV. ii. p. 363. n. 99 (1886) (Cochin, VI. to VIII.); Doherty, *ibid.* p. 124. n. 94 (1886) (Kumaon); Elwes & Nicéy., *ibid.* p. 426. n. 81 (1886) (Ponsekai & Dayoi = *samatha*); Nicéy., *Gazetteer of Sikkim* p. 147. n. 231 (1894) (Sikkim); Watson, *Journ. Bombay N. H. Soc.* X. p. 656. n. 118 (1896) (Chin Hills); Mackin. & Nicéy., *ibid.* XI. p. 377. n. 121 (1898) (*Mussorie and the Doo*, IV. to IX., common).
- Eulepis samatha*, Butler, *Ann. Mag. N. H.* (5) XVI. p. 306. n. 48 (1885) (Mylong R.).
- Charaxes bhārata* Felder, *Reise Novara, Lep.* III. p. 438. n. 712 (1867) (Darjeeling); Butl., *Tr. Ent. Soc. Lond.* p. 119. n. 3 (1890) (pt.; Nepal); Staud., *Erot. Taqf.* p. 172 (1886); Rober, *Ent. Nachr.* XX. p. 292 (1894).
- Nymphalis athamas* var. *b. C. bhārata*, Kirby, *Cat. Diura, Lep.* p. 271. sub n. 43 (1871) (Sikkim).
- Eulepis athamas hamata*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 60 (1898) (Sikkim; Kashmir).

The gradation from the wide-banded individuals (Nov. Zool. V. t. X. f. 1. 3. 9.) to the narrow-banded examples (*l.c.* t. X. f. 2. 5. 10) is complete. The specimens with broadest band occur in Sikkim in March, those with a somewhat narrower band in April, May, and June, and the narrow-banded ones from August to November (December?). Hence there can be no doubt (1) that the specimens belong to only one species, and (2) that the differences in the individuals must be accounted for by the differences in the season. Such specimens as represented by fig. 3 we have not seen from any other country than Sikkim, but they occur doubtless also in other parts of North and North-West India. From North-West India we have not received (nor have we seen in other collections) specimens with such a narrow band as fig. 3 has. The wide-banded specimens (*l.c.* f. 1. 3) from Sikkim are certainly those that emerged from pupae which had hibernated; hence we must expect to meet with similar specimens in North-West India only in the early spring at higher elevations. Judging from the differences in the characters of the pale South Indian form, which corresponds to the broad-banded North Indian forms, it is not probable that the extreme broad-banded form occurs at low elevation in North India. The product of the "dry" season in South India is a pale, but comparatively narrow-banded, form; in Burma and Tenasserim, at low elevations, there occur also individuals which are somewhat similar to that "dry" season form, having also a comparatively narrow band. Therefore, it seems to us probable that the widest band of *athamas* is the product of a cold climate—we do not say that the low temperature is the "cause" of there existing such a wide-banded form—and not of a "dry" and warm one.

The narrow-banded form is the one figured by Drury as *athamas*. Felder's *bhārata* has the band moderately wide, like the Sikkim individuals caught in May and June; in Moore's *hamata*, described from North-West India, the band is

wider than in *bharata*, but not so broad as in the extreme March examples from Sikkim; the name may, however, stand for the broods with the widest band.

♂ ♀. Cell-bar of forewing below very oblique, pointing towards upper angle of cell or to discocellular spot: two dots in cell, one of them sometimes absent in f. temp. *hamista*; red postdiscal spot C—SC<sup>2</sup> of hindwing below obliquely reniform, or regularly arched; posterior white submarginal spot of hindwing above not, or only a little, larger than the anterior ones; second tail in ♂ longer than, or as long as, in ♀ shorter than, the first tail. Femora black, oversprinkled with white scales.

a<sup>1</sup>. **E. athamas athamas** f. temp. **athamas** (Nov. Zool. V. t. X. f. 4, ♀, 5, ♂).

♂. Forewing from 30 to 35 mm. long in North India, sometimes shorter in Burma, Tenasserim, and the Malay Peninsula: our smallest individual, from the Shan States, has the wing 27 mm. long; submarginal spot SC<sup>5</sup>—R<sup>1</sup> mostly present, in the large as well as in the small specimens, sometimes very faint (in examples from all localities), less often quite absent (in examples from all localities); band, at SM<sup>2</sup>, about as wide as the black basal area.—Hindwing: band biconcave outwardly; its inner edge entering cell close to, or at, origin of R<sup>1</sup>; subanal abdominal pale patch very variable in distinctness, often almost absent; white submarginal dots also very variable, often very minute; the ochraceous or tawny admarginal spots sometimes clearly marked, but in most individuals rather obscure, the upper ones often absent, anal one somewhat paler than the others, seldom so pale as in South Indian examples of *agrarius* f. (temp.?) *maleus*.

*Underside*.—Forewing: cell with two heavy spots; upper end of cell-bar sometimes nearly joining bar D; interspace R<sup>3</sup>—M<sup>2</sup> between band and discal bars either rufous-brown or black, variable in width.—Hindwing: outer edge of band crossing R<sup>3</sup> between the base and the bent of that vein; bars sharply marked; interspace between submedian and median lines of bars, as on forewing, bright in colour; red postdiscal spots heavy, spot R<sup>3</sup>—M<sup>1</sup> deeply incurved; median bars SM<sup>1</sup>—SM<sup>3</sup> well marked, varying in position.

♀. Forewing 35 to 42 mm. long: band paler than in ♂, at least  $\frac{1}{3}$  wider than basal black area at SM<sup>2</sup>, white submarginal spots all very prominent; submarginal dot of forewing always (?) present.

b<sup>1</sup>. **E. athamas athamas** f. temp. **bharata** (Nov. Zool. V. t. X. f. 9, ♂).

♂. Of the same size as the preceding form, hindwing sometimes a little more triangular; band of forewing one third as wide again, or twice as wide as, black basal area at SM<sup>2</sup>; discal spot R<sup>1</sup>—R<sup>2</sup> at least 4 mm. long; on hindwing the outer edge of the band crosses R<sup>3</sup> at the bent of this vein.

*Underside* pale: the black markings in the basal half of the wings are sometimes less heavy than in f. temp. *athamas*, the second spot in the cell of the forewing occasionally absent, the postdiscal red spots thinner than in f. temp. *athamas*, more regularly curved.

♀. Band of forewing twice the width of basal black area at SM<sup>2</sup>.

Mr. Watson records (*loc.*) a peculiar form from Tilin Yaw, Burma, caught by him in February. The band is not wider than in f. temp. *athamas*, but the wings are more elongate, the red spots of the underside are thin, the underside is paler, the cell of the forewing has only one spot; the outer edge of the band of the



hindwing above is nearly straight, the white submarginal dots are heavy, the forewing has two submarginal dots (as *agrarius* f. (temp. ?) *agrarius*). But the most remarkable character found in a number of individuals is the colour of the band on the underside, the band not being white, but yellow with a white edge. As Mr. Watson obtained in the same locality at the same time of the year (February) also ordinary specimens, it is probable that this yellow-banded form is not of normal occurrence. But collectors visiting the same locality should pay special attention to *E. athamas*. For the present it is best not to name the form, but to keep it under *bharata* on account of the small red spots on the underside of the hindwing. Mr. Watson obtained in the same locality at the same time of the year also specimens which have broader bands, coming nearer to *bharata*, and with only one submarginal dot on the forewing. Moore, *Lep. Ind.* II. p. 257, treats the form as *agrarius* on account of the presence of two submarginal spots on the forewing; with the South Indian *athamas agrarius* it has, however, nothing to do; it occurs within the area of *athamas athamas*, with which it agrees in the position of the cell-bar of the forewing below, and has also the darker femora of the latter.

*e*<sup>1</sup>. **E. athamas athamas** f. temp. **hamasta** (Nov. Zool. V. t. X. f. 1. 3. ♂).

♂. Wings more elongate than in f. temp. *athamas* and f. temp. *bharata*. Band very wide, at SM<sup>2</sup> more than twice as wide as the black basal area; base of both wings and especially the abdominal fold paler than in the preceding two forms; discal patch SC<sup>5</sup>—R<sup>1</sup> of forewing large, much longer than broad, seldom with the trace of a small spot in front; generally one small submarginal dot, which is sometimes absent; a white line in middle of costal margin, and rarely a whitish patch in cell in the extreme specimens.

*Underside* pale, postdiscal spots small; submedian line of bars more or less obsolete in the palest individuals, often also the median bars of the hindwing nearly all obliterated.

*Hab.* Kashmir, N.W. India, N. India to Siam, Malacca, Tonkin and South China (Hong-Kong).

In the Tring Museum are specimens from the following localities;—

*a*<sup>1</sup>. *f.* temp. *athamas*: Sikkim, July to November, ♂♂, ♀♀; Khasia, Garo and Naga Hills, Assam; Tonkin; Burma, various places, October to December; Tenasserim, March, May; Penang, October; Perak, May.

*b*<sup>1</sup>. *f.* temp. *bharata*: Ranikhet, May; Kulu, Naini Tal, Kangra, N.W. India, June; Sikkim, June; Khasia Hills; Shan States.

*e*<sup>1</sup>. *f.* temp. *hamasta*: Sikkim, March.

Authentic Chinese specimens we have not examined. The specimens from the Malay Peninsula are partly indistinguishable from the following race.

As many authors have mixed up the pale forms of *athamas* with *E. arja*, we do not always know if what is recorded about the habits refers to *athamas* only, or to *athamas* and *arja*. But as both species have most likely the same habits, we shall give here what is said of them, without trying to keep that which refers apparently to *arja* separate from the notes on *athamas*.

Lang, *l.c.*, in his notes on the Diurnal Lepidoptera of North-Western India, says of *athamas*: "An insect of extremely rapid flight, flashing like lightning up and

down rocky-bedded streams in Himalayan glens (3,000 to 5,000 ft.). It pitches on rocks in mid-stream and flashes off again if approached. It is not common, and very difficult to capture; yet one very hot day in June I saw seven individuals sitting with closed wings, motionless, on a foul spot (by the damp sandy margin of a stream), so close together, that I might have put my hat over all of them. Except on that occasion, I have only seen one at a time."

Nicéville remarks (see Moore, *Lep. Ind.* II. p. 257) about North-West Indian *athamas*: "I took one specimen in October, 1878, at Kotgarh, imbibing moisture on a damp spot near the Komarsen stream. Of all the butterflies I am acquainted with, this insect is the swiftest on the wing. I have taken a few small and apparently hibernated specimens on hill tops near Simla in April, and have seen the ordinary sized ones in various places near Simla in the autumn. My Darjeeling specimens are decidedly darker than those taken at this end of the Himalayas. Expanse from 2.2 to 2.9 in." Mr. de Nicéville was at the time when he wrote this note (1879) most probably not yet acquainted with the very pale Sikkimese spring form.

Hocking, *P. Z. S.*, p. 238 (1882), considers our insect "The wildest butterfly that I know. Takes very long flights at a time, and returns to the same point. Very shy."

According to Elwes and Möller, *l.c.*, the species is "common in Sikkim at low elevations from April to December, and occurs up to 5,000 or 6,000 ft." There are several March examples in Möller's collection from Sikkim (now in the Triug Museum) labelled 9. 3. 88 and 11. 3. 87.

Mr. Elwes adds: "I have seen his (Moore's) type of *hamasta*, and have Ceylon specimens (*samatha*). In neither is there anything at all to make them worthy of distinction even as varieties."

In *Gazetteer* of Sikkim, Mr. de Nicéville says of *athamas*: "The commonest species of the genus occurring in Sikkim, and found from April to December from 6000 ft. to the level of the Terai. The larva feeds on a species of plant very like a prickly *Mimosæ*."

Mackinnon, *Journ. Bombay N. H. Soc.* XI. p. 377. n. 121 (1898): "Very common in Mussoorie and in the Dm from April to September. The larva feeds on the leaves of *Albizia julibrissin* Durazz., *Leguminosæ*, in Mussoorie, and on *Acacia catechu* Wild., *Leguminosæ*, in the Dm."

*e. E. athamas uraeus* Rothsch., subsp. nov. (Nov Zool. V. t. X. f. 8, ♂).

*Charaxes athamas*, Janson, *Cruise Marchesa* II. p. 375. n. 55 (1886) (Borneo); Hagen, *Tijdschr. Kon. Ned. Aardr. Genootsch.* p. 211. n. 3 (1890) (Deli, Sumatra); Snell, in Snelleman, *Mull.-Sumatra* II. p. 16 (1890); Röber, *Ent. Nachr.* XXI. p. 65 (1895) (Sumatra); Hagen, *Iris* IX. p. 186. n. 243 (1896) (Sumatra).

*Charaxes (Eulepis) athamas*, Nicéville & Martin, *Journ. As. Soc. Beng.* LXIV. p. 435. n. 256 (1895) (Sumatra).

*Charaxes samatha*, Standinger (non Moore, 1878), *Exot. Tagf.* p. 172 (1886) (pt.; Borneo); Hagen, *l.c.*, p. 211. n. 4 (1890) (Deli); Röber, *Ent. Nachr.* XX. p. 291 (1894) (pt.; Borneo); id., *l.c.* XXI. p. 65 (1895) (Borneo, Sumatra).

*Charaxes athamas* var. *C. attalus*, Butler (non Felder, 1867), *Journ. Linn. Soc. Lond.* XXV. p. 384 (1896) (pt.; Sumatra, Borneo).

No seasonal dimorphism: one form only known in each locality. The Sumatra specimens agree in the proportional width of the band with the examples of the

North Indian summer broods (f. temp. *athamas*); the Bornean individuals approach, however, in this respect the wider-banded f. temp. *bharata*. The Sumatran individuals are, on the whole, somewhat different from the Bornean ones; but as we have only one sex ( $\sigma\sigma$ ) for comparison, we do not think it advisable, for the present, to treat them under two subspecific names, but shall describe their characters separately. The Bornean race is the more differing of the two when compared with continental individuals.

Distance of tip of upper tail from a line connecting tip of  $R^2$  with the angle formed by the second tail and the anal edge of the wing larger than the distance of the tip of the second tail from this line; in f. temp. *athamas* the reverse is the case. Cell of forewing below with one dot, the second very seldom visible, and then extremely small.

Discal band in Sumatra specimens widest beyond  $SM^2$  on forewing, 8—9 mm., the last partition convex outwardly, more extended distal than partition  $M^2$ — $SM^2$ ; submarginal spot  $SC^{(5)}$ — $R^1$  mostly absent, but sometimes clearly marked, though small. Submarginal white spots of hindwing well marked, somewhat larger than in the ordinary individuals of f. temp. *athamas*; admarginal spots very obscure or absent, anal one pale. On the underside the red postdiscal spot  $C'$ — $SC^{(2)}$  comparatively larger than in North Indian individuals, less half-moon shaped, more obliquely ovate, heavily bordered with black, spot  $R^2$ — $R^3$  generally replaced by black; median bar  $M^2$ —( $SM^1$ ), bordering the last partition of the discal band proximally, absent from most specimens.

Length of forewing: 28—32 mm.

The Bornean specimens are mostly somewhat larger than the Sumatran ones, the forewing varying in our examples from 30—35 mm. Band in front of  $SM^2$  of forewing one-third wider than the black basal area at this vein, 9—10 mm. broad; discal spot  $R^1$ — $R^2$  obviously smaller than in North Indian specimens with the band of the same width; submarginal spot  $SC^{(5)}$ — $R^1$  very rarely indicated.—Hindwing: somewhat less triangular than in f. temp. *bharata* and most f. temp. *athamas*; tails often very short, the upper one mostly very broad at base; submarginal and admarginal spots as in Sumatran individuals. On the underside sometimes both spots in cell of forewing obliterated; red postdiscal spot  $C'$ — $SC^{(2)}$  of hindwing more often obliquely luniform than in Sumatran examples.

Our single example from Bunguran, Natuna Islands, is in a bad state of preservation; it agrees in the width of the band with the Bornean individuals.

*Hab.* Sumatra, 17  $\sigma\sigma$ : Deli, Battak Mts., Palembang; Fort de Koek and Setinjak, West Sumatra. Borneo, 13  $\sigma\sigma$ : Lawas, February (A. Everett), Mt. Dulit, February, March (Hose), Mt. Mulu, November, December (Hose), Mt. Kina Balu, Baram R., October (Everett), Pengarocan (S.E. Borneo): Bunguran, Natuna Islands, September to October 1894 (Hose), 4  $\sigma$ .

Martin, *loc.*, says that *athamas* is without doubt the commonest of all the "*Charaxes*" in Deli, occurring from near the sea to Bekantschan and Soengei Batoc; *females* are very rare. The *males* are very fond of moist places and faeces, to which they will always return after being disturbed; when frightened they retire temporarily to the leaves of the higher trees well out of reach, and settle with folded wings. On the wing they are not easily differentiated from the *Pierinae*, only their flight is very much stronger and more rapid. Dr. Martin's collectors did not obtain *females*, according to the material in Dr. Martin's collection. Occurs at Selesseh all the year round according to the dated specimens obtained by Dr. Martin.

*d. E. athamas palawanicus* Rothsch., subsp. nov. (Nov. Zool. V. t. XI.  
f. 9 ♂. 10 ♀).

*Charaxes athamas* Drur. (and ab. *bharata* Feld.). *Ständering Iris* II. p. 81 (1889) (Palawan).

♂ ♀. Approaches f. temp. *bharata* in the width of the band, but differs from it especially in the less triangular hindwing, the proportionately shorter second tail, the heavier, yellow, admarginal spots of the underside of the hindwing, the absence of the second spot in the cell of the forewing below.

*Forewing above*: band not indented upon veins outwardly, while in *uraeus* the band is indented at least upon SM<sup>2</sup>, not wider behind SM<sup>2</sup> than before this vein, last partition generally less wide than partition M<sup>2</sup>—SM<sup>2</sup>; band at SM<sup>2</sup> more than one-third broader than black basal area at this vein, detached discal spot R<sup>1</sup>—R<sup>2</sup> nearly as in f. temp. *bharata*, somewhat larger than in *uraeus*: submarginal spot SC<sup>5</sup>—R<sup>1</sup> seldom marked.—Hindwing: outer edge of band generally almost straight, seldom obviously biconcave; white submarginal spot large, in ♀ closer to edge of wing than in ♀ of f. temp. *athamas* and *bharata*.

*Underside*.—Forewing with one spot in cell, the second seldom indicated.—Hindwing, admarginal yellow bars longer and broader than in all preceding forms, not or scarcely interrupted at veins.

There is one ♂ in Dr. Ständering's collection caught by Dr. Platen in 1887, which differs considerably from the ordinary Palawan form. The forewing is more falcate, the hindwing much more triangular, the band is considerably narrower, widest on the forewing at M<sup>2</sup> (only 6½ mm.), outer edge indented on forewing upon SM<sup>2</sup>, taken as a whole somewhat concave, obviously biconcave on hindwing; two submarginal spots on forewing between SC<sup>5</sup> and R<sup>2</sup>: admarginal spots of hindwing tawny, very large, nearly as deep in tint as in the Philippine race; on the underside the band of the hindwing is bordered with brownish black down to R<sup>3</sup>; the admarginal spots are as large as in the typical Palawan examples, but tawny; the upper end of the cell-bar of the forewing is about as far from the upper angle of the cell as in the Philippine Island specimens. This individual approaches in several characters the following subspecies. A similar individual is in the British Museum. We do not know whether *athamas* exhibits seasonal dimorphism on Palawan, as all the specimens we have examined from that island were not dated.

*Hab.* Palawan, 5 ♂♂, 1 ♀.

In Dr. Ständering's collection there is a specimen with the band of the hindwing densely suffused with black; on the underside the white band is on the forewing, replaced by a band of reddish brown, on the hindwing by rufous red scaling; the black discal lunules of the hindwing are absent.

*e. E. athamas acutus* Rothsch., subsp. nov. (Nov. Zool. V. t. XI. f. 7 ♂.  
8 ♀, Mindoro).

*Charaxes athamas*, Semper, *Taqf. Philipp.* p. 79. n. 98 (1887) (Luzon, Mindoro, Bohol, E. Mindanao, Sarangani, January, May to July).

*Charaxes athamas* var. 4. *C. samatha*, Butler (non Moore, 1878), *Journ. Linn. Soc. Lond.* XXV. p. 383. sub. n. 92 (1896) (pt. : Philippines).

♂. Forewing deeply concave outwardly, hindwing triangular as in *agrarius* f. temp. *agrarius*; both tails acute, upper one short, wing deeply concave between tails; admarginal spots of hindwing above and below much deeper in tint than in

any other form of *E. athamas*, deep tawny; tails without pale blue scaling; upper end of cell-bar of forewing below farther from angle of cell than in *athamas athamas* and *uraeus*, similar in position to the bar of *agrarius* f. (temp. ?) *agrarius*.

*Upperside*: forewing, submarginal spot  $SC^{15}-R^1$  minute or absent; band more yellowish than in Palawan *athamas*, 9 mm. wide upon  $M^2$ , scarcely  $\frac{1}{4}$  wider at  $SM^2$  than black basal area, not indented upon veins, but more or less sinuate between veins, last partition not more, or not so far, extending distal as partition  $M^2-SM^2$ , the outer edge of the band taken as a whole slightly convex.—Hindwing: band conspicuously biconcave outwardly, indented just behind  $R^3$ ; white submarginal spots small but all well marked, except the uppermost one which is sometimes absent, the last two much shaded with blue; admarginal spots deep tawny, the posterior ones rather broad, anal one pale, creamy at least in middle.

*Underside*: band more greenish white than in the preceding races.—Forewing: cell-bar not curved at upper end, second cell-dot seldom indicated; silvery scaling at outside of postdisco-submarginal kidney-shaped markings not spot-like.—Hindwing: outer border of discal band black or blackish brown, not rufous red; upper postdiscal brown-red spot heavy; admarginal spots tawny, not ochraceous, thin, separated at the veins, especially the posterior ones, anal one pale, at least in middle; median bars ( $SM^1$ )— $SM^3$  at right angles to  $SM^2$ , or even pointing a little distad posteriorly, not basad as in the preceding races.

Length of forewing 30—32 mm. (Mindanao); our single Mindoro ♂ measures only  $27\frac{1}{2}$  mm., but there are specimens in Dr. Standinger's collection which are not smaller than the Mindanao examples. Semper gives 30—33 mm. as the length of the wing. The upper tail is in Mindoro individuals sometimes longer than is usually the case in the present subspecies.

♀. Mindanao ♀♀ unknown to us. The Mindoro ♀ has the band as pale as the Palawan form, but the band is somewhat narrower, the admarginal spots of the hindwing are deeper in tint, below much thinner; outer border of discal band of hindwing below blackish brown in front. Length of forewing according to Semper 34—37 mm.

*Hab.* Mindanao, 4 ♂♂, *type* (Dr. Platen); Mindoro, 1 ♂, 1 ♀ (Dr. Platen); Luzon, 1 ♂ (Lorquin, ex coll. Felder); Bohol, Sorangani. Semper's specimens were obtained in January and May to July. Occurs probably all the year round.

*f. E. athamas attalus* (Nov. Zool. V. t. XI. f. 1 ♂, 3 ♀).

*Nymphalis athamas*, Godart (non Drury, 1773), *Enc. Méth.* IX. p. 353. n. 11 (1823) (pt.; Java); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* II. p. 309. n. 29 (1850) (pt.; Java); Horsf. & Moore, *Cat. Lep. Mus. E. I. C.* I. p. 205. n. 417. t. 4. f. 3, 3a, l., p. (1857) (pt.; Java).

*Paphia athamas*, Horsfield, *Cat. Lep. Mus. E. I. C.* t. 8. f. 7 a—g, l., p. (1828) (Java).

*Charaxes athamas*, Butler, *P. Z. S.* p. 634. n. 45 (1865) (pt.; Java); id., *Cat. Diurn. Lep. descr. by Fabr.* p. 51. n. 6 (1869) (pt.; Java); Piep., *Tijdschr. v. Ent.* XIX. p. 146. n. 19 (1876) (Batavia); Nicéy., *Bull. of Ind.* II. p. 275. n. 568 (1882) (pt.; Java); Pagenst., *Jahrb. Nass. Ver. Nat.* XLIII. p. 97. n. 62 (1890) (E. Java, July); Rüb., *Ent. Nachr.* XX. p. 291. n. 1 (1894) (pt.; Java).

*Charaxes attalus* Felder, *Reise Norara, Lep.* III. p. 438. n. 711 (1867) (Java); Butl., *Tr. Ent. Soc. Lond.* p. 119. n. 2 (1870) (not distinct).

*Nymphalis athamas* var. a. *Char. attalus*, Kirby, *Cat. Diurn. Lep.* p. 271. sub n. 43 (1871) (Java).

♀. *Charaxes fruhstorferi* Rober, *Ent. Nachr.* XXI. p. 63 (1895) (Java).

♀. *Charaxes phicius* Rober, *l.c.* p. 61 (1895) (Java).

*Eulepis attalus*, Moore, *Lep. Ind.* II. p. 263 (1896) (Java); = *fruhstorferi* — *phicius*.

*Charaxes athamas batavianus* Fruhstorfer, *Ent. Nachr.* XXIV. p. 57. n. 3 (1898) (Batavia).

*Charaxes batavius* Fruhstorfer, *l.c.* p. 58 (1898) (Batavia : not Lombok).

*Charaxes athamas*, Fruhstorfer, *l.c.* p. 58 (1898) (E. Java : = *phivius*).

*Charaxes alpius*, Fruhstorfer (non Staudinger, 1886), *l.c.* p. 59 (1898) (*fruhstorferi* = ♀ *alpius* ex errore).

*Eulepis athamas aberratio samatha*, Fruhstorfer (non Moore, 1878), *l.c.* p. 60 (1898) (pt. : Java).

*Eulepis athamas batorivimus* Fruhstorfer, *l.c.* p. 60 (1898).

*Eulepis athamas alpius*, Fruhstorfer, *l.c.*

The type specimen of *attalus* is a very broad-banded individual (♂), which Felder found in the old collection of Van der Capellen. As it does not agree exactly with any of the other Javan examples we have examined, we were at first inclined to attribute this difference to a mistake as to locality; but the individual also does not agree with the examples from any other locality. The comparatively large white submarginal dots of the hindwing, above, it has in common with the ordinary Java specimens; the discal spot  $R^1-R^2$  of the forewing is much shorter than in Indian specimens with an equally wide band; the hindwing is less produced apically than in either the ordinary Java form or the wide-banded continental forms; the cell-bar of the forewing below has the same position as in *athamas athamas*, pointing towards the discocellular spot; the red postdiscal spots of the hindwing are thin—especially spot  $C'-SC^2$  is much thinner than in other Java individuals,—but this is attributable to the width of the band; the admarginal spots of the underside of the hindwing are pale yellow as in *athamas athamas*, small and ill-defined, while the tails are acute and slender as in Java examples; the femora are black with white scattered scales as in *athamas athamas*, *athamas urucus*, and *athamas acutus*; the body and wings beneath agree in general tint best with the North Indian summer form. On Mount Gede, at about 4000 feet, Mr. Prillwitz obtained a form which agrees with the type of *attalus* in the black femora, the colour of the body beneath and the general tint of underside of the wings, but has the band, which in the type is 11 mm. wide at the internal edge of the forewing and  $11\frac{1}{2}$  mm. at the costal margin of the hindwing, only 10 and  $9\frac{1}{2}$  mm. broad respectively; moreover, the yellow admarginal spots of the hindwing below are as large as in ordinary Java specimens, not so small as in the type, and have the deeper tawny-yellow tint of the spots of the former.

A specimen collected in South Java by Mr. H. Fruhstorfer, at 1500 feet elevation (Nov. Zool. V. t. XI. f. 1, ♂), agrees fairly well with the Gede form, but approaches in the paler underside the ordinary Java specimens. Such specimens show, however, that there is considerable variation among the Java *athamas*, and hence we believe that the type of *attalus* is really a Javan example. The material in collections is mostly without the date of capture; besides, there is little or no material available for comparison from the mountains except Mount Gede, where Prillwitz has collected, and is still collecting, Lepidoptera; hence we do not know what kind of variation the different specimens from Java illustrate. If we have to do with seasonal variation, the form with the white femora, silvery underside of the wings, and elongate wings is most likely the dry-season form; but then the wet-season form would have the wider band, while, judging from the differences between the seasonal forms of continental *E. athamas*, it should have, on the contrary, the narrower band of the two forms. The difference in the individuals would be more satisfactorily explained if the broad-banded individuals with the dark femora and less white underside represented a mountain race, while the specimens with the paler underside and more elongate wings represented the lowland race. Or, it is also possible that the difference in the specimens indicates only individual variation.

Which of the three possibilities here adduced will ultimately prove to be the true explanation, we do not venture to suggest. Anyhow, we have the interesting fact that there are in Java two forms, of which, though not very different from one another, the one resembles more the summer broods of continental *athamas*, while the other agrees more closely with *athamas* from the Lesser Sunda Islands.

The names *fruhstorferi* and *baticianus* apply to the individuals with the paler underside; *attalus* and *phircus* to the broader-banded specimens with the darker underside.

f<sup>1</sup>. **E. athamas attalus** f. **attalus** (Nov. Zool. V. t. XI. f. 1, ♂).

♂ ♀. Band varying on forewing before SM<sup>2</sup> from 9½ to 10½ mm., at least twice as broad at that vein as the black basal area; on hindwing the inner edge of the band crosses SC<sup>12</sup> just at (not beyond) origin of R<sup>1</sup>; discal spot R<sup>1</sup>—R<sup>2</sup> of forewing smaller than in *athamas athamas* f. temp. *bharata*; one, seldom two, submarginal dots; submarginal spots of hindwing larger than in f. temp. *bharata*; costal angle of hindwing less rounded; tooth at SC<sup>12</sup> more prominent; femora black with white, scattered scales; underside of body and basal region of wings as in f. temp. *athamas*.

g<sup>1</sup>. **E. athamas attalus** f. **fruhstorferi** (Nov. Zool. V. t. XI. f. 3, ♀, type).

♂. Wings shaped as in the South Indian f. (temp.?) *agrarius*, more elongate than in f. *attalus*.

*Upperside*.—Forewing: discal band varying in width at SM<sup>2</sup> from 7 to 8 mm., one-quarter or less wider than the black basal area; discal spot R<sup>1</sup>—R<sup>2</sup> concave proximally, variable in size; submarginal dot SC<sup>15</sup>—R<sup>1</sup> always well marked, often with a second in front.—Hindwing: pale subanal abdominal patch very distinct, mostly joined to the discal band; submarginal white dots as large as in f. *attalus*, the last two separate as in f. *attalus*; admarginal spots tawny, anal one very pale.

*Underside* pale; basal region of both wings and abdominal area of hindwing vinaceous silvery grey.—Forewing with one or two dots in cell, cell-bar reaching SC before upper angle of cell; median bar M<sup>1</sup>—M<sup>2</sup>, as in f. *attalus*, more proximal than in the ordinary specimens of f. temp. *athamas*.—Hindwing: submarginal black spots transverse.

Underside of palpi and sterna more white than in f. *attalus* and f. temp. *athamas*; femora all greyish white on account of the dense whitish scaling.

♀. Similar to ♂, but wings broader. Forewing mostly with a second, small, submarginal spot behind (not before, as in ♂) the ordinary spot SC<sup>15</sup>—R<sup>1</sup>; discal spot R<sup>1</sup>—R<sup>2</sup> often with a small spot in front; admarginal fawny ochreous spots of hindwing all marked, larger than in ♂, larger above than below; basal half of abdomen below grey or greyish white.

*Hab.* Java.

In Tring Museum, 9 ♂♂, 3 ♀♀:

f. *attalus* from Mt. Gede, 4000 feet, August 1892 (H. Fruhstorfer); the type labelled "Java, coll. V. d. Capell." Perhaps the mountain form.

A transition to the next from S. Java, 1500 feet (H. Fruhstorfer).

f. *fruhstorferi* from Batavia and S. Java, 1500 feet (H. Fruhstorfer). Perhaps the lowland form.

The larva and chrysalis are figured by Horsfield, *loc.*: they agree with those of

*E. athamas agrarius*, considering that the caterpillars of *agrarius*, and most likely also those of the other geographical races of *athamas*, are not quite constant in colour and pattern.

*g. E. athamas sumbaensis* (Nov. Zool. V. t. XI. f. 5 ♂, Lombok, 6 ♂, Sumba, 4 ♀, Sambawa).

*Charaxes athamas*, Snellen, *Tijdschr. v. Ent.* XXXIV. p. 239. n. 18 (1891) (Flores); Doherty, *Journ. As. Soc. Beng.* LX. ii. p. 174. n. 47 (1891) (Sambawa: Sumba); Pagenst., *Jahrb. Nass. Ver. Nat.* XLIX. p. 144 (1896) (Sumba).

*Charaxes athamas* var. *attalus*, Röber (non Felder, 1867), *Tijdschr. v. Ent.* XXXIV. p. 308 (1891) (Alor; Flores).

*Charaxes alphius*, Röber (non Standinger, 1886), *Ent. Nachr.* XX. p. 291 (1894) (pt.: Flores; Alor); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 384. n. 93 (1896) (pt.: Sambawa); Fruhst., *Ent. Nachr.* XXIV. p. 58 (1898) (Lombok; Sambawa).

*Charaxes phiræus*, Fruhstorfer (non Röber, 1895), *Berl. Ent. Zeitschr.* XLI. p. 389 (1896) (Lombok).

*Charaxes athamas alphius*, Fruhstorfer, *l.c.*, XLII. p. 6 (1897) (Lombok; not rare near the coast).

*Charaxes athamas phiræus*, Fruhstorfer, *l.c.*, p. 6 (1897) (Lombok).

*Eulepis sumbaensis*, Swinhoe, *Ann. Mag. N. II.* (6). XIX. p. 408 (1897) (Waingapo, Sumba).

*Charaxes (Eulepis) athamas*, Nicéville and Elwes, *Journ. As. Soc. Beng.* LXVI. ii. p. 691. n. 142 (1898) (pt.: Lombok; Sambawa).

*Charaxes (Eulepis) butaricus*, Nicéville and Elwes, *l.c.* n. 143 (1898) (Lombok).

*Charaxes (Eulepis) alphius*, *id.*, *l.c.* n. 144 (1898) (Lombok).

*Charaxes butaricus*, Fruhstorfer, *Ent. Nachr.* XXIV. p. 58 (1898) (pt.: Lombok, coast, April).

The specimens from Lombok to Alor and Sumba form a complete transition from the pale and slender Javanese *attalus* f. *fruhstorferi* to *athamas alphius* from Timor and Wetter. There is always a discal spot  $SC^5-R^1$  marked on the forewing; this spot is in the specimens from Lombok, Sambawa, Flores, Adonara, mostly about one-fourth the size of the second discal spot,  $R^1-R^2$ , but in the examples from Sumba, Pantar and Alor often as large as, or even larger than, in *alphius*. From *attalus* f. *fruhstorferi* it differs in the angle formed on the forewing by  $R^3$  and  $M^1$  being above somewhat more extended black, the band appearing deeper incised; on the underside the bar  $R^2-M^1$  stands not quite so close to the base of  $M^1$  as in *attalus* f. *fruhstorferi*, there being a distinct reddish brown spot visible at proximal side of bar in nearly all specimens; the rufous brown scaling at the proximal side of the discal spot  $R^1-R^2$  on the underside of the forewing is generally more extended; median bar  $SC^5-R^1$  is well marked, and the tawny ochraceous admarginal spots of the hindwing below are generally larger than in *attalus*.

From *alphius* the present form is distinguished by the larger submarginal white spots of the hindwing, the paler colour of the discal band on the upperside, and the less extended brownish red scaling in the costal region of the forewing below, there being scarcely any obviously brown-red scales between  $SC^4$  and  $R^1$ .

The *females* have often a second submarginal spot on the forewing placed in front of the spot  $SC^5-R^1$ , which latter is never absent; in some *males* there are also two submarginal spots marked, but the additional one stands behind vein  $R^1$ . The white submarginal spots of the hindwing are, at least in the *females*, as large as the submarginal spot  $SC^5-R^1$  of the forewing. There are always two dots in the cell of the forewing below; the cell-bar is hooked at upper end, it does not reach the upper angle of the cell. Abdomen below greyish white or creamy white in ♀; legs and sterna greyish white, anterior tibiae also much shaded with white scales. Most specimens have the median bar  $R^2-R^2$  of the forewing below in front of band more or less obviously marked.



Our specimens from Flores were caught during the dry season when the country was quite parched up and when there had not been any rain for a long time. These individuals have the underside of the body, legs and base of wings very white, almost chalky. As they agree well with the individuals from Sambawa, Adonara, and some from Lombok, and disagree with those from Sumba, Pantar, and Alor only in the upper discal spot  $SC^5-R^1$  of the forewing not being quite so large, we have no doubt that on these islands, either during a wet season or at higher elevations, a form of *athamas* occurs which resembles the Javanese *attalus* f. *attalus* with dark femora, wide band and darker underside. In fact, in Dr. Pagenstecher's collection (Wiesbaden), there is an individual from Sumba, kindly lent to us for inspection by the owner, which is so much like *attalus* f. *attalus* that we do not find any distinguishing character. The example is small (forewing  $26\frac{1}{2}$  mm. long), the submarginal dot of the forewing is very faint, the admarginal spots of the hindwing above are obscure, on underside they are pale yellow; there is one dot in cell of forewing below, the cell-bar points towards the disco-cellular spot, the hook not being developed; the median bar  $R^2-M^1$  close to cell. The discal band is at  $SM^2$  of the forewing almost twice as broad as the black basal area. Median bars ( $SM^1$ )— $SM^2$  of hindwing below more oblique than in the ordinary *athamas* from these islands.

*Hab.* Lombok; Sambawa; Flores; Adonara; Alor; Pantar; Sumba.

In the Tring Museum 13 ♂♂, 5 ♀♀ from: Pringabaja, Lombok, April 1896 (H. Fruhstorfer); Sapit, Lombok, 2000 feet, May to June 1896 (H. Fruhstorfer); Tambora, Sambawa, (W. Doherty); South Flores, October and November 1896, dry season (A. Everett); Sumba, February 1896, below 2000 feet (W. Doherty); Adonara, November 1891 (W. Doherty); Pantar, April 1897 (A. Everett).

*b. E. athamas alphius* (Nov. Zool. V. t. XI. f. 11. ♂ Wetter, 12 ♂ Timor).

*Charaxes alphius* Staudinger, *Erot. Tafel*. p. 172 (1886) (Timor); Rober, *Ent. Nachr.* XX. p. 291 (1894) (pt.; Timor); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 384, n. 93 (1896) (pt.; Timor).

♂♀. Wings shaped as in *sumbaensis*, *attalus* f. *fruhstorferi*, and *agrarius* f. (temp.) *agrarius*; discal band on upper side more yellow than in other forms of *athamas*.—Forewing with two discal spots  $SC^5-R^2$ , more or less fused together, the upper seldom less than half the size of the second, band narrow, very little or not wider than the basal black area at  $SM^2$ , its inner edge indented before  $M^1$  as in *sumbaensis*.—Hindwing: submarginal white dots smaller, but admarginal spots heavier and deeper in colour than in *sumbaensis*, anal one pale yellow, heavy.—Underside as in *sumbaensis*; cellules  $SC^1-R^1$  more or less reddish brown beyond the discal spots.

*Hab.* Timor; Wetter; Savu.

In the Tring Museum 16 ♂♂ from: Dili, Timor, May 1892 (W. Doherty); Wetter, May 1892 (W. Doherty); Savu, August 1896 (A. Everett).

1 ♀ from Timor in Dr. Staudinger's collection.

13. *Eulepis jalysus* (Nov. Zool. VI. t. VII. f. 7, ♂).

*Charaxes jalysus* Felder, *Reise Novara, Lep.* p. 438, n. 714, t. 59, f. 5 (1867) (Malacca); Butl., *Tr. Ent. Soc. Lond.* p. 129, n. 5 (1870) (Penang, err. loc. ?); id., *Proc. Linn. Soc. Lond.* (2), Zool. 1 p. 539, n. 1 (1877) (Prov. Wellesley); Dist., *Rhop. Mal.* p. 108, n. 7 t. 13, f. 4 ♂ (1883) (Prov. Wellesley; Malacca; Borneo); Nicéw., *Bull. of India* II. p. 278 note (1886) (Perak); Staud., *Erot. Tafel*. p. 172 (1886) (Malacca; Borneo); Elwes, *P. Z. S.* p. 281. (1891) (Karen

Hills, Burma): Röber, *Ent. Nachr.* XX pp. 291. 293 (1894) (Malacca: Borneo): Hagen, *Iris* IX. p. 187. n. 246 (1896) (N.E. Sumatra, not rare): Butl., *Journ. Linn. Soc. Lond.* XXV p. 382. n. 89 (1896) (Borneo: Perak: Malacca).

*Nymphalis lobe* var. a. *Char. julysus*, Kirby, *Cat. Diurn. Lep.* p. 271. sub n. 43 (1875) (Malacca).

*Charaxes julibus* (?), Druce, *P. Z. S.* p. 246 (1873) (Malacca).

*Charaxes noori*, Adamson, *Cat. Berm. Butt.* p. 20 (1889) (Poonkan, Tenasserim, August).

*Charaxes (Eulypis) julysus*, Nicéville & Martin, *Journ. As. Soc. Beng.* LXIV. ii. p. 435. n. 259 (1895) (N.E. Sumatra).

*Eulypis julysus*, Moore, *Lep. Ind.* II. p. 259. t. 187. f. 1. 1a. ♂ (1896) (Burma: Malay Peninsula): Fruhst., *Ent. Nachr.* XXIV. p. 56 (1898) (Sumatra: Borneo).

♂ ♀. *Body* as in *E. lobe*, upperside of abdomen varying from greyish white to olivaceous black; posterior part of metasternum black.

*Wings, upperside*: purplish black, the greater part occupied by a very broad, yellowish white—in five specimens probably more greenish white—discal band.—Forewing: discal band about as wide above as below, a very little broader posteriorly than below, the edge of the band of the underside shining through, extending basad to the points of origin of  $M^1$  and  $M^2$ ; base of wing and basal two-thirds of cell with a bluish tint, cell often partly scaled white posteriorly; band 14 to 16 mm. wide behind  $M^1$  in ♂, a little broader in ♀; its outer edge nearly straight, oblique, sometimes slightly convex, in some individuals slightly concave between veins; discal spot  $R^1-R^2$  at least  $1\frac{1}{2}$  mm. long in ♂, larger in ♀ than ♂.—Hindwing: discal band extended basad to origin of  $R^1$ , but base of wing and abdominal fold also scaled white, the latter with a brown patch of variable size beyond apex of  $SM^3$ ; outer edge of band almost parallel to outer margin (taken as a whole), crossing  $R^3$  far beyond bent of the vein, bordered with a thin band of bluish white scaling up to  $R^1$  (seldom  $SC^2$ ), this scaling more or less concave between veins, sometimes extended along veins to admarginal spots; black border of wing varying in width, not more than 6 mm. wide at  $C$ , either entire or (more rarely) broken up into patches, the proximal portions of these patches often not wider than the yellow admarginal spots; white submarginal spots sometimes minute, heaviest in the specimens with very wide band; admarginal spots clearly marked, yellow, the anal one scarcely or not paler than the others; spots  $R^3-M^2$  generally shorter than the others, spots  $C-SC^2$  often absent; tails with pale blue streaks, upper tail longer than second.

*Underside*: base of both wings, costal region of fore-, and abdominal region of hindwing pinkish white, slightly vinaceous; interspace between submedian and median lines of bars ferruginous chestnut, this band prolonged on forewing across  $D^3$  to median bar  $R^1-R^2$  and discal bar  $R^2-R^4$ , filling up the cellules  $R^1-R^3$  as far as those bars, and also produced on hindwing along hindside of  $M^2$  to median bar  $M^2-(SM^1)$ .—Forewing: one or no dot in cell, cell-bar approaching disco-cellular bar with upper end or somewhat abbreviated; discal band not extending across  $R^3$  in either sex, its outer edge as above; postdisco-submarginal reniform spots thin, but very clearly marked, owing to the interspace between them and the discal bars, as well as the scaling at the outside of the spots being nearly white, the spots appearing to be situated in a narrow, almost white, band, marginal border dark tawny olive, about 4 mm. broad at  $R^1$ ; black discal bar behind  $SM^2$  about 3 mm. from tip of  $SM^2$ , mostly rather clearly marked, sometimes patch-like, no white scaling between it and internal angle of wing.—Hindwing: upper submedian bar situated upon praecostal spur; white discal band separated from black discal luniform bars by a thin, ferruginous or blackish brown interspace, which is barely

1 mm. wide between  $R^2$  and  $M^2$  where it is widest ; discal and postdiscal black luniform bars thin, not widened to patches, including between themselves the brownish red postdiscal spots which are all of nearly the same size, spot  $R^2-R^3$  only being smaller, owing to the veins being closer together ; the metallic white proximal borders of these spots also the same in width ; submarginal white spots fused with the white borders of the yellowish admarginal spots, forming a more or less continuous (at the veins constricted) narrow white band in which the black submarginal dots are placed ; interspace between this band and the postdiscal spots more or less slate-colour ; tails metallic pale blue.

Length of forewing : ♂, 32—39 mm.

” ” ” ♀, 39 ”

*Hab.* From Burma to Borneo and Sumatra. In Tring Museum 30 ♂♂, 1 ♀ from Thuangnyn Valley, Tenass., 1500 feet, March 1890 (Bingham) ; Dalgwin-Papun, December 1891 (Bingham) ; Downat Range, August 12th, 1893 (Bingham), March 1895 (Hauxwell) ; Theiping, Perak ; Selesseh, Deli, May, August (Dr. Martin) ; Gayoe country, January, May (Dr. Martin) ; Battaek Mts., July (Dr. Martin) ; Setinjak, W. Sumatra, June (Ericsson) ; Mt. Mulu, Borneo (Hose) ; Pengeron, S.E. Borneo.

Dr. Martin, in the list of the Butterflies of Sumatra (*l.c.*), refers to this species as being mostly captured by the Gayoe collectors in the forests west of Langkat, leading to their country ; while Dr. Hagen (*l.c.*) says that he found it more often on the plains than *E. hebe* and *moori*, especially on the Ramunia Estate at Serdong, close to the sea, but received also many examples from the Karo and Gayoe countries.

*d.* Forewing below without kidney-shaped postdisco-submarginal markings.

*e*<sup>1</sup>. Brown band on basal half of hindwing below at least 2 mm. distant from base of præcostal veinlet.

*e*<sup>2</sup>. White submarginal spots of upperside of forewing present.

*e*<sup>3</sup>. Yellow-brown median band of forewing below curving distad behind  $R^2$ .

#### 14. *Eulepis eudamippus* (Nov. Zool. V. t. VIII. f. 1 to 6).

*Charaxes eudamippus* Doubleday, *Ann. Soc. Ent. France* (2). I. p. 218. t. 8. ♂ (1843) (Silhet).

♂. *Body above* olivaceous black, with the usual white dots on head and pronotum, or more greyish olive, or head, pronotum and front part of mesonotum pale olive, and the rest of upperside yellowish white.

*Underside* : palpi, breast and legs white, front side of anterior tibia and of four posterior femora, and stripes on breast underneath the femora, black ; abdomen black, marked white, or white with black markings, or white with black spots at base, seldom quite black.

*Wings, upperside* : black, with a yellowish white band which occupies sometimes the greater part of the wings.—Forewing : discal band either extending to base and occupying also the cell, or the band more restricted, the base of the wing being black ; band entire from  $R^3$  to internal margin, but separated into three spots from  $R^3$  to  $Sc^{\omega}$  ; spot  $R^2-R^3$  close to cell, separated from partition  $R^2-M^1$  of band by a black streak of even width ( $1\frac{2}{3}$  mm.) which extends along  $R^1$  and  $D^1$  and corresponds to the discal branch of the yellowish tawny olive median band of the underside ; on

account of this black streak the partition  $R^3-M^1$  is somewhat hook- or hammer-shaped; the (distal) dilated portion of the partition is often joined to spot  $R^2-R^3$ , the partition is seldom not wider distally than proximally, the partition then being reduced to a streak along  $M^1$ ; spots  $Sc^5-R^2$  oblique to each other, about midway between discal spot  $R^2-R^3$  and postdiscal series of spots; this series stands oblique, approaching the outer edge of the wing posteriorly, it consists of seven or eight spots, the first is small or absent, the fourth,  $R^2-R^3$ , is smaller than those before and behind it and more discal, the posterior ones are mostly luniform, the last sometimes pale blue, occasionally small, the last two often fused to a **W**-shaped spot; there is, besides, often a patch of yellowish white or pale blue scales at internal margin close to angle of wing; a submarginal series of seven or eight more or less elongated small spots parallel to outer margin of wing.—Hindwing: discal band as variable in width as on forewing, in the narrow-banded forms broader than on forewing, its outer edge (taken as a whole) varying from being evenly convex, nearly parallel to outer margin of wing, to being quite straight; basal area of wing white or black, with every intergradation in the extent of black, the black area often prolonged towards anal angle along ( $SM^1$ ); abdominal fold all white, or with a black or blackish patch beyond tip of  $SM^3$ ; a black discal-submarginal band of very variable width, generally with a series of pale blue lunules near its inner edge (corresponding to the outer border of the discal series of bars), and with a series of eight white submarginal spots; of the latter the uppermost is largest, the seventh is small, the eighth thin, linear, the last two more or less suffused with pale blue; admarginal, biconcave, yellowish white, interspaces heavy, distally, or at least at veins, more or less heavily shaded with pale blue, the pale blue scaling extending into tails, which are long and pointed; edge of wing black, except between  $M^2$  and  $SM^2$ , where the margin has seldom black scales; fringe at internervular folds more or less restricted white.

*Underside* chalky white, glossy, discal area slightly yellowish.—Forewing: cell with two, mostly heavy, black dots, which are sometimes again subdivided, the last about on a level with base of  $M^2$ , or more distal; cell-bar 4 angle-shaped, reaching  $M$  about half-way between  $M^1$  and  $M^2$ , and  $Sc^1$  close to upper angle of cell; submedian bars  $M^1-(SM^1)$  short, forming a prolongation of cell-bar; bar  $M^2-(SM^2)$  fused with the resp. median bar; median bar  $M^1-M^2$  slightly curved or straight, reaching  $M^2$  close to base or even touching  $M$ ; median bar  $R^2-M^1$  a little more distal, very oblique, parallel to  $R^3$ , but its distal end curved suddenly towards  $R^3$ , the interspace between these bars, the cell-bar, bar  $D$  and vein  $R^3$  tawny olive (or more yellow), the figure thus formed resembling the letter **Y**; median bar  $R^2-R^3$  fused with bar  $D$ ; bars  $Sc^5-R^2$  present, or partly or totally absent, standing about at one-third or one-fourth the way from cell to apex of wing; an oblique, almost straight, tawny yellow band (varying in tint) of  $1\frac{1}{2}$  and 3 mm. width expands between costal and internal margins, beginning about half-way between cell and apex and reaching  $SM^2$  7 to 10 mm. from tip of that vein; this band is bordered distally by a complete series of black discal bars, which are more or less luniform, seldom straight; the bars  $M^2-SM^2$  fused together, followed behind  $SM^2$  often by a black patch; posterior postdiscal black bars more vestigial, bars  $M^2-SM^2$  often well marked, angle-shaped, the interspace between them and the discal bars often blackish or bluish: these postdiscal bars correspond to the outer edge of the yellowish white postdiscal spots of the upperside, which are also on the underside more or less indistinctly marked, as are also the white submarginal spots; margin

bordered with tawny yellow or yellow-olive : area between discal and marginal bands white or greyish, in the latter case (form from Formosa) the white postdiscal and submarginal spots plainly marked ; costal margin in some forms tawny olive, except a streak at base.—Hindwing : submedian and median series of bars close together, parallel, interspace varying from tawny olive to orange ochraceous in the various local forms, representing a band that appears as a prolongation of the forewing, and extends to the disco-postdiscal black-blue-black marking  $M^2-SM^2$  ; the two costal bars often joined together at costal margin, in other individuals divergent costad ; the discal and postdiscal bars form together a series of half-moons, in which are situated blue or tawny-olive half-moons ; the series is closer to outer margin behind than in front ; it is curved, or from  $C-M^1$  almost straight ; lunule  $R^3-M^1$  about midway or at two-thirds of the way from base of  $M^1$  to tip of  $R^3$ , the series bordered proximally by a band of the same colour and nearly the same width as the median band ; submarginal area white, mostly interrupted at  $M^2$  and ( $SM^1$ ), often also at  $M^1$ , with a series of more or less prominent, seldom minute, submarginal, black, dots ; a deep tawny olive, or olive, marginal band, with tawny ochraceous admarginal spots of variable size ; edge of wing and tails black, whitish blue streaks in tails ; anal admarginal yellow spot large.

♀. Like ♂, larger, forewing generally less concave outwardly ; abdomen beneath always black, with edges of segments partly white, and with a faintly marked white middle line ; tails longer, the upper one not pointed, often somewhat dilated at tip ; cell of forewing sometimes nearly all black above (summer form ? = warm and wet season form ?).

Tenth tergite of abdomen of ♂ somewhat bent downwards at tip and more or less obviously sinuate ; the dorsal dilatation of the clasper often forming a broad tooth.

Early stages unknown.

Length of forewing : ♂, 41—52 mm.

“ “ “ ♀, 49—60 mm.

*Hab.* Nepal to Tenasserim, China, Formosa, and the Loo Choo Islands.

A specimen captured by O. Müller on the 2nd of July, 1886 (the only one found so late in the year we have) has the black colour at the base of the forewing, especially in the cell, more extended than the specimens obtained in April. As this increase in the amount of black (as compared with the spring specimens) is in accordance with the differences between the spring and summer form of *E. athamas*, it is probable that *E. eudamippus* is, in North India, seasonally dimorphic.

#### a. *E. eudamippus eudamippus* (Nov. Zool. V. t. VIII. f. 1. ♂).

- Charaxes eudamippus* Doubleday, *Ann. Soc. Ent. France* (2) I. p. 218. t. 8 ♂ (1843) (Silhet) ; Butl., *P. Z. S.* p. 635. n. 47 (1865) (Silhet ; Assam) ; Standl., *Exot. Tijds.* p. 173. t. 59. ♂ (1886) (N. India) ; Nicéy., *Bull. of India* II. p. 273. n. 566 (1886) (Sikkim, common ; Sylhet ; Sibsagar, Upp. Assam, Naga Hills ; Thoungyeen forests, Upp. Tenass. ; Tavoy) ; Elwes, *Tr. Ent. Soc. Lond.* p. 367. n. 208 (1888) (Sikkim, common at low elev., April to August) ; Watson, *Journ. Bombay N. H. Soc.* VI. p. 41. n. 90 (1891) (Tilin, Chin Hills, February) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 380. n. 83 (1896) (Nepal ; Silhet ; Darjiling ; Bhutan ; Mungphu ; Khasia Hills ; Meetan, Burma ; Tilin Yaw ; East Pegu).
- Nymphalis eudamippus*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* II. p. 369. n. 23 (1850) (Silhet) ; Kirby, *Cat. Diurn. Lep.* p. 271. n. 44 (1871) (*cit. fals.*) ; Robbe, *Ann. Soc. Ent. Belg.* XXXVI. p. 130. n. 52 (1892) (Darjiling . Kurseong).
- Nymphalis eudamippus* (!), Horsfield & Moore, *Cat. Lep. Ins. Mus. E. I. C. I.* p. 206. n. 420 (1857) (Darjiling).

*Charaxes (Eulepis) eudamippus*, Doherty, *Journ. As. Soc. Beng.* LIV. ii. p. 124. n. 95 (1886) (Kumaon, seen! *Hare spec.* vel *E. dohertyi*?); Elw. & Nicéy., *ibid.*, p. 427. n. 83 (1886) (Tavoy; Ponekai); Nicéy., in Risley, *Gazetteer of Sikkim* p. 147. n. 230 (1894) (Sikkim); Watson, *Journ. Bombay N. H. Soc.* X. p. 656. n. 118 (1896) (Chiu Hills, April).  
*Murcareola eudamippus*, Moore, *Lep. Ind.* II. p. 264. t. 189. f. 2. 2*a* (1896) (E. Himalayas; Assam; Naga Hills; Burma; Tenasserim).

♂. Mesonotum more or less grey, becoming white behind; metanotum and abdomen (♂) yellowish white or nearly pure white, the latter seldom all white beneath, bearing at least at base some black scaling, sometimes the underside of abdomen more extended black than white; in ♀ underside of abdomen black, with edges of segments somewhat white—occasionally there is a vestigial white middle line.

*Wings, upper side*: discal yellowish white area always extended to base.—Forewing: cell for the greater part yellowish white, but sometimes this colour reduced to a broad streak along M that scarcely extends basal beyond M<sup>2</sup>; yellowish white area very oblique distally, at SM<sup>2</sup> only 5 or 6 mm. distant from edge of wing; detached discal spot R<sup>2</sup>—R<sup>3</sup> very variable in size, sometimes joined along R<sup>3</sup> to the dilated part of partition R<sup>2</sup>—M<sup>1</sup> of discal area, the black streak behind this spot along base of R<sup>3</sup> often overshadowed with white scales; postdiscal spot R<sup>2</sup>—R<sup>3</sup> more basal than the others, often as close to discal spot R<sup>1</sup>—R<sup>2</sup> as to postdiscal one R<sup>1</sup>—R<sup>2</sup>; last two postdiscal spots uniform, often fused together, spot (SM<sup>1</sup>)—SM<sup>2</sup> sometimes bluish, there is always a patch of whitish or bluish scales at internal margin close to internal angle, often fused with discal area.—Hindwing: no black scaling at base; disco-submarginal black band variable in width, as are the white submarginal spots situated in it, the part proximal of the white submarginal spots often not wider (or even narrower) than the part outside these spots, but also often twice or three times as wide, the pale blue or olive buff lunules in this band mostly separated from the discal area, but sometimes the posterior ones contiguous with it.

*Underside*: Forewing, median bars SC<sup>5</sup>—R<sup>2</sup> often wanting, mostly vestigial, seldom so well marked that they touch the veins; discal tawny olive band not quite straight in most specimens, being generally somewhat curved distad between SC<sup>5</sup> and R<sup>3</sup>.—Hindwing: discal tawny ochraceous band curved, almost parallel to outer margin (taken as a whole); disco-postdiscal uniform spots including either only whitish blue lunules, or, besides, tawny ochraceous ones.

Length of forewing: ♂, 43—50 mm.

♀, 51—60 mm.

*Hab.* Nepal; Sikkim 14♂♂, 4♀♀ (April and July, O. Möller); Bhutan; Assam: Silhet, Khasia Hills 1♀, Shillong 1♂, Jaintia Hills 1♀, Garo Hills 2♂♂, Naga Hills 8♂♂; Burma: Katha 2♂♂, N. Chin Hills 1♂, E. Pegu, Meetan; Tenasserim: Meple 1♂ (Bingham, March 1891), Tavoy, Thoungyeen forests.

The species occurs in Sikkim, where it is common at low elevations from April to August, according to Möller; in Burma it flies already in February. It is found rather plentifully in the beds of streams; the *female* is scarce in collections.

*b. E. eudamippus nigrobasalis* (Nov. Zool. V. t. VIII. f. 2. 3, ♂♂).

(?) *Charaxes eudamippus*, Manders, *Tr. Ent. Soc. Lond.* p. 525. n. 89 (1890) (Shan States).

(?) *Murcareola eudamippus*, Moore, *Lep. Ind.* II. p. 264 (1896) (pt.; Upper Makong, Shan States).  
*Eulepis nigrobasalis* Lathy, *Entom.* XXXI. p. 192 (1898) (Pak-a-jong, Siam).

♂. *Upper side* of body all brownish black, or metanotum and abdomen drab or drab grey, or abdomen pale yellow (*type*): *underside* of abdomen black with a series

of white spots on each side, and a white, interrupted, median line, or white with edges more or less black.

*Wings above*, yellowish white colour more restricted than in *E. eudamippus eudamippus*.—Forewing: cell all black (*type*), or with a yellowish white, ill-defined, patch of variable size, base of wing from cell to internal margin black or almost without black scaling, with intergradations; this black area in the darkest individuals about as wide at SM<sup>2</sup> as the black outer area at M<sup>2</sup>; last postdiscal spot more or less bluish.—Hindwing: base with or without black scaling; disco-submarginal band as in those examples of *E. eudamippus eudamippus* in which it is broadest, the portion proximal of the white spots in it broader (except before SC<sup>2</sup>) than these spots.

*Underside* as in *eudamippus eudamippus*.

♀. From "Yunnan": *Upperside* of body olive grey, abdomen paler; *underside* of abdomen brownish black, somewhat greyish at sides.

*Wings above*.—Forewing: cell pale olive (except black band at apex), the white scaling not entirely suppressed, extreme base of cell M<sup>1</sup>—M<sup>2</sup> olive black, base between cell and internal margin for about 9 mm. pale olive.—Hindwing: disco-submarginal band of almost even width from C—M<sup>1</sup> (7 mm. between veins), its proximal edge concave between veins, blue lunules in it well marked, separated from white area, except heavy spot M<sup>1</sup>—SM<sup>2</sup>, which touches yellowish white area at (SM<sup>1</sup>). *Underside* as in *E. eud. eudamippus*.

On the underside of the hindwing the specimens (♂♂) in Mr. Adams's collection have the admarginal "orange markings and orange spot at anal angle much more dull and indistinct" than *eud. eudamippus*, which is not the case in our specimens (♂♂) and in Mr. Crowley's *female*.

Length of forewing: ♂ 43 to 52 mm.

♀ 50 mm.

*Hab.* Pakajong, Siam (*type*, 2 ♂♂ in Mr. Adams's coll.); "Yunnan" (1 ♀ in Mr. Crowley's coll.); Muong Gnow, Shan States, 2 ♂♂; Shan States, 1 ♂.

One of the specimens from Muong Gnow is said to be collected during July to November; it is small (43 mm.), has the base of both wings and the cell of the forewing as well as the upperside of the body black; the other individual from the same place, caught earlier in the year, is larger (52 mm.) and there is a small white patch in the cell of the forewing, the black basal area of the forewing is more restricted, and there is no black scaling at the base of the hindwing. Are these differences seasonal? Our third individual from the Shan States, without more precise locality, is figured Nov. Zool. V. t. VIII. f. 2: the black at the base of the forewing is much restricted in this example, and the abdomen is below sparsely spotted with black. It appears singular that in the specimens from Pakajong the abdomen is "pale yellow" as in *E. eud. eudamippus*.

*c. E. eudamippus rothschildi* (Nov. Zool. V. t. VIII. f. 5. 6, ♂♂).

*Charaxes gunguialis* Leech (*non* Staudinger, 1886), *Entom.* XXIV. Suppl. p. 30 (1881) (Omei-shan, July and August).

*Charaxes rothschildi* Leech, *Bull. Chim.* I. p. 128. t. 14. f. 3 ♂ (1893) (Chow-pin-sa, Omei-shan, Mupin, July—Aug., 5000 feet); *Bull. Jouru. Linn. Soc. Lond.* XXV. p. 380. n. 85 (1895).

*Murwareda rothschildi*, Moore, *Lep. Ind.* II. p. 267 (1896) (W. China).

♂. Body above olivaceous black, abdomen beneath black, with a series of white dots on each side and in middle mostly with some white hairs.

*Wings, above*: discal band restricted on account of the great development of black at the base.—Forewing: base and cell black; discal yellowish white band 8 to 10 mm. broad in front of  $SM^2$ , 11 mm. from outer margin at  $SM^2$ , distally incised at  $M^1$ , partition  $R^3-M^1$  small, often separated from the partition behind it in consequence of  $M^1$  being scaled black, its dilated outer portion thin, or there is no dilatation; postdiscal series generally more straight than in the Indian form, the spots of the series rather larger, the last ones mostly somewhat rounded, not deeply concave or angle-shaped as in *nigrobasis* and *eudamippus*.—Hindwing: base black, this colour extending along ( $SM^1$ ) to near disco-submarginal band which it does not generally reach; abdominal fold yellowish white, in the darkest specimens black beyond tip of  $SM^3$ , with a yellowish white triangular patch at end; disco-submarginal black band nearly or quite straight proximally down to ( $SM^1$ ),  $6\frac{1}{2}$  to  $8\frac{1}{2}$  mm. broad between  $SC^2$  and  $R^1$ , narrowing behind, the pale blue spots near its discal edge more or less obsolete; white submarginal spots (within band) varying much in size, the upper one the largest; admarginal spots smaller than in *eudamippus*, much shaded with olive buff and pale blue, sometimes nearly separated from each other; black marginal line somewhat broader than in the Indian form, visible also at anal angle.

*Underside*: the median and discal bands darker in colour than in *E. eudamippus eudamippus*.—Forewing: costal margin tawny olive, especially in middle; discal band somewhat more proximal, less oblique, close to discal branch of median band, which it sometimes touches; black discal bars less curved, the upper ones straight or nearly so; no median bars  $SC^6-R^2$ .—Hindwing: discal band down to  $M^1$  straight or almost so, more proximal than in *eudamippus*, the interspace between the discal and postdiscal black uniform bars tawny olive, the discal bars with very thin or without bluish white distal borders; white submarginal area 5 to 7 mm. broad between  $SC^2-R^1$ , very much narrowed behind, divided into spots below  $M^1$ ; admarginal spots dark tawny olive, shading into orange ochraceous proximally; pale blue lines in tails very thin; anal admarginal spot gallstone yellow.

♀. Like ♂, body above and base of wings more brown, less black.

*Wings, upperside*.—Forewing: partition  $R^3-M^1$  of discal band larger than in ♂, especially the dilated portion, which is joined to the discal spot  $R^2-R^3$  by means of yellowish white scaling along  $R^3$ .—Hindwing: base less extended black than in ♂, inner edge of disco-submarginal black band less straight; upper admarginal spots paler, less shaded with pale blue.

*Underside*: the dots in cell of forewing small (individual character?).

Length of forewing: ♂, 41—46 mm.

” ” ” ♀, 49 mm.

*Hab.* Central and West China, 6 ♂♂, 1 ♀: Mujin, Ya-tschen, Siao-Lu, Ch'ow-pin-sa (May—June), Ichang.

According to Leech *E. eudamippus rothschildi* is found in July and August, but one of the specimens we received from Mr. Leech bears the date “May & June” on the label.

*d. E. eudamippus formosanus* Rothsch., subsp. nov. (Nov. Zool. V. t. VIII. f. 4, ♂).

♂. Body as in *E. eudamippus rothschildi*, but abdomen more or less pure white beneath.

*Wings, upperside*: as in *rothschildi*, but forewing with outer edge of discal band



irregularly concave between veins, band itself somewhat broader, discal spot  $Sc^5-R^2$  more proximal, and hindwing with outer edge of yellowish white area dentate at veins, admarginal spots pale blue, olivaceous, except anal one.

On *underside* the median and discal bands are more yellow: the forewing has the median bars  $Sc^5-R^2$  strongly marked, there is mostly also bar  $Sc^4-Sc^5$  present, these bars are more proximal than in the Indian race: the discal band is broad, more irregular than in *rothschildi*, the discal black bars are very heavy, the submarginal area is less pure white, more grey, hence the white postdiscal and submarginal spots well visible; marginal band somewhat broader than in *rothschildi*.—Hindwing: all the black lines heavy; disco-postdiscal band slightly, but almost evenly, convex; postdiscal black lunules heavier and more curved, the white submarginal area much narrower, the black submarginal spots larger and the admarginal ones heavier, than in *rothschildi*.

♀. The same differences as in ♂, still more pronounced, especially those presented by the underside; abdomen beneath as in *rothschildi* ♀.

The blue lunules in the black band of the hindwing above are in both sexes deeper blue than in the continental races, and in ♀ well pronounced. The large, blue, admarginal spots of the ♀ show some yellowish scaling in centre.

*Hab.* North Formosa, 2 ♂♂, 3 ♀♀: Keelung, 25. vii. 96 (*type*), and August 1897; Patchima, July 1896; collected by Mr. Jonas.

### c. *E. eudamippus weismanni*.

*Charaxes weismanni* Fritze, *Zool. Jahrb., Abth. Systemat.* VII. p. 898. n. 13. f. 12 (1894) (Okinawa).

♂. Similar to *E. eudamippus rothschildi* and *formosanus*. Differs from all the other forms of *E. eudamippus* in the yellowish white discal band of the upperside of the forewing being shorter and narrower: the partition  $R^3-M^1$  is almost entirely obliterated; the postdiscal spots  $R^3-M^2$  of the same wing are very large, while spot ( $SM^1$ )— $SM^2$  is absent; the admarginal spots of the hindwing above are large; tails short. On the *underside* the black markings are very heavy: the cell spots of the forewing fused together, the discal band is broad, touches the discal branch of the median band; the median bars  $Sc^5-R^2$  are present; the hindwing seems to be similar to that of *formosanus*.

Length of forewing 44 mm.

*Hab.* Okinawa, Liu Kiu Islands.

We have not seen this form.

*d*<sup>3</sup>. Median band of forewing below not curving distad behind  $R^2$ .

### 15. *Eulepis nepenthes* (Nov. Zool. V. t. IX. f. 3, ♂).

*Charaxes nepenthes* Smith, *Ent. Monthly Mag.* XX. p. 58 (1883) (Siam); Nic'v., *Bull. of Ind.* II. p. 274. note (1886); Smith & Kirby, *Rhop. Escot.* I, *Charax.* t. 2. f. 3, 4 (1887); *Bull. Journ. Linn. Soc. Lond.* XXV. p. 380. n. 84 (1896) (Salween R., Shan States). *Murawecchi nepenthes*, Moore, *Lep. Ind.* II. p. 267 (1896).

♂. *Body above* white; *upperside* of palpi black, head and pronotum bistre, mesonotum olive in front; *underside* white, anterior tibia, frontside of femora, stripes on sterna underneath legs, and some spots on basal half of abdomen, black.

*Wings, upperside* for the greater part white, with a faint yellowish tint.—Forewing: white area extended to base, occupying also cell, its outer edge oblique.

about 6 to 9 mm. from outer margin before  $M^2$ , dentate upon veins, discal patch  $R^2-R^3$  not separated from white area, discal spots  $SC^5-R^2$  more or less isolated; costal margin and outer area of wing black; disco-cellular bar marked, broad in front, fused with black costal border; within black outer area there are two series of white spots, the inner (postdiscal) series is oblique, the upper three spots  $SC^5-R^3$  more or less rounded, spot  $SC^5-R^1$ , the largest of the three,  $1\frac{2}{3}$  to  $2\frac{1}{2}$  mm. long, about 9 or 10 mm. from outer margin, spot  $R^2-R^3$  the smallest, a little more proximal, the following four mostly angle-shaped, heavy, spots  $M^1-SM^2$  merged together, the black discal bars separating spots  $R^3-SM^2$  from the discal area become gradually thinner behind, the bar  $R^3-M^1$  being 1 to 3 mm. wide in middle (broader at the veins), double bar  $M^2-SM^2$  thin (in specimen figured very thin), resembling the number 3; there is mostly a black patch at internal margin, partly separating a white patch at internal angle from the white area, postdiscal spot  $SC^4-SC^5$  not marked; submarginal spots thin, no spot before  $SC^5$ , that before  $R^1$  sometimes vestigial only, spot  $M^2-SC^2$  longer, fused with one another and with respective postdiscal spots, isolating two black dots or arrowhead-shaped spots.—Hindwing: a postdiscal series of black, luniform, or arrowhead-shaped spots, the upper ones the heaviest, but all comparatively small; the scaling at their proximal side is mostly somewhat bluish (owing to the presence of black scales under the white ones), and there is a trace of the black discal bars close to the postdiscal spots between  $C^1$  and  $R^1$ , and the last discal bar is at least partly marked at abdominal margin, being separated from the last postdiscal one by pale blue scaling; a complete series of black submarginal spots, transverse, elongate, ellipsoidal, the upper four shorter but broader than the spots  $R^3-M^1$ , the last spots  $M^2-SM^2$  thin, bluish, separated from one another at  $(SM^1)$ , joined to black postdiscal lunules  $M^2-SM^2$ , which are also separated at  $(SM^1)$ ; the white submarginal spots separating the two series of black markings about as broad as the black submarginal spots, or somewhat broader, except the last ones,  $M^2-SM^2$ , which are very thin, or even absent (as in figure); admarginal interspaces bluish at veins  $R^3-M^2$ , the blue scaling extending well into tails, anal interspace forming a large pale yellow spot; a black marginal line; tails pointed, of about the same length (6 to 7 mm.).

*Underside* white.—Forewing: two heavy cell spots black, upper cell-bar more or less incompletely separated from the disco-cellular bar by a pale blue line, submedian and median bars  $M^1$  ( $SM^1$ ) merged together; these black markings form a narrow black band which is interrupted at veins and is almost straight, median bar  $R^3-M^1$ , if present, close to cell, not prolonged distad as in *E. cadamippus*, partition  $M^2-(SM^1)$  of that band sometimes wanting; median bars  $SC^5-R^2$  present, dot-like, or elongate, not straight and transverse, closer to cell than to discal band, at least the upper one; white area bordered distally by an olive tawny or tawny ochraceous band of about 2 mm. width that corresponds to the inner border of the black outer area of the upperside, this band almost straight, bordered distally by the black discal, more or less luniform bars; area between discal bars and tawny olive or tawny ochraceous marginal border grey, this colour extending to edge of wing at apex; within the grey area the postdiscal white spots are marked, size as above, bordered by a series of black postdiscal spots, of which the last ones are the largest, spots  $R^3-M^2$  more or less angle-shaped, spots  $SC^5-R^3$  minute, the upper ones sometimes absent; the white submarginal spots also visible, and there is sometimes an indication of the dark submarginal bars  $M^2-SM^2$ .—Hindwing:

submedian and median series of black bars close together, the upper bars mostly more or less merged together, but the bars of the same series mostly rather widely apart at veins and liable to obliteration, the posterior bars often dot-like, median bars ( $SM^1$ )— $SM^3$  more or less heavy, oblique, never extending to ( $SM^1$ ), interspace between submedian and median series of bars fawny ochraceous or ochraceous, representing a band that extends towards anal angle, where it meets a discal band of about the same width, but of a somewhat darker tint; this discal band on the whole about parallel to outer margin, bordered distally by a series of disco-postdiscal black luniform spots, which includes pale blue lunules; submarginal area white, broader than the discal band plus luniform spots, with prominent black submarginal spots, between  $M^2$  and  $SM^2$  the white area reduced to two small dots with or without ill-defined black centres; admarginal spots transverse, thin, more or less ochreous, with bluish scaling at tip of middle and posterior veins, anal admarginal spot large prolonged along ( $SM^1$ ) to black discal lunule; marginal line black, not or scarcely vestigial at anal angle; tenth tergite of abdomen rather deeply sinuate.

♀. Unknown.

Length of forewing: ♂, 43 mm.

*Hab.* Shan States and Tonkin: 3 ♂♂ in Tring Museum from "Tonkin" and Van-bu, Upper Tonkin.

A rare insect in collections. Nothing is recorded of the time of appearance or the habits of the species.

*f*<sup>2</sup>. Forewing above without distinct submarginal dots.

#### 16. *Eulepis dolon* (Nov. Zool. V. t. IX. f. 1. 2,\* ♂♂).

*Choraxes dolon* Westwood, *Cat. Or. Ent.* t. 27. f. 2. 3 ♂ (1848).

♂. *Upperside* of head and thorax olivaceous bistre brown, abdomen rather more black; head with four white dots above and one behind each eye, pronotum with three dots, the middle one, situated at the hinder edge, often concealed, hairs at sides of meso- and metanotum more or less grey; palpi above like head or darker. *Underside* of palpi and thorax, innerside of palpi, the middle and hinder tibiae, all tarsi, outside of the brown anterior femur and tibia white, middle and hinder femora black or brown with sparse white scales; abdomen brown or black, valves beneath with white scales.

*Wings: upperside* yellowish white with a slight greenish tint, distal region and costal margin of forewing, and a narrow band of hindwing composed of the discal, postdiscal and submarginal bars, brownish black or black.—Forewing: dark outer area measuring at  $SM^2$  about 4 mm., its inner edge oblique, nearly straight up to  $R^3$ , where the area is about 9 or 10 mm. wide, then more curved basad, sometimes the edge of the area is almost evenly curved from  $SC^{1.5}$  to  $SM^2$ , rather often the black area is extended basad between  $R^2$  and  $R^3$ ; costal margin as far as  $SC$  and  $SC^{1.5}$  brown, the brownish black outer area appearing to extend to base along costal edge of wing; interspace between black disco-cellular bar and upper cell-bar black or brownish black, forming a short band, which is often continued beyond  $M^1$ , the interspace between median bars and  $R^3$ — $M^2$  and  $M$  resp. the cell-bar being then also partly filled up with brownish black scaling; in outer area there is

\* The explanation of Plate IX. should read Fig. 1, Sikkin; Fig. 2, Shan States.

a straight series of yellowish white, postdiscal, spots, the upper one  $SC^4$ — $SC^5$  seldom marked, the second and third the largest, mostly triangular, pointing distad, seldom the second rounded, the last two,  $M^2$ — $SM^2$ , sometimes partly or totally obliterated, often replaced by bluish triangles, base of second spot about 10 to 13 mm. from outer edge of wing, that of spot  $M^1$ — $M^2$  only 4 or 5 mm.; the white submarginal spots of *E. endamippus* here sometimes vestigial, being in some individuals traceable under a lens.—Hindwing: distal, postdiscal and submarginal black bars fused to a narrow band,  $2\frac{1}{2}$  to 3 mm. broad, of nearly even width, but more or less constricted near veins, separated from the thin black edge of the wing by the admarginal interspaces: the band taken as a whole evenly curved, parallel to the outer edge of the wing: each partition of the band includes a pale, buffish, lunule which separates the thin (often very thin) discal, curved, bar from the heavier postdiscal one, between the latter and the submarginal bar (which is generally convex distally) is included the bluish white or pale blue submarginal dot, anal partition of band and its pale blue spot largest: admarginal, biconcave, pale buff or pale yellow, interspaces about  $1\frac{1}{2}$  to  $2\frac{1}{2}$  mm. broad, slightly separated from each other by the black veins, often shaded with blue: black marginal line varying in width, absent from anal angle: tails black with two pale blue streaks, upper tail mostly somewhat shorter than second, length 6 to 10 mm., and 7 to 12 mm. respectively.

*Underside* white, with a greenish tint (the membrane of the wing being green), marked with black and brown.—Forewing: basal two-thirds of costal margin occupied by a stripe of about 2 mm. width of raw umber colour, including a white basal streak; this stripe joined at its distal end to a straight band, of about the same width and colour, running obliquely to the anal angle, crossing  $SM^2$  about 3 to 4 mm. from tip of vein, outwardly bordered by a complete series of black (discal) bars, which stand more or less separate, and are mostly slightly curved (the upper ones generally excepted), discal bar  $SC^4$ — $SC^5$  often obsolete; outer margin occupied by a band of similar width and colour; the interspace between marginal and discal band appears less greenish than the rest of the wing owing to the black sealing of the upperside: between  $M^2$  and  $SM^2$  there are generally two more or less obvious, black, spots, representing the postdiscal bars; similar but smaller spots are occasionally visible between  $R^2$  and  $M^2$ , they are placed at the outer edge of the postdiscal, white, spots of the upperside which shine through: the submarginal bars which should stand at the edge of the marginal band are not traceable: cell-bar 3 represented by a heavy, black, dot standing just behind  $SC$  in middle of cell, cell-bar 4 at upper end about 1 mm. from bar D, curved, reaching  $M$  about  $\frac{1}{2}$  to  $1\frac{1}{2}$  mm. before base of  $M^1$ , almost continuous with submedian bar  $M^1$ — $M^2$ , cell-bar 4 and submedian bars  $M^1$ — $SM^2$  on the one side, and bar D together with median bars  $R^1$ —( $SM^1$ ) on the other form the borders of a yellowish tawny olive band of about 2 to  $2\frac{1}{2}$  mm. breadth (incl. of bars); median bar  $R^3$ — $M^1$  short, oblique, median bar  $SC^5$ — $R^1$  sometimes present, oblique, placed at the edge of the tawny olive costal border.—Hindwing: submedian bars  $C$ —( $SM^1$ ) forming one broken line, entering cell at origin of  $D^1$ , crossing  $M$  at or near base of  $M^2$ , bar  $C$  often absent; median bars forming a line parallel to the first: interspace between the lines about  $1\frac{3}{4}$  to 2 mm. wide, ochre yellow, sometimes gallstone yellow, this band continued to the disco-postdiscal band which it joins at ( $SM^1$ ); outer edge of white discal area evenly convex, parallel to outer margin of wing (taken as a whole, apart of tails and dentition): the disco-postdiscal band composed of the

uniform discal and postdiscal bars, which are concave distally, and the yellowish tawny interspace olive between this series of double-bars and the white discal area, the interspaces between discal and postdiscal bars also tawny olive, discal bars, besides, bordered distally with very thin bluish white lines; the band is narrower than on upperside owing to the black submarginal bars not being included into it, these bars being reduced to small black dots placed in white patches: border of wing tawny olive,  $1\frac{1}{2}$  to 2 mm. broad, blackish at edge, with pale blue scales at end of veins in our specimens, border at anal angle more yellow, tails blackish with two thin, indistinct, bluish white lines close to veins.

♀. Like ♂, larger, tails longer and less pointed; the disco-submarginal band of the upperside and the disco-postdiscal band of the underside of the hindwing somewhat narrower, the black outer area of the forewing above also a little more restricted.

Length of forewing: ♂, 39 to 54 mm.

” ” ♀, 55 mm. (our specimen).

Tergite of tenth abdominal segment of ♂ sinuate at apex, the edge of the plate being bent downwards in middle; the depth of the sinus variable, greatest in the specimens from the Shan States.

*Hab.* Malwa, Kumaon, Kulu, Nepal, Sikkim, Khasia Hills, Sylhet, Caehar, Shan States, Tenasserim.

In North India it occurs during April and May, while in Tenasserim it has been found in December and February. The species has one brood only, judging from the short time it is found on the wing. The larva and chrysalis are unknown.

The species is described by Westwood from a specimen in the collection of Captain Boyes, the specimen being said to be from “Malwah in the East Indies.” In Doubleday, Westwood & Hewitson, *Gen. Diurn. Lep.* II, p. 309 n. 34 (1850), the species is recorded as being represented in the British Museum from “Malwah, East India.” Dr. Butler, in his “Account of the Butterflies of the Genus *Charaxes* in the Collection of the British Museum” (*Journ. Linn. Soc. Lond.* XXV, p. 379, n. 82 1896), enumerates under *H.* a ♂ from “N. India (Capt. Boyes),” but this example is not the type, as it does not agree with Westwood’s figure.

We have lately received a number of specimens from Naini Tal, Kumaon, collected by Mr. Charles Maries. The upper postdiscal spot of the forewing above, which is seldom vestigial in the examples from other localities, is in one of those Naini Tal individuals as well marked as in Westwood’s figure, while in some of the other specimens from there it is minute, the remainder of our series being without that spot.

The specimens of *E. dolon* from Kulu differ yet a little more from the Sikkimese and other more eastern individuals than our Kumaon examples do, but the difference is very slight.

The locality “Malwah” whence the type came is most likely Malwa Tal in Kumaon.

#### a. *E. dolon dolon*.

- Charaxes dolon* Westwood, *Cab. Or. Ent.* t. 27, f. 2, 3, ♂ (1848) (Malwah, E. Ind.); *Butl. P. Z. S.* p. 635, n. 49 (1865) (“E. India”); *Niečv., Bull. of Ent.* II, p. 272, n. 565 (1886) (pt.: Kulu). *Nymphalis dolon*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* II, p. 309 n. 34 (1850) (Malwah). *Maracorda (?) dolon*, Moore, *Lep. Ind.* II, p. 261 (1896) (pt.: Kulu). *Charaxes (Maracorda) dolon*, Mackinnon & Niečv., *Journ. Bombay N. H. Soc.* XI, p. 377, n. 129 (1888) (Tehri Garwhal, 8000 ft., April, May).

♂. Anterior tibiae and stripes of sterna underneath femora paler than in the following subspecies, underside of abdomen also paler brown.

*Wings above*: forewing, of postdiscal series of spots the uppermost,  $Sc^1—Sc^5$ , rather often marked (*type*), spot  $M^2—(SM^1)$  rather heavy, rounded or somewhat triangular, the following one absent or minute. The pale buffish lunules near the inner edge of the disco-submarginal band of the hindwing all well marked, inclusive of lunule  $C^1—Sc^2$ , the band itself rather thinner than in *E. dolon centralis*; admarginal, cream coloured, spots (interspaces) pale, purer cream colour than in *E. dolon centralis*, being less shaded with blue, especially in individuals from Kulu.

*Underside*: submedian and median black bars thinner than in *E. dolon centralis*, especially those of the hindwing.

On the whole somewhat inferior in size to North Indian examples of *E. dolon*.

*Hab.* N.W. India: Malwa Tal (= "Malwah"); Naini Tal, Kumaon, 7 ♂♂ (Chas. Maries); Kulu, 7 ♂♂.

According to Mackinnon (*loc.*) this species is very rare in N.W. India: he found it at 8000 feet elevation in April and May at Nag Tiba in Tehri Garhwal. Doherty, *loc.*, records *E. eudamippus* as having been seen by himself at Kumaon; it was doubtless *E. dolon*, as *E. eudamippus* is not known to occur so far west.

*b. E. dolon centralis* Rothsch., subsp. nov. (Nov. Zool., V. t. 1X. f. 1, ♂, Sikkim \*).

*Nymphalis dolon*, Horsfield & Moore (non Westwood, 1848), *Cat. Lep. Ins. Mus. E. I. C.*, I. p. 206. n. 421 (1857) (Darjiling); Kirby, *Cat. Down. Lep.* p. 271. n. 46 (1871) (Sikkim).

*Charaxes (Haridra) dolon*, Butler, *Ann. Mag. N. H.* (5). XVI. p. 306. n. 52 (1885).

*Charaxes dolon*, Staudinger, *Exot. Papf.*, p. 173 (1886) (Sikkim); Nicéy., *Bull. of Ind.* II. p. 272. n. 565. t. 22. f. 100. ♂ (1886) (pt.; Sikkim: near Assam); Elwes, *Tr. Ent. Soc. Lond.*, p. 367. n. 207 (1888) (Sikkim, rare, 3 to 4000 feet, April and May); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 379. n. 82 (1896) (pt.; Sikkim; Nepal).

*Charaxes (Eulepis) dolon*, Nicéville, in Risley, *Gazetteer of Sikkim* p. 147. n. 229 (1894) (Sikkim, low elevations, April and May; desc. of ♀ from Bhutan, May 2nd).

*Marsipanda (?) dolon*, Moore, *Lep. Ind.* II. p. 263. t. 189. f. 1. 1a. ♂ (1896) (pt.; Eastern Himalayas, Assam, Cachar, Sylhet, Upp. Tenasserim, Tavoy (December), Thonngyeen Valley (February); "Malay Peninsula, Sumatra and Borneo" *ex err.*)

♂♀. Abdomen beneath almost pure black. Postdiscal spot ( $SM^1$ )— $SM^2$  of forewing above larger than in the preceding form, mostly angle-shaped, seldom both submedian spots very small.—Hindwing: disco-submarginal black band somewhat heavier than in *E. dolon dolon*, especially posteriorly, the pale buffish lunules near its proximal edge seldom conspicuous, the upper three or four mostly, the upper one always, absent or obsolete; admarginal, cream-coloured, spots much overshadowed with bluish scales, hence appearing darker than in *dolon dolon*; upper tail somewhat longer. On the *underside* the submedian and median black bars of both wings are heavier than in the western race.

*Hab.* Nepal to Tenasserim, 27 ♂♂, 1 ♀: Nepal (in Brit. Mus.); Sikkim (*type*, 26 iv. 88, O. Möller); Cachar (acc. to Moore); Sylhet (acc. to Moore); Khasia Hills (May 1889, Hamilton); Tavoy, Thonngyeen Valley and Upp. Tenasserim (acc. to Moore).

\* Fig. 2 represents a specimen from the Shan States.

c. *E. dolon grandis* Rothsch., subsp. nov. (Nov. Zool. V. t. IX. f. 2, ♂).

♂. Large, forewing measuring 61—63 mm. in length.

*Upperside*: forewing, disco-cellular band not extended beyond  $R^2$ , generally wider in front than behind, broad: apical black area a little more extended than in *E. dolon centralis*, the upper partition  $SC^{9-5}-R^1$  of the yellowish white discal area reduced to a narrow, long, triangle, the black colour also more extended basal between  $R^2$  and  $R^3$ : postdiscal yellowish white spots comparatively small, uppermost,  $SC^9-SC^5$ , absent, the second rounded, not triangular like the third, last two,  $M^2-SM^2$ , absent or represented by blue angles, a more or less indistinct blue spot behind  $SM^2$ .—Hindwing more strongly dentate than in the other form of *E. dolon*: disco-submarginal black band about as broad as in those specimens of *E. dolon centralis* in which it is heaviest, rather wider in front: the pale blue distal borders of the discal bars of the band variable in number as in *E. dolon centralis*, lunule  $C-S^{10}$  always absent, submarginal spots within band blue, larger than in either *dolon centralis* or *dolon dolon*: admarginal interspaces wider than in the other races, the marginal line being extremely thin, much shaded with blue at veins, anal interspace pure pale yellow, wide: tails almost entirely sealed blue.

*Underside*: the costal border of the forewing and the bands of both wings more yellow, less olivaceous than in the other forms.—Forewing: the interspace between discal and postdiscal bar (near internal angle) more or less obviously suffused with blue scaling, postdiscal spot ( $SM^1$ )— $SM^2$  somewhat angle-shaped; discal bars wider apart than in the other forms.—Hindwing: median band (like that of forewing) comparatively broader, and white submarginal scaling more extended, the anal yellow patch purer yellow and larger than in *E. dolon dolon* and *centralis*; submedian bars  $C-M-C$  and  $M-(SM^1)$  absent or only vestigial; in three out of four specimens the postdiscal bars  $R^1-M^2$  are vestigial: black submarginal dots well marked.

*Hob.* Shan States, 4 ♂♂ without more exact indication of locality in the Tring Museum.

*f*<sup>1</sup>. Yellow-brown band in basal half of hindwing below touching precostal veinlet.

*g*<sup>2</sup>. Cell of forewing below with many black dots, abdominal fold of hindwing below speckled with black scales: postdiscal olivaceous brown band of underside of forewing parallel to margin of wing.

#### 17. *Eulepis posidonius* (Nov. Zool. VI. t. VII. f. 8, ♂).

*Choraxes posidonius* Leech, *Entom.* XXIV. *Suppl.* p. 30 (1891, May) (Wa-ssu-kow, June: Ni-tou, May); id., *Bull. China* p. 127 t. 14. f. 4. ♂ (1893) (Wa-ssu-kow, June: Ni-tou, May, 5000 feet): *Bull. Journ. Linn. Soc. Lond.* XXV. p. 381. n. 87 (1896).

*Choraxes elitiphon* Oberthur, *Et. d'Ent.* XV. p. 12. t. 2. f. 11 (1891, July) (Tse-kou).

*Muraveda posidonius*, Moore, *Lep. Ind.* II. p. 237 (1896).

♂. *Body, above*: olivaceous black; abdomen deeper black than thorax and head; antennae quite black; spots on head present, those on pronotum obsolete. *Underside* of palpi and thorax yellowish white, with black stripes underneath the legs; sides of palpi white; abdomen black, claspers edged white; anterior tibiae, upper part of anterior tarsus and front part of femora, black.

*Wings, above*: black and greenish white or yellowish white.—Forewing: elongate, but apex rounded; greenish white discal band about 11 mm. broad at  $SM^2$ , its outer edge somewhat concave, band touching M at base of  $M^1$ , partition  $R^3-M^1$  costally convex, separated from  $R^2$  by a black interspace of about 1 mm. width, discal spot  $R^2-R^3$  close to cell, isolated, elongate, dimensions about  $3\frac{1}{2} : 1\frac{1}{2}$  mm., discal spots  $SC^1-R^2$  close together, nearer postdiscal spots than cell, upper one a little longer than the second, extending more basad; some white scales in upper half of cell and also a few in middle of costal margin: a series of 8 yellowish white postdiscal spots, parallel to edge of wing, the last two fused, upper four smaller than posterior four; no submarginal spots.—Hindwing: base as far as origin of  $R^1$  black, this small black area across M along ( $SM^1$ ) about half way to outer black area which it seldom almost touches; abdominal fold greenish white, somewhat slightly blackish at base: outer edge of greenish white discal area oblique from C to  $R^2$ , straight or faintly concave, then somewhat concave between veins; disco-marginal black area 9 mm. broad at  $R^1$ , 8 mm. at  $M^1$ , including a series of rather large, yellowish white, admarginal spots, the upper three more or less square, the following three longer, oblique, pointed at ends, anal one more yellow, large, about  $2\frac{1}{2}$  mm. broad; at outer side of these spots, except anal ones, there are pale blue scales which form heavy streaks in tails, black edge of wing about as broad as the admarginal spots or narrower, at anal angle it forms a thin line; in black disco-marginal band there are, between  $M^2$  and  $SM^2$ , two pale blue lines, one close to inner edge of black band, marking the outer border of the discal bar, the other close to pale yellow anal spot, generally divided, representing the submarginal series of white spots present in allied species: outline of wing triangular, outer margin not dentate at veins, upper tail (10 mm.) longer than second (6 to 7 mm.).

*Underside* greyish silvery white, faintly vinaceous: the white markings which correspond to those of upperside more greenish except at edges, scales of these greenish parts narrow.—Forewing: costal margin white at base, but C blackish: cell greyish, with numerous small black dots, the cell-bar of the allied species vestigial opposite point of origin of  $M^2$ , but the place where it should be is indicated by the proximal edge of a band of bistre colour, which is about  $2\frac{1}{2}$  mm. broad and has about the form of the letter Y with the disco-cellular branch very short; this band is bordered outwardly by the three continuous black median bars, which line crosses  $M^2$  about  $2\frac{1}{2}$  mm. from base of  $M^2$ , touches M before base of  $M^1$  and then runs distad, parallel to  $R^2$ , the discal branch of the band is bordered in front of  $R^2$  by median bar  $R^2-R^3$ , which runs here along  $R^2$  and is continuous with bar D; there are some black scales behind  $R^2$  which represent the upper end of median bar  $R^2-R^3$ , the greenish white spot in front of  $R^3$  as above, median bars  $SC^1-R^2$  8 mm. from end of cell, each with a triangular patch of bistre colour at proximal side and a greenish white spot at outside (as above): discal black bars almost straight, forming a scarcely interrupted line which is parallel to, and is situated 6 mm. from, outer margin of wing: this line forms the distal border of a band of bistre colour of 2 to  $2\frac{1}{2}$  mm. width, the proximal edge of which is slightly convex between veins; the postdiscal spots of the upperside are visible below, all are bordered distally by thin, black, postdiscal, curved lines the ends of which are pointing basad: a marginal band of bistre colour 2 to  $2\frac{1}{2}$  mm. broad, faintly edged proximally with tawny ochraceous, slightly indented at veins.—Hindwing: costal submedian bar vestigial at  $PC$ , submedian bars C—( $SM^1$ ) nearly continuous, crossing  $SC^2$  close to base of this vein, bar M—( $SM^1$ ) almost at right angles to M: median bars continuous, the bars down



to M forming a line that is curved basad: this line touches M before M<sup>2</sup>, extends a little along M and joins bar M<sup>1</sup>—M<sup>2</sup>, which is situated close to the base of M<sup>2</sup>, bar M<sup>2</sup>—(SM<sup>1</sup>) about parallel with M<sup>2</sup>, close to it, reaching (or almost reaching) discal black bar M<sup>2</sup>—(SM<sup>1</sup>), bars (SM<sup>1</sup>)—SM<sup>2</sup> oblique, heavy: interspace between submedian and median bars bistre colour, band-like, this band extending to discal series of bars: upper discal black bar extends from the upper end of the first median bar very obliquely to C, which it reaches about middle, discal bar C—SC<sup>2</sup> begins in middle of C, curves round to SC<sup>2</sup>, which it reaches 8 to 9 mm. from tip, the other discal bars luniform, the series on the whole parallel to outer margin, slightly angled at R<sup>2</sup>, bars bordered by pale blue lines distally, followed by dark red luniform spots which are bordered distally by very indistinct black postdiscal bars: interspace between oblique costal bar and costal margin reddish brown; submarginal area white, with very thin black submarginal dots, dots R<sup>2</sup>—M<sup>2</sup> mostly obsolete, anal two or anal one larger, admarginal spots visible, bordered with tawny ochraceous outside, extending into bases of tails; marginal band bistre colour, about 2½ mm. broad, very thin at anal angle; blue streaks in tails; abdominal region up to median band oversprinkled with black scattered scales.

Length of forewing: C, 40 mm.; SM<sup>2</sup>, 27 mm.

Cell of forewing narrow and long (17 mm.), longer than in the allied species.

*Hab.* Western China: Ni-tu, 5000 ft., May 1890, 1 ♂: Wa-ssu-kow, June (Leech): Tse-ku (Oberthür).

The pattern of this species presents some interesting features. In the position, parallel to the edge of the wing, of the postdiscal spots of the upperside and the discal bars of the underside of the forewing, in the presence of red, luniform, postdiscal spots on the hindwing below, and in the development of a series of postdiscal black bars on the forewing below, *E. posidonius* is more ancestral than its allies, while the large admarginal markings of the upperside of the hindwing—which the describers of the species have erroneously treated as being homologous of the submarginal spots of *E. narcaeus*,—the dots in the cell of the forewing below, the obliteration of the cell-bar of the same wing, the position of costal discal bar of the hindwing below, the sprinkling of black scales over the abdominal area of the same wing, are specialisations which we do not find elsewhere in *Eulepis*. Though the few specimens we have seen had no white submarginal spots on the forewing above, and only a vestige of the last submarginal spots on the upperside of the hindwing, it is probable that such (yellowish white) spots appear sometimes in this species as minute dots. On receipt of more material it will perhaps also be found that of the cell-bar of the forewing below there is sometimes a greater portion developed, and that the abdomen is occasionally spotted white beneath from base to middle.

♂. Cell of forewing below without many black dots: abdominal fold of hindwing below without a sprinkling of black scales.

### 18. *Eulepis narcaeus* (Nov. Zool. VI. t. VII. f. 9. 10).

*Nymphalis narcaeus* Hewitson, *Ex. Butt.* I., *Nymph.* t. I. f. 1. 4 (1854) (Chekiang).

*Charaxes narcaeus*, Butler, *Journ. Linn. Soc. Lond.* XXV. p. 381. n. 86 (1896) (Shanghai; Kinkiang):

Leech, *Tr. Ent. Soc. Lond.* p. 108. n. 39 (1889) (Kinkiang, apparently common): id, *Bull. Chino* I. p. 126 (1893) (throughout Eastern, Central, and Western China).

♂. *Body above* olive black, abdomen often more or less extended white: dots on head and pronotum yellowish white, those on the latter often obsolete.

*Underside* of palpi and thorax white, somewhat yellowish, streaks underneath legs black : abdomen all white, or black with white markings : anterior tibia black, middle and hinder femora black with scattered white scales, rest of legs white, scales often partly rubbed away.

*Wings, upperside* : purplish black, more or less extendedly greenish white, slightly yellowish, in the pale form the black colour reduced to some narrow bands and streaks. —Forewing : costal and outer margin always black : greenish white discal band separated into two portions by a black streak of about  $1\frac{1}{4}$  mm. width, which is situated behind  $R^3$  and is the distal portion of a black median band which begins below the base of  $M^2$  and which is joined to the costal border of the wing by means of a short disco-cellular band of the same width : the posterior, larger portion of the greenish white band is sometimes extended to the base, mostly, however, the base is black beyond cell : a series of eight to nine postdiscal, greenish white, spots separated from the discal band by a continuous, more or less straight, black band : the series of spots is nearly parallel to the outer margin, the spots are either separated or more or less fused together : the first is small, spot ( $SM^1$ )— $SM^2$  is seldom obsolete : submarginal greenish white dots often marked. —Hindwing : greenish white discal band sometimes occupying the basal three-fifths of the wing ; mostly the base of the wing is black ; this colour extends as a broad stripe across cell and runs along abdominal fold to disco-marginal black area, separating the greenish white abdominal area from the discal band proper, the latter forming a large triangle ; within the black outer area there is a series of submarginal, greenish white spots of variable size, often fused to a band ; spot  $M^1$ — $M^2$  smaller than those before it : spots  $M^2$ — $SM^2$  minute or only vestigial ; near proximal edge of black area there is, at anal angle, a blue lunule, another is vestigial before  $M^2$  ; anal admarginal spot narrow, yellow ; admarginal spots  $R^3$ — $M^2$  mostly marked, oblique, at veins with blue scaling which extends into tails, the other admarginal spots vestigial at least in the pale form ; tails slightly pointed, the upper one as long as, or longer than, the second.

*Underside* very pale green, the edges of the pale green areas more or less heavily silvery grey : costal margin, except a streak at base, and outer margin, rawumber-colour, the costal border suddenly narrower at apex of wing : cell seldom without black dots, there are generally two or three, one at the edge of the costal border before middle of cell, the posterior one opposite base of  $M^2$  ; sometimes the spots are fused to a bar, which, however, does not reach  $M$  ; cell-bar reaching from base of  $M^2$ — $SC$  near upper angle of cell, angle-shaped, mostly recurving basad along costal border to upper cell-spot ; cell-bar continuous with submedian bar  $M^2$ —( $SM^1$ ) ; median bars ( $SM^1$ )— $M^1$  parallel to cell-bar ; bar  $R^3$ — $M^1$  directed distad, parallel with  $R^3$ , its distal end suddenly bent costal, the interspace between these bars, vein  $R^3$  and bar  $D$ , of the same colour as costal border of wing : median bars  $R^1$ — $R^3$  fused with bar  $D$  (or absent?) ; median bars  $SC$ — $R^1$  situated along costal border of wing ; discal bars nearly straight or somewhat luniform, forming a continuous line which is posteriorly closer to outer margin than anteriorly ; upper bar oblique, pointing distad with upper end : this line of bars is the outer border of a tawny olive, almost straight band, of 2 mm. width about, which joins the costal border ; the postdiscal pale green spots as above, the two last ones in the dark form vestigial, but here their outer edge indicated by two black dots representing the postdiscal bars. —Hindwing : abdominal fold greenish white, slightly silvery grey ; a line of submedian bars from costal margin to ( $SM^1$ ) crossing  $C$  close

to PC, and M half-way to M<sup>2</sup>, slightly curved; a median line of bars, parallel to the first, entering cell at base of R<sup>2</sup>, crossing M just before M<sup>2</sup>, with bar M<sup>2</sup>—(SM<sup>1</sup>) very long and parallel to M<sup>2</sup>, the tawny olive interspace between these lines of bars continued to discal series of bars, forming a band of about 1 $\frac{2}{3}$  mm. in width which is paler at ends; median bars (SM<sup>1</sup>)—SM<sup>3</sup> oblique, often obliterated; discal bars continuous, the last from R<sup>3</sup>—SM<sup>2</sup> luniform, the line crossing R<sup>3</sup> 3 to 5 mm. from M<sup>1</sup>, bordered bluish white distally, followed by a continuous band (about 1 $\frac{1}{2}$  to 2 $\frac{1}{2}$  mm. broad) of maroon red spots (sometimes more ferruginous red); spots R<sup>3</sup>—SM<sup>2</sup> luniform, all bordered distally by the postdiscal black bars; pale green submarginal spots as above, bordered with pale silver grey, black submarginal dots close to outer edge of this whitish area; admarginal spots orange-buff, often very small and ill-defined; marginal border bistre-colour, about 1 mm. broad, much narrower at anal angle, where it is nearly black; tails with pale blue streaks.

♀. Like ♂, somewhat larger; abdomen more black; forewing somewhat broader, its outer edge on the whole less concave; tails blunter.

Length of forewing, ♂ 31—43 mm.

” ” ” ♀ 40—49 ”

The species has not been bred, the larva and pupa being, in fact, unknown to science; but there is scarcely any doubt that there are two broods, which differ so considerably from one another, though they are connected by all intergradations, that they have been described as two species. Mr. Leech, in *Bull. China* I. p. 127, says that “the species is on the wing from April to August, but the type-form appears only to be found from April to June.” According to the specimens that are dated, the individuals with the greenish white colour of the wing extended (f. temp. *narcaeus*) belong to the spring brood, or, as is perhaps safer to say, emerge from April to June; while the examples that come out later in the year have the greenish white colour of the wings restricted (f. temp. *mandarinus*), and represent most likely a second brood. The differences between the two forms are remarkable in one respect. The early form *narcaeus* has the black colour of the wings restricted, as is the case with the spring broods of *E. atamas*, *Papilio sarpedon*, *eurypylus*, etc.; but the abdomen is much more extended black in f. temp. *narcaeus* than in the dark-winged f. temp. *mandarinus*, while in *Eulepis atamas* the darker-winged specimens of the summer brood (or broods) have also the darker abdomen.

In the individuals from Central and Western China the tawny olive bands of the underside are, as a rule, more olive than in the specimens from Eastern China.

The rows of scales on the greenish parts of the underside do not cover one another, the green wing membrane is visible between them; on the forewing the scales of the discal greenish band are rounded at the apex, while those of the discal band of the hindwing are unisinate.

The tenth abdominal segment of the ♂ is broad and sinuate at the apex; the tooth-like dorsal dilatation of the clasper is generally acute.

a<sup>1</sup>. *E. narcaeus* f. temp. *narcaeus* (Nov. Zool. VI. t. VII. f. 9, ♂).

*Nymphalis narcaeus* Hewitson, *Er. Butt.* I. *Nymph.* t. 1. f. 1. 4 (1854) (N. China); Kirby, *Cat. Diurn. Lep.* p. 271. n. 45 (1871).

*Charaxes narcaeus*, Butler, *P. Z. S.* p. 635. n. 48 (1865) (N. China); Lewis, *Ent. Monthly Mag.* XV. p. 257 (1879) (Japan!!); Elwes, *P. Z. S.* p. 891 (1881) (Shanghai); Leech, *l.c.* (1893) (pt.). *Butl. l.c.* (1896) (pt. : *mendemus* = typical *narcaeus*).

*Charaxes satyrina* var. *menedemus* Oberthur, *Et. d'Ent.* XV, p. 13, t. 2, f. 9 (1891) (Tsé-kou).

*Charaxes satyrina* (?), "Butler," Oberthur, *l.c.* (Ta-t sien-lou : *satyrina* = Butler "ex err., dealer's name").

*Murwareda narcaeus*, Moore, *Lep. Ind.* II, p. 267 (1896) (N. China : Chusan Is. : Japan).

*Murwareda menedemus*, id., *l.c.* (W. China).

♂ ♀. Abdomen black ; *underside* in ♂ mostly with some white spots ; edge of claspers white or buffish.

*Wings, upperside* : greenish white colour occupying the greater part of the wings.—Forewing : cell all or nearly all greenish white ; greenish white discal area often extended to base, broader behind than black outer area, black streak along R<sup>3</sup> often separated from black outer area ; greenish white patch in front of this streak large, not broken up ; postdiscal greenish white spots mostly fused to a band, often extended to internal margin ; a series of minute white submarginal dots is occasionally present.—Hindwing : the greenish white area extends sometimes to base, the disco-postdiscal black band narrower, the streak along abdominal fold pale, often partly, seldom totally, obliterated ; submarginal greenish white spots heavy, fused to a broad band ; spot M<sup>1</sup>—M<sup>2</sup> half-moon-shaped, sometimes isolated, admarginal spots mostly present, separated from the greenish white submarginal ones by the black, mostly abbreviated, submarginal bars. Tails seldom very short and mostly blunt.

Length of forewing, ♂ 31—42 mm. .

" " " ♀ 40 " "

Occurs from April to June : 21 ♂♂, 2 ♀♀ in Tring Museum.

Oberthur's *menedemus* is based on a small specimen with very short tails : we have not seen a specimen with the tails so short as they are in Oberthur's figure. The fawny scales (upper layer) of the marginal band of the forewing below are, in the April examples from Ningpo, bidentate ; while in the specimens from the Central and West Chinese localities they are mostly tridentate.

*W. E. narcaeus* f. temp. *mandarinus* (Nov. Zool. VI. t. VII. f. 10, ♂).

*Charaxes mandarinus* Felder, *Reise Novara, Lep.* p. 437, n. 710 (1867) (Shanghai) ; Butl., *Tr. Ent. Soc. Lond.* p. 119, n. 1 (1870) (distinct ?).

*Nymphales narcaeus* var. a. *Char. mandarinus*, Kirby, *Cat. Diurn. Lep.* p. 271, sub n. 45 (1871) (Shanghai).

*Charaxes narcaeus* var. *thibetanus* Oberthur, *Et. d'Ent.* XV, p. 11, t. 2, f. 10 (1891) (Chang Yang : Ta-t sien-lou) ; Alphér., *Mém. Romanoff* IX, p. 98 (1897) (July, Sze-Chuen).

*Charaxes narcaeus* var. *mandarinus* Leech, *Tr. Ent. Soc. Lond.* p. 198, sub n. 39 (1889) (Kiukiang) ; id., *Bull. Chom* I, p. 126 (1893) ; Butler, *Journ. Linn. Soc. Lond.* XXV, p. 381, sub n. 86 (1896) (*mandarinus* = *thibetanus*).

*Murwareda mandarinus*, Moore, *Lep. Ind.* II, p. 267 (1896) (Shanghai ; Chusan Is.).

*Murwareda thibetanus* (?), Moore, *l.c.* (1896) (E. Tibet, *sic!*).

♂ ♀. Abdomen of ♂ beneath white, often with black spots, above more or less extended white or grey ; in ♀ grey or black above, beneath white, but middle more or less black.

*Wings, upperside* : greenish white markings reduced.—Forewing : cell and base of wing black, often a greenish white patch near apex of cell ; posterior portion of greenish white discal band about as wide as the black outer area, upper portion incised at veins, sometimes almost broken up into three spots, the upper one of these spots occasionally very small, the third extended to cell, while the second does not often reach so far basad ; postdiscal greenish white spots separated from each

other, more or less rounded; spot at internal margin mostly wanting; spot ( $SM^1$ )— $SM^2$  also sometimes absent.—Hindwing: longitudinal black streak heavy; submarginal greenish white spots mostly separated, sometimes the upper five incompletely merged together; spot  $M^1$ — $M^2$  always isolated, the spots as wide as, or smaller in diameter than, the proximal portion of the black disco-marginal area, sometimes the spots only  $1\frac{1}{2}$  mm. in diameter; admarginal spots  $R^3$ — $M^2$ , if present, small; anal one yellow.

On the *underside* the dark bands and spots are generally heavier than in the spring form, the last median bars near abdominal margin seldom absent.

Length of forewing, ♂ 36—43 mm.

” ” ” ♀ 47 ”

Occurs from June to August; 32 ♂♂, 2 ♀♀ in Tring Museum.

*Hab.* The species is found in both forms from the coast to Mapin, and as far north as Shanghai. The southern limit of its range is not known; the species extends probably into Tonkin.

Mr. Lewis, *loc.*, records *E. narvacus* from Japan; if the species should really occur in Southern Japan (which we do not believe), the Japanese specimens will, no doubt, be different from the Chinese individuals.

D. Submedian and median bars of the underside not continuous, forming some rings.

### 19. *Eulepis delphis* (Figs. 40, 41, 42).

*Charaxes delphis* Doubleday, *Ann. Soc. Ent. France* (2) 1. p. 217. t. 7 ♂ (1843).

♂. Head, pronotum and anterior portion of mesonotum pale olive, rest of *upperside* of body creamy white, but black colour of chitin of mesothorax generally shining through, upperside of palpi brownish black, four dots on head, a line behind each eye, a dot at each side of pronotum white.

*Underside*: white, stripes on breast beneath femora, upperside of anterior tibia, middle legs, upperside of posterior femora and bases of tarsal segments more or less extended black.

*Wings, upperside*: yellowish white.—Forewing: a black apical area, widest in front, very narrow behind, varying somewhat in extent in the different subspecies and also individually; it seldom reaches upper angle of cell along  $SC^{1-5}$ , interspace between cell and inner edge of black area at least 4 mm. in front of  $R^2$ , inner edge of black area more or less deeply incised upon veins, the partitions of the area between  $R^3$  and  $M^2$  mostly strongly convex discally, partition  $M^1$ — $M^2$  3—10 mm. long in fold  $M^1$ — $M^2$ , partitions  $M^2$ — $SM^2$  short, mostly separated from each other, and sometimes also from partition  $M^1$ — $M^2$ , the last of those two sometimes obsolescent; the white scaling extends along ( $SM^1$ ) close to margin, expands here and separates more or less complete partition ( $SM^1$ )— $SM^2$  from edge of wing, in some specimens this admarginal white scaling extends to  $M^2$ ; before  $R^2$  a black spot is sometimes separated from the apical area; a black disco-cellular bar is in many specimens vestigial; the black area includes mostly one postdiscal, yellowish white, spot of variable size standing before  $R^1$ , sometimes, especially in the North Indian form, there is another, smaller dot behind it, or even a third behind  $R^2$ , in a few specimens the postdiscal spots are altogether wanting; no submarginal spots; costal edge of wing from base to apical area more or less shaded with brown.—Hindwing: all yellowish white, abdominal fold purer white (if not greasy); a series of

postdisco-submarginal spots with white centres representing the white submarginal dots, upper three almost straight, the first seldom obliterated, at right angles to the veins which they do not always touch, well separated from each other, spots  $R^2-SM^2$  arched, densely shaded with pale blue, extending distad along the veins, reaching tips of tails, veins  $SC^{12}$  and  $R^1$  mostly thinly black beyond spots: admarginal interspaces more or less tinged with pale yellow in middle: edge of wing strongly dentate, forewing almost short tails at  $R^2$  and  $M^1$ , tail  $R^3$  longer than tail  $M^2$ , pointed: fringe black, except at and near tip of ( $SM^1$ ) in many specimens.

*Vnderside*: chalky white, somewhat glossy.—Forewing: cell-bar three separated into three dots, the uppermost close to  $SC^1$  largest, the second and third close together, sometimes fused, the third below origin of  $M^2$ , larger than the second, the latter sometimes absent or minute; upper cell-bar curved, its ends touching bar D, forming with the latter a half-moon filled up with pale bluish grey scaling: no median and submedian bars  $M^2-(SM^1)$  and  $R^3-M^1$ , median and submedian bar  $M^1-M^2$  fused together forming a ring filled up with pale bluish grey scaling: this ring varies very much in size, it seldom touches the veins and is always more than 1 mm. distant from origin of  $M^1$ ; median bar  $R^2-R^3$  close to apex of cell, sometimes touching bar D, either straight or curved basad at ends, median bars  $SC^5-R^2$  always present, well marked, straight or angled, about 9 mm. from cell: a series of rather thin, bluish grey—the black underscales being covered by white scales—seldom blackish, strongly arched, discal bars, from  $SC^5$  to  $SM^1$ , bar  $SC^1-SC^5$  being marked only as a small dot or streak, bars  $SC^5-R^3$  at outside with bluish grey scaling generally, but two bars joined together in most individuals forming a mark resembling number 3, bar  $SC^5-R^1$  about 14 mm. from edge of wing midway between veins, the next about  $10\frac{1}{2}$ , the following one  $11\frac{1}{2}$ , the last three about  $8\frac{1}{2}$  mm. distant from edge of wing: a series of seven postdiscal spots from  $SC^5-SM^2$  (representing the postdiscal bars), deep wax yellow, the upper ones a little closer to discal lunules than to edge of wing, the posterior ones much closer to discal lunules, the first two and last two rounded, the other three luniform, the upper ones sometimes faintly marked; there is often (especially in continental individuals) a series of wax-yellow, small, submarginal spots: fringe black.—Hindwing: submedian and median costal bars fused to a ring which varies in size and is filled up with pale bluish grey scaling, a similar but smaller ring (sometimes absent) behind C; cell-bar close to apex as on forewing, generally joined at ends to the median bar  $R^2-R^3$  thus forming an ovate ring in which bar D is situated, submedian bar  $M^1-M^2$ , if present, about halfway between bases of  $M^1$  and  $M^2$  or nearer  $M^2$ , submedian bar  $M^2-(SM^1)$  also often marked, about 3 mm. from base of  $M^2$ ; median bar  $M^1-M^2$  behind base of  $M^1$ , seldom absent, bar  $M^2-(SM^1)$  also mostly present, oblique like the preceding ones, about 8 mm. from base of  $M^2$ , median bars ( $SM^1$ )- $SM^3$  separate from each other, at right angles to  $SM^2$  or more oblique, the upper one of the two touching generally with upper end the respective discal bar: a complete series of luniform discal bars, the black lunules overshadowed with white, hence appearing pale blue, the upper ones the heaviest, lunule C- $SC^2$  about 10 mm. from edge of wing, the last one about 6 or 7 mm. from margin at ( $SM^1$ ), lunules  $M^2-SM^2$  interrupted or complete: this series followed by a series of dots, of which the upper four are deep wax-yellow and larger than the posterior four, which are red, the last two sometimes fused to one spot: submarginal bars of nearly equal thickness, the upper ones almost or quite straight, the others curved, pale blue, separated from the wax-yellow admarginal interspaces by white borders, which are nearly as broad as the

submarginal lunules themselves ; postdisco-submarginal area white, with a wax-yellow band (= postdiscal series of bars), the upper three spots of the band more or less isolated, sometimes faint, resembling somewhat the letter M, the band not interrupted from  $R^2$  to  $SM^2$ , twice as broad as the anterior spots, or more, somewhat dilated discal at veins, especially much dilated basad at ( $SM^1$ ), the additional proximal portion—which corresponds to the distal end of the brownish yellow median band of *athamus*, *eudamippus*, etc.—cut off from the band of the discal lunules  $M^1$ — $SM^2$  not interrupted ; edge of wing white with a faint blue or green tint, fringe black ; end of veins thinly black.

♀. One battered specimen in the Tring Museum ; somewhat larger than our largest ♂♂, the teeth of the hindwing less acute, otherwise like the ♂.

Tenth tergite of ♂ broad, slightly emarginate at tip ; clasper with the upper edge produced dorsad into a broad tooth of variable length and breadth.

Length of forewing : ♂ 41 to 48 mm.

“ “ ♀ about 52 mm.

*Hab.* Assam to Palawan and Java, from near the sea up to 4000 ft.

Larva and pupa are unknown. The ♀ in our collection was found alive in an empty whiskey bottle at Ipoh, Perak, in August 1898 by Mr. Blaze. The larva must have crept into the bottle to pupate. Unfortunately when breaking the bottle to get the specimen out the collector injured the insect very much.

We recognise four geographical forms which occur respectively in (1) Assam, (2) Burma to Borneo and Sumatra, (3) Java, and (4) Palawan.

The most interesting feature of the distinguishing characters of these four forms is that the Palawan form agrees so well with the Assamese subspecies in the lesser development of black on the upperside of the forewing as compared with the subspecies from the other localities.

A highly remarkable phenomenon in the habits of this species is observed by Martin and Hagen (see *E. delphis concha*), namely, the association of the ♂ with *Pieridae*, which it resembles in its white colour.

#### a. *E. delphis delphis* (Fig. 40, ♂).

*Charaxes delphis* Doubleday, *Ann. Soc. Ent. France* (2) I. p. 217, t. 7. ♂ (1843) (Silhet) ; Butl., *P. Z. S.* p. 635, n. 50 (1865) (Silhet ; *syn. excl.*) ; Druce, *ibid.*, p. 346 (1873) (Silhet) ; Dist., *Rhop. Mal.* p. 105, n. 3 (1883) (pt.) ; Nicésv., *Bull. of Insl.* II. p. 272, n. 564 (1886) (pt. ; Assam ; Cachar ; Sylhet) ; Staud., *Evot. Tagf.* p. 173 (1886) (pt.) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 379, n. 81 (1896) (pt. ; Silhet).

*Nymphalis delphis*, Doubleday, Westw., & Hew. *Gen. Diurn. Lep.* II. p. 309, n. 33. (1850) (Silhet) ; Horsf. & Moore, *Cat. Lep. Ins. Mus. E. I. C. I.* p. 206, n. 419 (1857) (Silhet) ; Kirby, *Cat. Diurn. Lep.* p. 271, n. 47 (1871) (Ind. bor. ; *syn. excl.*).

*Charaxes (Eulepis) delphis*, Woo!-Mason & Nicésv., *Journ. As. Soc. Beng.* LIV. II. p. 362, n. 98 (1886) (Cachar, August).

*Murexareda delphis*, Moore, *Lep. Insl.* II. p. 266, t. 180, f. 1. 1a. ♂ (1896) (pt. ; Assam ; Cachar ; Sylhet).

♂. *Upperside*.—Forewing : black area not so far extended basal between  $SC^{4,5}$  and  $R^3$  as in the following two forms ; the white colour more or less separating a spot from the black area in front of  $R^2$  ; this spot corresponds to median bar  $R^1$ — $R^2$  of underside, and is sometimes very small, quite isolated, or even obliterated ; yellowish white postdiscal spot  $SC^6$ — $R^1$   $1\frac{1}{2}$  to  $4\frac{3}{4}$  mm. long, as a rule concave distally, mostly followed by a second or even a third dot.

*Underside*.—Hindwing: postdiscal red spots  $R^3$ — $SM^1$  rather larger than in the other races, the last two merged together, spot  $R^2$ — $R^3$  also of a somewhat reddish tint; discal pale blue lunules  $M^2$ — $SM^2$  not interrupted at ( $SM^1$ ), or very slightly so, the wax-yellow scaling at the proximal side of this lunule, if present, separated from the wax-yellow band of the post-disco-submarginal area.



FIG. 40.

*Hab.* Assam, 9 ♂♂: Silhet; Khasia Hills; Cachar.

Specimens from Burma and Tenasserim connect this form with *E. delphis concha*.

*d. E. delphis concha* (Fig. 41, ♂, Sumatra).

*Chavaxes concha* Vollenhoven, *Tijdschr. v. Ent.* IV. p. 162. t. 10. f. 1. 3 (1861) (Java?; Padang; Sumatra).

*Chavaxes delphis*, Butler (*non* Doubleday, 1843), *P. Z. S.* p. 635. n. 50 (1865) (pt.): Dist., *Rhop. Mal.* p. 105. n. 3. t. 15. f. 1. ♂ (1883) (pt.: Mal. Pen., Malacca; Labuan; Tenasserim); Nicéy., *Bull. of Ind.* II. p. 272. n. 564 (1886) (pt.): Stand., *Exot. Tijds.* p. 173 (1886) (pt.: Borneo); Dist. & Pryer, *Ann. Mag. N. H.* (5). XIX. p. 52. n. 50 (1889) (N. Borneo); Elwes, *P. Z. S.* p. 283 (1891) (foot of Karen Hills); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 379. n. 81 (1896) (pt., Labuan); Hagen, *Iris* IX. p. 182. n. 239 (1896) (N. E. Sumatra).

*Nymphalis delphis*, Kirby, *Cat. Diura. Lep.* p. 271. n. 47 (1871) (pt.).

*Chavaxes (Eulepis) delphis*, Elwes & Nicéy., *Journ. As. Soc. Beng.* LV. ii. p. 426. n. 81 (1886) (Tavoy); Wood-Mas. & Nicéy., *ibid.* p. 362. n. 89 (1887) (Cachar, August); Nicéy. & Martin, *ibid.* LXIV. ii. p. 433. n. 253 (1895) (N.E. Sumatra).

*Marcopoda delphis*, Moore, *Lep. Ind.* II. p. 266 (1896) (pt.: Upp. Tenasserim, Mal. Pen., Sumatra, Borneo).

♂. *Wings, upperside*.—Forewing: black area more extended than in *E. delphis delphis*, especially in front, partition  $R^1$ — $R^2$  of this area not incised in front of  $R^2$ , the black spot which is more or less separated from the black area in *E. delphis delphis* is here entirely fused with the area; yellowish white submarginal spot small or absent.

*Underside*: black markings generally somewhat heavier than in *delphis delphis*; on hindwing the greyish blue discal bar  $M^2$ — $SM^2$  as well as the red postdiscal spots  $M^2$ — $SM^2$  separated each into two markings, the yellow submarginal scaling extending basad along the submedian fold, the upper of these two red dots often absent.

*Hab.* Burma to Sumatra (*type*) and Borneo, at lower elevations.

18 ♂♂ in Tring Museum: N.E. Sumatra, coll. by Dr. Martin, Quala Lemoerak, June 1894, Begoemit, May 1894, Gayoe country, January and May 1893; S.E. and



FIG. 41.



N. Borneo, Mt. Dulit, December 1893 to January 1894 (Hose); Malay Peninsula; Tenasserim, Dalgwin, December 1891 (Bingham), foot of Donat Range, October 1891 (Bingham). A specimen from the Salween valley, July 1889 (Bingham), has the red spots  $M^2-SM^2$  of the underside of the hindwing large and confluent, while the discal greyish blue bar  $M^2-SM^2$  is divided at ( $SM^1$ ).

The individuals from Tenasserim and Lower Burma connect *E. delphis concha* with *delphis delphis*.

Nicéville, *Butt. of Ind., l.c.*, records it from the Donat range (January), the Thoungyeen forests, Moulmein, and Perak; and Moore, *Lep. Ind., l.c.*, says that it was caught by Major Adamson at "Tavoy and Hapapoon in October and November," and that Mr. Tucker also found it at Tavoy.

Vollenhoven described this form from specimens from Java and Padang, Sumatra, but he doubted the correctness of the locality "Java." His figure represents certainly the Sumatran example, as it does not show the distinguishing characters exhibited by Javan specimens: hence the name of *concha* is to be restricted to the Sumatran form of *delphis*, from which the individuals from Borneo and the Malay Peninsula do not differ. Vollenhoven's figure 3 is not correct in so far as there is on the forewing one vein and one discal line too much: the black median bars  $SC^u-R^2$  on the forewing should stand in the same cellules as the upper two yellow postdiscal dots.

According to Martin and Nicéville, *l.c.*, *E. delphis* occurs in N.E. Sumatra "from near the sea to the elevation of Bekantschan, but not higher. Though it is met with everywhere over a large area, it is never so plentiful as are *C. dolon*, Westwood, and *E. eulamippus*, Doubleday, in Sikkim in the beds of streams in the spring. As Gayoe collectors brought this species in some numbers, it may perhaps be less rare in the north of Sumatra. No female has been obtained. The male is found of places on forest roads: also small pools and moist places on roads, especially if there are any *Pierinae* assembled to suck up the moisture, with whom the big *Charaxes* always associates. In such spots will be found sitting in the hottest sun perhaps half a hundred or more *Catopsilia*s and *Appias hippo*, Cramer, and amongst them one *Charaxes delphis*, numbers of similarly coloured butterflies evidently affording mutual protection. Dr. Martin's Javan collector Saki, in consequence of this characteristic, used to call *C. delphis* the 'Koepoe Raja,' because it sat amongst the *Pierinae* like a Raja surrounded by his followers. *C. delphis* is not restricted only to big jungle, but is found on roads far from the forests, if only there are assembled the protecting *Pierinae*."

Dr. Hagen says of *E. delphis concha* of N.E. Sumatra, *l.c.*: "Ueberall, aber nicht häufig, und jetzt wohl mehr auf die Vorberge beschränkt. Mit Vorliebe auf dem feuchten Sand an Furthen durch fliessende Wässer, oft mitten unter Scharen von weissen Pieriden und *Papilio antiophates*, sehr gern auch an über das Wasser hereinhängenden Zweigen."

c. *E. delphis cygnus* Rothsch., subsp. nov.

*Charaxes concha* Vollenhoven, *Tijdschr. v. Ent.* IV. p. 162 (1861) (pt.: Java?).

*Charaxes delphis*, Fruhstorfer, *Berl. Ent. Zet.* XLI. p. 302 (1896) (Java).

♂. Wings, upper side: as in *E. delphis concha*, but submarginal spot  $C-S^2$  of hindwing small, more or less obliterated, admarginal interspaces more distinctly

yellow. The black apical area of the forewing is more or less incised in front of  $R^2$ ; there are one, two, or no submarginal spots in this area.

*Underside*: on forewing posterior pair of cell-spots, upper cell-bar (close to D), round spot before  $M^2$ , and on hindwing round costal spot, and bars at end of cell, smaller than in *E. delphis concha*. The yellow markings on hindwing between postdiscal yellow dots and greyish blue submarginal bars less heavy than in *concha*, especially the upper ones small, the postdiscal dots also rather smaller, the last two,  $M^2$ — $SM^2$  either separate or confluent, the yellow sealing at proximal side of discal bar  $M^1$ — $SM^1$  (in submedian fold), less extended; there is no round spot behind C in our specimens.

*Hab.* Mt. Gede, Java, 4000 ft. (Prillwitz), received from H. Fruhstorfer, 2 ♂♂. A specimen in Dr. Staudinger's collection from the same locality and also obtained by Prillwitz, has two submarginal spots on the forewing above.

*d. E. delphis niveus* Rothschn., subsp. nov. (Fig. 42, ♂).

*Charaxes delphis*, Standinger (*non* Doubleday, 1843), *Iris* II, p. 81 (1889) (Palawan); Semper, *Typh. Philipp.* p. 335, n. 516 (1892) (Palawan); *Batl. Journ. Linn. Soc. Lond.* XXV, p. 379, n. 81 (1896) (pt.; Palawan).

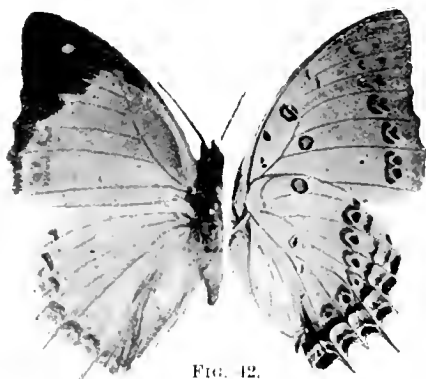


FIG. 42.

♂. *Wings, upperside*: as in *E. delphis delphis*, i.e. the black area more restricted than in *delphis concha*; the submarginal spot of the forewing larger than in *concha*, more or less rounded, generally somewhat smaller than in typical *delphis delphis*.

*Underside*: postdiscal dots  $R^3$ — $SM^1$  less deep red than in the other races, more brownish red, the last two separated as in *concha*, not confluent as in *delphis delphis*, the greyish blue discal lunule

$M^2$ — $SM^1$  also divided a submedian fold.

*Hab.* Palawan (Platen), 2 ♂♂.

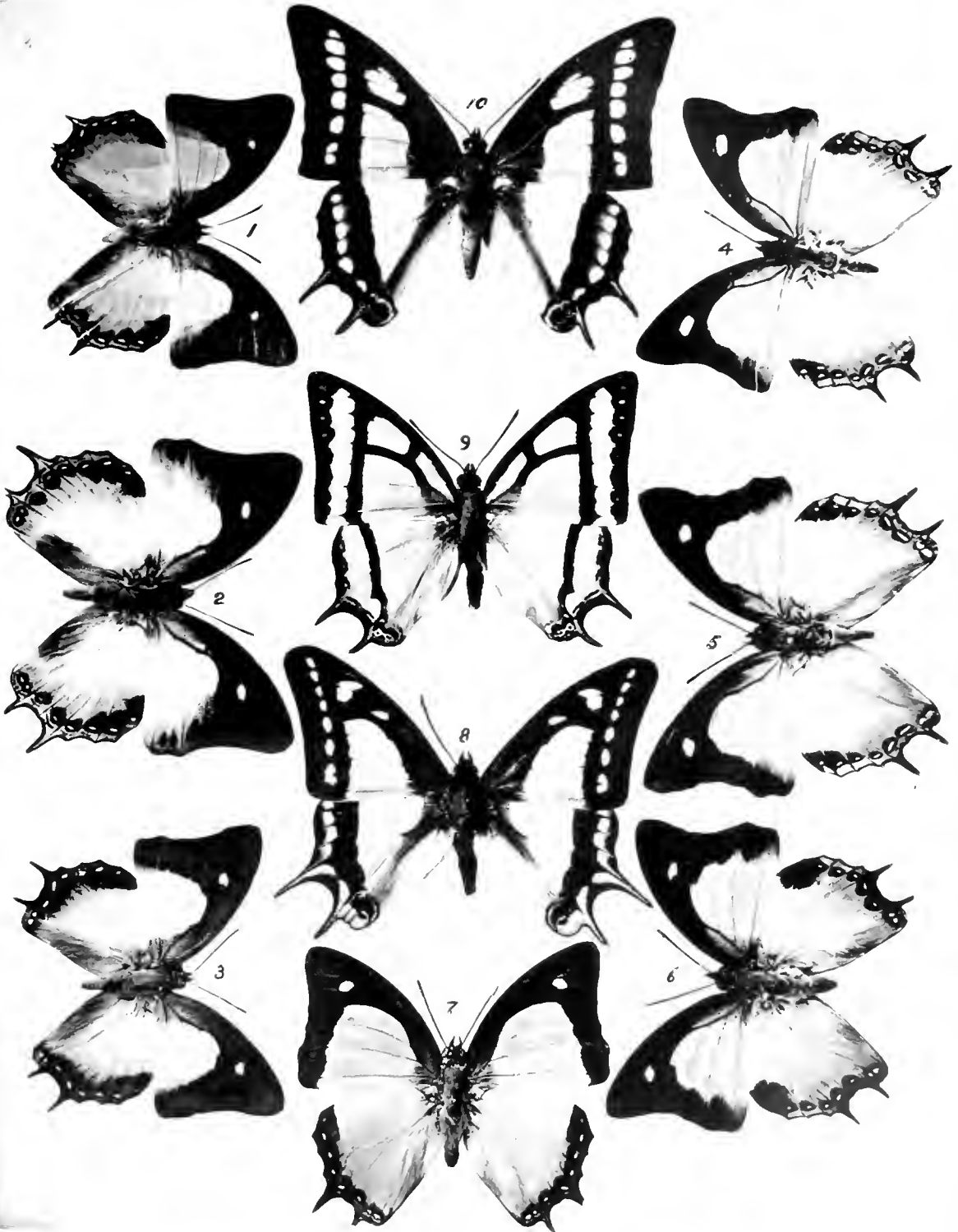


## EXPLANATION OF PLATE VII.

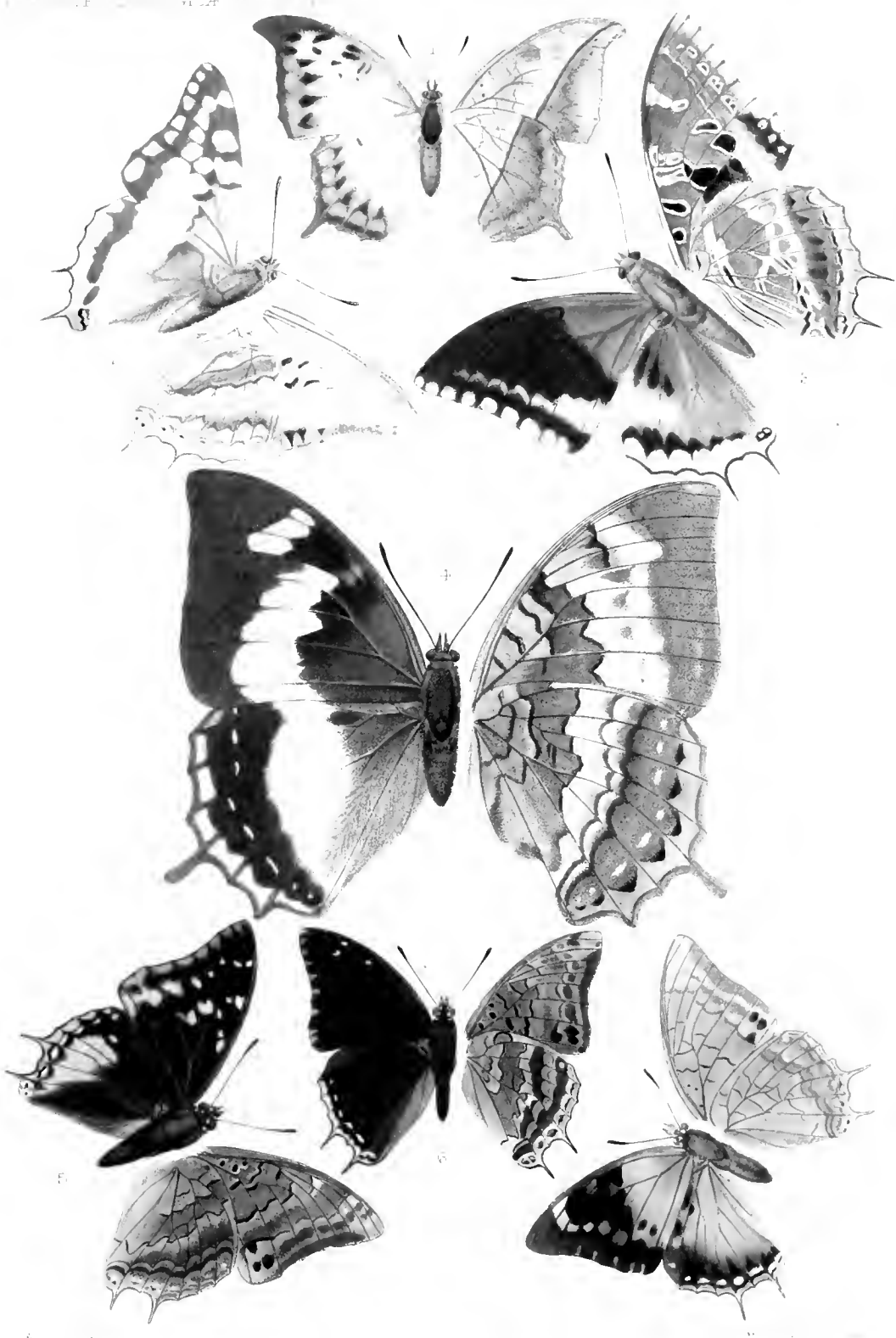
- Fig. 1. *Eulepis hebe chersonesus* ♂, p. 231.  
 „ 2. „ „ *ganymedes* ♂, p. 232.  
 „ 3. „ „ *lombokianus* ♂, p. 236.  
 „ 4. „ *moori sandakanus* ♂, (type) p. 243.  
 „ 5. „ „ „ ♂, p. 243, from the Khasi Hills.  
 „ 6. „ „ *kaba* ♂, p. 241.  
 „ 7. „ *jalyas* ♂, p. 261.  
 „ 8. „ *posidonius* ♂, p. 275.  
 „ 9. „ *narcus* f. temp. *narcus* ♂, p. 279.  
 „ 10. „ „ „ *mandarinus* ♂, p. 280.
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## EXPLANATION OF PLATE VIII.

- Fig. 1. *Charaxes paphianus* Ward, ♀.  
 „ 2. „ „ *boueti boueti* Feisth., ♂.  
 „ 3. „ „ *euloxus mechowii* Oberth. (i.l.), ♂.  
 „ 4. „ „ *madensis* Rothsch., ♀.  
 „ 5. „ „ *northcotti* Rothsch., ♂.  
 „ 6. „ „ *etheoctes* Cram., ♂ var.  
 „ 7. „ „ „ „ ♀ „











# NOVITATES ZOOLOGICAE.

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## NEW *DREPANULIDAE*, *THYRIDIDAE*, AND *GEOMETRIDAE* FROM THE AETHIOPIAN REGION.

By W. WARREN, M.A., F.E.S.

### FAMILY *DREPANULIDAE*.

#### *Phalacrothyris* gen. nov.

♀. *Forewings*: with costa curved, more strongly close to base; apex produced, subacute; hindmargin angled at end of vein 4, concave above, oblique below; anal angle well marked.

*Hindwings*: with the anal angle square, the hindmargin straight from it to end of vein 6, where it is strongly toothed, the apex truncate.

Antennae unipectinate; palpi very short; tongue and frenulum absent.

*Nervation*: forewings, cell more than half as long as wing, the discocellular unangulated; first median nervule at two-thirds; second shortly before end; third and lower radial from the end; vein 6 shortly stalked with 7, 8; 9, 10, stalked; 11 free. Hindwings, with 7 well before end of cell, strongly anastomosing with 8. The rest as in forewings.

Forewings with hyaline spots at end of, below, and beyond cell; hindwings with smaller spots beyond cell only.

Type: *Phalacrothyris subviridis* sp. nov.

#### 1. *Phalacrothyris subviridis* sp. nov.

*Forewings*: fawn-colour, irregularly speckled with brown, the costal area paler, with a few larger brown spots; discocellular marked with brown scales; a glassy spot in the lower half of the end of cell, preceded by a brown spot; another below it between the median vein and vein 2, and a smaller one between vein 2 and submedian fold; one still smaller between veins 3 and 4; fringe rufous, with traces of a darker basal line.

*Hindwings*: with the discocellular slightly darker, and with a dark spot at its lower end, followed by two small hyaline spots on each side of vein 4; marginal area darker; fringe rufous.

Underside dull ochreous, more sparsely speckled, with an oblique diffuse dark fuscous submarginal line angled on vein 6 of forewings, continued less distinctly through the costal half of hindwings; the hyaline spots greenish. Head, thorax, and abdomen concolorous with wings; face dark brown.

Expanse of wings: 30 mm.

One ♀ from Warri, Niger Coast Protectorate, July 1897 (Dr. Roth).

## FAMILY THYRIDIDAE.

2. *Hypolamprus minutula* (?).

*Sculodes minutula* Saalm., Ber. Senck. Ges. 1880 p. 295; Saalm., Lep. Madag. p. 216, t. 5, f. 59 (1891).

Saalmüller's description of his species is not very full; but, judging from his figure as well, I am disposed to refer here 2 ♂♂ in the Tring Museum, one from Mombasa Island, October 1896 (Dr. Ansorge), the other from Dar-es-Salaam, German East Africa, the latter larger than the Mombasa example: both of these have veins 8, 9, of forewing stalked, and must be referred therefore to *Hypolamprus*.

They have the hindmargin of hindwing sinuous, incurved below apex. This will separate them from the species described below, *H. verticalis*, from the Niger district, which has the hindmargin quite straight, but bears otherwise great resemblance to them.

3. *Hypolamprus verticalis* sp. nov.

*Forewings*: fulvous brown, with dark brown markings, which are mainly vertical; one or two indistinct lines near base, a fascia with darker edges just before middle; two narrower postmedian fasciae, the second of which is interrupted below middle, and a narrow submarginal line; fringe concolorous; a deeper brown shade on hindmargin below middle, narrower towards the lower angle of cell.

*Hindwings*: with 3 or 4 dark brown lines, and a few fainter reticulations: a black-brown shade along middle of hindmargin and at anal angle; the costal region paler quite to apex.

Underside with the markings more broken up. Head, thorax, and abdomen all brown.

Expanse of wings: 16 mm.

One ♂ from Anambra District, River Niger.

The hindwings are prominently triangular, the apex bluntly prominent, the hindmargin nearly straight. It is allied to *H. minutula* Saalm., from Madagascar and the East Coast of Africa, of which it may be a form.

4. *Isothauma* (?) *serraticornis* sp. nov.

*Forewings*: semi-transparent, shining white; the costa with seven pinkish brown darker-edged spots, the intervals between them small, rosy white; from the edges of the brownish spots run faint rufous lines across the wings, most of which become faint below the middle; marginal area with shorter, darker, irregularly crooked lines edged with rosy; apical region varied with minute dark specks; marginal line rosy, thickened into spots at end of veins, which project into the silvery white fringe.

*Hindwings*: except for the costal markings, similar.

Underside the same, with the markings brighter and plainer: the retinaculum, which is in the form of a triangular projecting fold, covered with brownish and silvery scales: two tufts of pink scales close to base, and a line of silvery scales above the subcostal vein. Head and palpi brown; second joint of palpi white at the apex; thorax and abdomen white, the latter rosy-tinged on anal segments: legs whitish tinged with rosy.

Expanse of wings : 28 mm.

One ♂ from Katagrukwa River, Uuyoro, May 1897 (Dr. Ausorge).

I leave the species for the present in *Isothauma*, as it agrees in the size and shape of the cell of the hindwing. It agrees fairly well, as far as description goes, with *Rhodoneura margaritalis* Hmps. from Madagascar, which must be very near *opalinula* Mab., also from Madagascar; but these are both much larger species, and in neither case is any mention made of the antennae of the ♂, which are thick and armed with short clavate pectinations. *Siculodes mellea* Saalm. from Madagascar agrees in size.

##### 5. *Pharambara ansorgei* sp. nov.

*Forewings* : pinkish ochreous, washed with fulvous; the lines and veins marked in darker fulvous, and towards the margins with fine blackish scales; costa, especially at base, tinged with fuscous; the costal edge with geminated white dots; transverse lines fairly regular, beyond the middle curved outwards in the upper half of wing, with regular fainter lines in the intervals; a dark-edged pale ocellus on the discocellular, the line passing round it forked towards inner margin and blackish; a blackish curved line from costa before apex to middle of hindmargin, enclosing some small black striae; fringe concolorous, with irregular blackish scales along the base.

*Hindwings* : with all markings fulvous except middle line near inner margin and the black scales at base of fringe.

Underside like upper: the pale costal spots developing into patches of leaden-coloured scales above the subcostal vein. Head, thorax, and abdomen like wings; anal tuft whitish.

Expanse of wings : 17 mm.

One ♂ from Masindi, April 1897 (Dr. Ausorge).

##### 6. *Proterozeuxis ansorgei* sp. nov.

*Forewings* : dark ochreous, with black-brown ramifying strigulae; the costa blackish brown at base, and with strongly marked partially confluent black-brown strigae. The most prominent of the transverse lines are one nearly vertical from one-third of costa to near middle of inner margin; two beyond middle parallel to one another, enclosing a browner space, and uniting in a black-brown spot at base of discocellular; and a third before apex to anal angle, bent above vein 6; fringe black-brown, hindmargin red-brown.

*Hindwings* : suffused with fulvous in marginal half, with a black-brown spot at bottom of discocellular; fringe black-brown.

Underside similar; the brown costal strigae of forewings strongly marked; cell of forewing with a row of ochreous hairs above and below the central fold. Head, shoulders, tips of palpi, and the fore-tibiae blackish brown; thorax and abdomen concolorous with wings; anal segment of abdomen, and a lateral line on last three segments black brown.

Expanse of wings : 54 mm.

One ♀ from Masindi, January 1898, Dr. Ausorge.

I have named this fine species in honour of its discoverer. From the species of

\* In Dr. Ausorge's collection, which is, for the time, under the care of the curator of the Tring Museum.

the genera *Plagiostella* Hmps., and *Camptochilus* Hmps., with which *Proterozeuris* agrees in the staking of veins 7 and 8, it is readily separated by the pectinated antennae: while the venation and shape of wings equally distinguish it from *Oxycephina* Warr., which has likewise pectinated antennae.

### **Tridesmodes** gen. nov.

*Forewings*: narrow and elongate; costa bulged at base, insinuate in middle; apex produced, blunt: hindmargin obliquely curved, slightly indented below apex.

*Hindwings*: triangular: the apex much produced: hindmargin straight: inner margin short.

Antennae simple, lamellate; palpi slender, porrect, ascending.

*Neuration*: forewings; vein 5 close to vein 4; 7, 8, 9, stalked from before upper angle of cell; 10 closely approximated to 9; otherwise like *Siculodes*.

Type: *Tridesmodes ramiculata* sp. nov.

#### **7. Tridesmodes ramiculata** sp. nov.

*Forewings*: white, semihyaline, crossed by numerous fine brown branching lines, with still finer transverse brown striae between them: two in the middle forming a brownish triangular mark on costa and inner margin: the outermost line excurved towards hindmargin: marginal line brown: fringe white, tipped with brown.

*Hindwings*: similar: the veins marked with brown.

Underside like upper. Head, thorax, and abdomen white.

Expanse of wings: 19 mm.

One ♂ from Masindi, January 1898 (Dr. Ansonge).

Superficially much resembling a small *Siculodes*.

### FAMILY GEOMETRIDAE.

#### SUBFAMILY GEOMETRINAE.

#### **8. Acollesis umbrata** sp. nov.

*Forewings*: whitish green, darker towards hindmargin: a small black cell-spot: an oblique broadish white line from costa shortly before apex to two-thirds of inner margin, inwardly diffusely edged with darker green.

*Hindwings*: similar, the line slightly sinuous.

Underside whitish, without markings. Head, thorax, and abdomen all whitish green.

Expanse of wings: 32 mm.

One ♀ from Wakibara, Unyoro, July 1897 (Dr. Ansonge).

Differs from *A. fraudulenta* Warr., from the Transvaal, in having the face, legs, and palpi whitish instead of red: and the line of forewings starting from near apex, as in *Collesis mimica*. It agrees with *fraudulenta* in neuration, except that vein 10 approximates only to vein 11 without anastomosing with it.

#### **9. Antharmostes mesoleuca** ab. *semimarginata* nov.

Differs from the type-form in having an irregularly edged dark brown shade along hindmargin from vein 6 to anal angle obliterating the white lunules. In the hindwings this shade is narrower, and the lunule before the tail is pinkish white.

Underside with a dull brown blotch at anal angle of forewings, and a smaller one at apex of hindwings, the tooth filled up with brown.

One ♂ from Warri (Dr. Roth).

10. **Aplodes capensis** sp. nov.

*Forewings*: pale blue-green, the costa finely ochreous; traces only of a waved pale line at five-sixths; fringe concolorous.

*Hindwings*: similar.

Underside glossy, greenish white; the costa of forewings broadly rufous from base to beyond middle. Face and palpi above reddish; vertex white; thorax and abdomen greenish.

Expanse of wings: 21 mm.

One ♂ from Cape Town, October 1860 (Felder Collection).

Agrees in venuration with *Aplodes*, except that vein 11 of forewings is stalked with 6, 7, 8, 9, 10, rising above 6 and becoming coincident with 12; in *Aplodes* it rises from the cell and anastomoses shortly with 12.

11. **Microloxia divergens** sp. nov.

*Forewings*: pale apple-green; the costa narrowly white; an oblique narrow whitish line from inner margin at two-thirds straight towards apex, before which it is obsoletely retracted to costa; fringe pure white.

*Hindwings*: with the line curved, but much nearer hindmargin on costa than on inner margin; traces of an inner curved line.

Underside uniform green. Face, palpi, and forelegs red; vertex white; thorax and abdomen pale green.

Expanse of wings: 21 mm.

Two ♂♂ from Unyoro: one from Labonga, July 1897 (type), the other from Wakibara, November 1897 (Dr. Ansoerge).

12. **Phorodesma (?) fuscipuncta** sp. nov.

*Forewings*: bright apple-green: cell-spot distinct, black, edged with brown; no inner line; outer line whitish, at two-thirds, parallel to hindmargin, slightly indented on vein 4 and recurved towards costa which it scarcely reaches; marginal line interrupted, reddish, distinct only towards costa; fringe yellow; a faint spot of brown scales on inner margin touching the line.

*Hindwings*: with the cell-spot oblong, dark brown; the line bent in middle.

Underside whitish green. Fillet and antennae white; face and palpi ochreous white, face with a slight reddish line above; vertex, thorax, and abdomen green.

Expanse of wings: 22 mm.

One ♀ from Grahamstown, S. Africa.

The antennae are well pectinated: veins 6, 7, 8, 9, 10, 11, all stalked, 11 anastomosing with 12, and 10 with 11; cell only two-thirds of wing; 3 and 4 stalked. In hindwings both 3 and 4, and 6 and 7 are stalked.

13. **Prasinocyma diaphana** sp. nov.

*Forewings*: pale yellowish green, very transparent, rippled with white; costa finely ochreous; fringe pale green; cell-spot black.

*Hindwings*: the same.

Underside whitish green; slight dark dots at the vein-ends, which are faintly visible above. Face reddish; vertex white; thorax and abdomen whitish green.

Expanse of wings: 21 mm.

One ♂ from Ivohimanitra Forest, Tanola, Madagascar, October 1894 (Dr. F. Major).

Ditfers in neuration from typical *Prasinocyma*, in that the cell of hindwing is longer and vein 3 rises before the lower end instead of being stalked with 4.

#### 14. *Thalassodes rubrimacula* sp. nov.

Like *Thalassodes germinaria*, Guen., but larger; in the forewings, instead of the small white spot edged with dark scales which is very often present in that species at middle of inner margin, the black scales reach to the submedian fold and are followed by a large round spot of pink scales; cell-spot obsolete.

Expanse of wings: 40 mm.

Two ♂♂, one from Kiorbezi, Unyoro, January 1898, the other from Masindi, June 1897 (Dr. Ansonge).

### SUBFAMILY STERRHINAE.

#### *Cacorista* gen. nov.

*Forewings*: costa slightly curved; apex prominent; hindmargin nearly as long as costal; inner margin very short, convex, curving into hindmargin.

*Hindwings*: inner margin very short, anal angle obtuse; hindmargin from anal angle to vein 2 straight and parallel to costa; thence strongly rounded.

Antennae with angulated joints, and strongly ciliated; palpi extremely short, hardly visible; hind legs wanting.

*Neuration*: as in *Ptychopoda*—but the cells of both wings broad.

Type: *C. amputata* sp. nov.

#### 15. *Cacorista amputata* sp. nov.

*Forewings*: pale ochreous, varied with yellow ochreous, with traces of ochreous transverse bands, but with no dark markings; fringe concolorous.

*Hindwings*: yellowish ochreous, with a few dark scales collected at the anal angle.

Underside yellowish ochreous; thorax and abdomen ochreous; face and palpi brown.

Expanse of wings: 13 mm.

One ♂ from Pabo, Unyoro, November 1897 (Dr. Ansonge).

#### *Chlorocraspedia* gen. nov.

*Forewings*: costa well-curved; apex slightly prominent; hindmargin obliquely curved.

*Hindwings*: ample, with hindmargin curved, and faintly elbowed at middle.

Antennae ♀, subserrate with short fine fascicles of cilia; palpi short, porrect.

*Neuration*: forewings, cell half as long as wing; discocellular vertical, short, the subcostal vein being depressed at extremity; first median at three-fourths,

second close before third ; radials normal ; 7, 8, 9, stalked from well before end of cell ; 10 and 11 stalked from much nearer base, 10 anastomosing with 7, 8, 9. Hindwings with vein 7 before end of cell.

Type : *C. ansorgei* sp. nov.

#### 16. *Chlorocraspedia ansorgei* sp. nov.

*Forewings* : dull olive-green, the lines darker, more yellowish green; first curved at one-third ; second, median, outcurved round cell to middle of inner margin ; third postmedian at four-fifths, curved parallel to hindmargin, denticulate ; submarginal similar, but less distinct ; marginal line blackish-green, forming spots between veins ; fringe concolorous ; cell-spot small, blackish.

*Hindwings* : like forewings, but without first line, and with a large velvety black cell-spot.

Underside very pale whitish green, with the marginal line black and distinct, cell-spots and outer line faint. Face and palpi dark brown ; thorax and abdomen green, like wings.

Expanse of wings : 39 mm.

One ♀ from Port Alice, Uganda, March 1897 (Dr. Ansorge).

#### 17. *Craspedia improba* sp. nov.

*Forewings* : dirty grey, with a dull flesh-coloured tinge and dusted with blackish ; the lines dark, at about one-fourth, two-thirds, and three-fourths respectively ; the second and third parallel, denticulate on the veins ; submarginal waved, pale, between two dark shades, of which the exterior is the lighter ; cell-spot and marginal dots black ; fringe concolorous, with black dots beyond the veins.

*Hindwings* : similar, without first line and more thickly dusted with blackish.

Underside dull cinereous, unspotted, with all the markings darker ; head black ; thorax and abdomen like wings.

Expanse of wings : 24 mm.

Three ♂♂ from Katagnkwa River, Unyoro, May 1897, Kiagnsi, Unyoro, November 1897, and Port Alice, Uganda, February 1897 (Dr. Ansorge).

A very dull-looking insect.

#### 18. *Craspedia ochreofusa* sp. nov.

*Forewings* : pale, silky, ochreous ; the costa, especially towards apex, finely and thickly dusted with dark atoms ; the lines brownish ochreous, at one-third, and three-fourths, waved and denticulate, approaching each other on inner margin ; a row of small round blackish marginal spots ; fringe concolorous ; cell-spot brownish ochreous.

*Hindwings* : without first line, and with two faintly visible submarginal shades, which are sometimes seen on the forewings.

Underside silky, without markings ; the costa fuscous at base, ochreous beyond. Face and palpi brown-black ; thorax and abdomen like wings.

Expanse of wings : 26 mm.

Eight ♂♂, one ♀, from Unyoro: Fajao, July 1897; Monyonyo, January 1897; Port Alice, Uganda, February—March 1897 (Dr. Ansorge).

Exactly like *C. subperlaria* Warr., but somewhat smaller, and with the ground colour silky ochreous instead of white.

19. *Craspedia tenera* sp. nov.

*Forewings*: silvery white, washed with pale sea-green; the lines deeper green; first at one-third, bent outwards in cell; second from middle of costa, bluntly angled at vein 6, then oblique to inner margin before middle, below middle of wing approximated to inner line, from which it is separated by a band of white ground, colour; third line from five-sixths of costa, below which it is bluntly angled, thence running parallel to median line to inner margin at two-thirds, preceded, like the median line, by a white space unclouded with green; submarginal line very indistinct; a green oblique dash from below apex to the outer line; marginal line deep green; fringe whitish green.

*Hindwings*: similar; the basal patch smaller; submarginal shade more distinct; traces of a dark green cell-spot.

Underside silvery whitish with the three outer lines and costa of forewings greenish. Hindwings with a slight cell-spot. Face and palpi deep brown; vertex, thorax, and abdomen like wings.

Expanse of wings: 30 mm.

Eight ♂♂, one ♀ from Ran, Nandi country, March 1898 (Dr. Ansonge).

A delicate species, allied to *C. celebraria* Wlk. from India.

20. *Craspedia tricommata* sp. nov.

*Forewings*: chalk white; the three lines starting from black comma-shaped marks on the costa, at one-fourth, one-half, and three-fourths respectively; the first marked only by black dots on the veins; the second grey, finely denticulate, excurved round the grey ocelloid cell-spot and angled on veins 6 and 4; the outer brown-grey and marked with blackish on the veins, followed by a grey lunular band, which beyond cell and on submedian fold is somewhat tinged with red-brown, veins 5 and 6 sometimes marked with black dashes; an irregular grey submarginal shade starting from an oblique subapical brown blotch; a row of marginal blackish lunules, the upper four larger; fringe white, with a line of grey scales close to base, and spotted with grey towards the tips.

*Hindwings*: the same, but the cell-spot small and black.

Underside nearly pure white; the four upper marginal lunules black. Face and palpi black-brown; vertex, thorax, and abdomen white.

Expanse of wings: 26 mm.

Eight ♂♂, one ♀ from Unyoro, various localities: Labonga, July 1897; Warringo R., July and December 1897; Kitanwa, August 1897; Katagrukwa River, May 1897; Kiorbezi, January 1898 (Dr. Ansonge).

The African form of *C. deliciosaria* Wlk.

21. *Induna albida* sp. nov.

*Forewings*: milk-white, faintly discoloured with ochreous; the lines pale ochreous, very indistinct; first at about one-third, outcurved in midwing, second in middle, outcurved round cell, then oblique to middle of inner margin, outer line fine and slightly fuscons, at three-quarters, bluntly outcurved on vein 6, then hardly bent to inner margin; marginal area with two faintly expressed waved ochreous shades; an interrupted blackish marginal line; fringe white; cell-spot dull.

*Hindwings*: with the markings plainer; the central line double; a small blackish cell-dot on the outer arm.



Underside with the markings fuscous grey, and distinct ; the base of forewings grey ; hindwing whiter. Face and palpi brownish ; thorax and abdomen white ; antennae ochreous.

Expanse of wings : 25 mm.

Two ♂♂ from Mtibua and Lugula, Usuga, December 1896 (Dr. Ansorge).

Hind tarsi as long as hind tibiae, which are thickened, with a pencil of hairs, but without spurs ; antennae with fine pectinations.

## 22. *Lipomelia irregularis*.

*Cosymbia ? irregularis* Warr., Nov. Zool. v. p. 239, ♀ (1898).

Having now seen and examined a ♂ of this species, I am able to refer it to the genus *Lipomelia* Warr. The palpi are shortly upcurved in front of face ; the ♂ antennae subserrate and ciliated ; hind tibiae of ♂ swollen and tufted with hair at extremity, without spurs ; hind tarsi about two-thirds the length of the tibiae, not so much abbreviated as in typical *Lipomelia*. In forewings 10 and 11 are stalked, 10 anastomosing with 8, 9.

In markings the ♂ does not differ from the ♀ ; in this particular specimen the lower half of basal line below the median is very indistinct, and the upper half is united along the median to the second line, so that the two lines superficially appear to form an oblique Y. The fringe is pinkish, with dark mottlings beyond the vein ends.

## 23. *Mnesithetis delicata* sp. nov.

*Forewings* : pale ochreous, tinged with olive-grey and pinkish scales ; a regularly zigzag pale brown submarginal line ; some slight marginal marks before fringe, which is concolorous.

*Hindwings* : with the disc tinged with pinkish yellow ; the cell-spot consisting of two white dots ; submarginal line less zigzag.

Underside glossy, paler ; the forewings with a rosy flush ; the marginalline blackish. Head deep red-brown ; thorax and abdomen concolorous with wings.

Expanse of wings : 22 mm.

One ♂ from Masindi, January 1898 (Dr. Ansorge).

## 24. *Ptychopoda subscutulata* sp. nov.

*Forewings* : straw-colour, sparsely dusted with fuscous ; the lines fuscous, starting from fuscous-brown costal spots : first at one-third of costa, obliquely curved inwards to one-third of inner margin ; second from three-fourths of costa, angled outwards at vein 6, thence oblique and sinuous to inner margin at two-thirds, where it is thickened and followed by a small brown patch ; median and submarginal lines hardly visible ; cell-dot blackish ; fringe concolorous, with a basal row of rather large dark brown spots.

*Hindwings* : with the outer line central, followed at middle of inner margin by a brownish blotch ; a faint dark postmedian and submarginal line ; antemedian shade visible only on inner margin ; cell-spot small.

Underside similar ; the cell-spots better marked. Face and palpi dark brown ; thorax and abdomen concolorous with wings.

Expanse of wings : 12 mm.

One ♂ from Masindi, April 1897 (Dr. Ansorge).

25. *Traminda?* *pallida* sp. nov.

*Forewings* : dull pale ochreous green, slightly pinkish-tinged towards hind-margin, and thickly dusted with darker ; a diffuse dull pinkish oblique line from costa close before apex to beyond middle of inner margin, with slight traces of a submarginal narrower line, diverging from the same point on costa ; fringe dull rufous ; cell-spot elongated, white, with rufous edges.

*Hindwings* : with faint central and submarginal lines, both diffuse and not reaching costa ; a faint pale cell-spot.

Underside similar, the submarginal line only marked. Face and collar dull green ; fillet whitish ; thorax and abdomen paler, like wings.

Expanse of wings : 22 mm.

One ♀ from Kiboko River, British East Africa, November 1896 (Dr. Ansonge).

Hindmargin of both wings without angle, hardly visibly elbowed.

Referred to *Traminda* provisionally, in the absence of the ♂.

## SUBFAMILY ASTHENINAE.

26. *Asthenotricha ansongei* sp. nov.

*Forewings* : whitish, dusted with pale ochreous and fuscous, and crossed by faint wavy ochreous lines ; outer edge of central fascia from three-fourths of costa to two-thirds of inner margin, dark grey, forming two blunt projections outwards on veins 6 and 4, preceded by two similar lines, the space between them also dusted with grey ; two greyish ochreous irregularly wavy submarginal lines ; fringe concolorous, with a darker line at base.

*Hindwings* : with two curved and parallel dark grey central lines and two ochreous submarginal lines. Tuft of hair shorter than in *A. flavicoma*, duller yellow, the tips fuscous.

Underside similar, the markings greyish ochreous. Thorax and abdomen concolorous ; head damaged.

Expanse of wings : 26 mm.

One ♂ from Nandi, Uganda Protectorate, December 1896 (Dr. Ansonge).

The specimen is not in good condition.

27. *Asthenotricha flavicoma* sp. nov.

*Forewings* : greyish ochreous, with a slight flesh-coloured tinge ; crossed by many slightly darker but indistinct wavy and denticulate lines ; one close to base, and two curved and parallel to one another from one-fourth of costa to one-third of inner margin ; three wavy lines from beyond middle of costa, curved inwards to middle of inner margin, nearly joining the two inner lines ; two or three wavy submarginal lines, marked by dark dashes on the veins ; fringe concolorous, with a row of dark lunules between the veins.

*Hindwings* : with two curved median and three submarginal grey lines, all marked darker on the veins ; tuft of hairs long, bright yellow.

Underside similar, the markings indistinct ; cell-spots black.

Face and palpi brown ; thorax and abdomen cinereous.

Expanse of wings : 27 mm.

One ♂ from Ran, Nandi country, March 1898 (Dr. Ansonge).

The mealy scales clothing the basal costal area of hindwings above in the type-species *A. dentatissima* appear to be peculiar to that species, and not characteristic of the genus as a whole, which is sufficiently distinguished by the tuft of hairs and costal shoulder of hindwings.

Guenée's *Acidalia lophopteruta* from Madagascar, which I have not seen, is almost certainly an *Asthenotricha*: indeed, his description of that species applies, with certain restrictions, to *flavicomis*; but as the localities are different, and the descriptions not altogether in accord, I prefer, at least for the present, to keep the mainland species distinct.

#### SUBFAMILY TEPHROCLYSTIINAE.

##### 28. *Tephroclystia connexa* sp. nov.

*Forewings*: rufous grey, dusted with blackish scales, and crossed by whitish and rufous lines; the lines thickened and forming blackish spots on costa; the black dusting thicker along the course of the veins; all the lines more vertical than usual, and not sharply angled below costa; a whitish dark-edged line at one-fourth, angled in cell; a similar outer line at two-thirds, slightly angled at veins 6 and 4; these whitish lines indicate the margins of the central fascia, which is traversed by three or four wavy diffuse grey lines, forming dark costal blotches; cell-spot rather large, blackish: following the outer line is a similar rufous line; marginal area varied with dark grey and rufous, the submarginal line paler, but very indistinct; a distinct black marginal line, interrupted by rufous dashes at the vein-ends; fringe grey, with a rufous basal line.

*Hindwings*: suffused, except along costal third, which is pale, with dark grey: a pale, rufous-tinged line just before the middle, on which stands the dark cell-spot: the rufous outer line distinct.

Underside greyer and duller, crossed by darker bands. Head, thorax, and abdomen ochreous grey.

Expanse of wings: 15 mm.

One ♂ from Fovira, Uuyoro, May 1897 (Dr. Ansorge).

##### 29. *Tephroclystia dilucida* sp. nov.

*Forewings*: thinly scaled, greyish white, with a slight greenish tinge, much dusted with blackish scales; an oblique diffuse blackish fascia at one-third, formed apparently by the connection of two or three lines; outer edge of central fascia at two-thirds, oblique outwards to vein 6, then bent and incurved: traces of two or three dark transverse lines within it; the pale band beyond the fascia with a blackish central line distinct only on costa; marginal area blackish, darkest on costa.

*Hindwings*: with traces of five waved and curved grey lines.

Underside paler: the costa of forewings spotted with black.

Head, thorax, and abdomen grey, speckled with black.

Expanse of wings: 19 mm.

One ♀ from Nandi, December 1896 (Dr. Ansorge).

The above description is necessarily incomplete, as the insect is considerably worn, but it is evidently a distinct species.

30. *Tephroclystia ustiplaga* sp. nov.

*Forewings*: whitish ochreous, thickly sprinkled with dark fuscous; basal patch blackish; central fascia darker, with the edges blackish and containing a large black cell-spot, crossed by wavy fuscous lines; the bands preceding and following it broad, with pale ochreous edges and darker centres, partially filled up with brown; submarginal line wavy, whitish, followed by blackish markings; the apex and anal angle more or less tinged with brown; all the lines blackish along costa.

*Hindwings*: with the marginal half tinged with brown; the outer edge of central fascia black.

Underside dingy ochreous; the markings blackish; no brown suffusion.

Head and thorax dark cinereous, abdomen grey with black rings, the third and fourth segments brown on the back. Antennae subserrate, pubescent.

Expanse of wings: 22 mm.

One ♂ from Pinetown, Natal.

The only example is not in a good condition, and the description is necessarily somewhat imperfect; but it may be recognised by the brown patches.

## SUBFAMILY HYDRIOMENINAE.

*Ansorgia* gen. nov.

Allied to *Cataclysmæ* Hübn.; but veins 8, 9, 10, 11 are all stalked together from before end of cell; 6 and 7 together from the upper angle or very shortly stalked.

Type: *Ansorgia divergens* sp. nov.

31. *Ansorgia divergens* sp. nov.

*Forewings*: pale greyish white with a slight ochreous tinge; basal patch formed of three or four dark grey lines, strongly angled in cell, followed by a whitish band similarly angled and with a grey thread down it; central fascia blackish, containing four or five waved dark lines, its outer edge crenulate and slightly prominent on vein 4, followed by a pale band; submarginal line pale, lunulate, preceded by dark patches at costa and inner margin and by a triangular cloud above median vein, touching the prominence in the central fascia and produced to hindmargin; a marginal row of black lunules; fringe dark grey; cell-spot large, black, touching the inner edge of central fascia.

*Hindwings*: similar, but the markings less pronounced and more distinct along inner margin; the submarginal line more uniformly filled up with dark on its inside.

Underside similar, with the markings less distinct. Head, thorax, and abdomen cinereous, the abdomen tinged with blackish.

Expanse of wings: 30 mm.

One ♂ from Port Alice, Uganda, (type) February 1897; two ♂♂ from Lugula, Usoga, December 1896; one ♂ from Kiorbezi, Unyoro, January 1898; and three ♂♂ from Masindi, November and December 1897 (Dr. Anson).

In two examples veins 6 and 7 of forewings are not stalked, but 7 rises close before the upper angle of cell; in all cases the other 4 subcostals are stalked together, and there is no areole.

32. *Gonanticlea carnifasciata* sp. nov.

*Forewings*: purplish fuscous, the basal two-thirds deeper tinted: the edge of the basal patch, which is small, and the inner edge of central fascia, both curved and crenulate: outer edge of central fascia forming a blunt projection at vein 6 and an acute one at vein 4; from middle of costa to middle of inner margin the central fascia is crossed by a broad dull flesh-coloured fascia, of which the inner edge is perfectly straight, the outer diffuse: a dark triangular costal blotch before apex: the bands limiting the central fascia are likewise narrowly tinged with flesh-colour at the costa: fringe concolorous, with a deeper line at base.

*Hindwings*: uniformly purplish fuscous.

Underside dull cinereous; the cell-spots and sinuous outer line on both wings blackish; the lines on costa of forewing edged with ochreous. Head, thorax and abdomen all purplish fuscous.

Expanse of wings: 30—35 mm.

Two ♂♂; one from Kiagusi, Unyoro, November 1897, the other from Port Alice, Uganda, February 1897 (Dr. Ansonge).

33. *Ochyria ansorgei* sp. nov.

*Forewings*: whitish: the markings dark grey and blackish: basal patch small, formed of three or four dark grey lines, its outer edge curved and oblique: central fascia with the inner edge bent on the median vein, oblique below, from one-third of costa to one-third of inner margin, the outer edge from three-fourths of costa to two-thirds of inner margin, subcrenulate just below costa, faintly incurved beyond cell and hardly projecting at vein 4: its edges darker than the middle, which contains a small black cell-spot: the pale bands preceding and following it each traversed by a grey line: submarginal line pale, obscure, indicated generally by a dark grey shade which precedes it, which has its outer edge irregularly rounded and contains a black blotch beyond cell: both are interrupted by an oblique whitish streak from apex: a row of blackish marginal lunules: fringe dark grey with slightly paler base.

*Hindwings*: duskier, with the markings reproduced.

Underside similar, but blurred: outer edge of central fascia, which is distinctly crenulate, and the submarginal band on both wings blacker and more distinct: fringes pale grey, tipped with blackish, and with square blackish spots at ends of veins. Head, thorax, and abdomen dull grey.

Expanse of wings: 30 mm.

One ♀ from Kampala, Uganda, January 1897, dry season (Dr. Ansonge). Three ♂♂, two from Rau, Nandi country, March 1898; the other from Kiorbezi, Unyoro, January 1898 (Dr. Ansonge).

In this last example the hindmargin of central fascia is decidedly excavated beyond cell: in the two from Rau, the marginal area is much darker, and in it the submarginal line forms a rather large white spot between veins 3 and 4.

34. *Perizoma cancellata* sp. nov.

*Forewings*: dingy whitish ochreous, crossed by grey waved and lunulate lines: basal patch with four lines, the outermost curved, at one-sixth: the pale curved band following, with two lines: inner edge of central fascia curved, at one-third, outer edge beyond two-thirds of costa to two-thirds of inner margin nearly straight,

but faintly bent on vein 4 and more distinctly at vein 6; two fine lines before and three beyond the small black cell-dot; outer edge of fascia thickened and preceded by brown scales; an outer pale band, like inner, with two faint lines; marginal area suffused with ochreous grey except at apex; fringe dark grey with darker line at base.

*Hindwings*: with the lines only distinct on the inner half of wing.

Underside the same, the markings brownish; cell-spots blackish, distinct; both wings speckled with brownish. Head, thorax, and abdomen dingy ochreous; palpi brown; antennae lamellate, subserrate, laterally flattened.

Expanse of wings: 26 mm.

One ♂ from Masindi, November 1897 (Dr. Ansonge).

#### SUBFAMILY DEILINIINAE.

##### **Choregia** gen. nov.

Superficially like *Syntaracta* and *Synegia*; but with fully bipectinated antennae in the ♂ as in *Parasynegia*, the retinaculum, however, being only a short tuft. Forewings without fovea.

Neuration of forewings different: 11 given off from 12; 7, 8, 9, 10, stalked together, 10 anastomosing with 11 and again with 8, 9.

Type: *Choregia consocia* sp. nov.

##### 35. **Choregia consocia** sp. nov.

*Forewings*: yellow, thickly sprinkled with coarse orange-red atoms; the costa rufous grey, with fuscous striae; first line at one-third, irregularly curved, blackish, followed by an olive-grey shade; second line at two-thirds, bent outwards at vein 4, dentate on all the veins, the teeth marked with black, preceded by an olive-grey shade; submarginal line finer, approximated to hindmargin, forming two outward curves and dentate inwards on the veins, the teeth beyond cell and on submedian fold much more prominent than the rest; a black spot at the end of each vein running out into the yellow fringe; cell-spot blackish.

*Hindwings*: similar.

Underside much duller; all the markings leaden grey. Head, thorax, and abdomen like wings.

Expanse of wings: 32 mm.

Three ♂♂, two ♀♀: a pair from Rau, Naudi Country, March 1898; the second ♂ from Kampala, Uganda, March 1897; the ♀ from Monyonyo, Unyoro, February 1897 (Dr. Ansonge); the third ♂ from Warri, July 1897 (Dr. Roth).

##### **Pigiopsis** gen. nov.

*Forewings*: triangular; costa straight, only slightly curved at base and before apex, which is depressed; hindmargin straight, oblique; anal angle well expressed.

*Hindwings*: kite-shaped; hindmargin curved; anal angle square.

Antennae of ♂ shortly and concisely bipectinate for three-fourths; palpi porrect, reaching beyond face; second joint hairy, third smooth and pointed; tongue and frenulum present; no fovea in forewings; hind-tibiae somewhat thickened, with four spurs.

*Neuration* : forewings, cell not quite half the length of wing ; discocellular vertical, the lower half slightly oblique ; first median nervule at three-fourths, second close before third ; radials normal ; 7, 8, 9, stalked from end of cell ; 10 from close before end, anastomosing at a point with 11, which is given off from 12. Hindwings with costal approximated to subcostal for nearly half of cell ; first subcostal close before end of cell ; medians as in forewing ; no radial.

Allied to *Orthocabera* Butl.

Type : *Pigiopsis convergens*, sp. nov.

### 36. *Pigiopsis convergens* sp. nov.

*Forewings* : whitish ; the costa irregularly spotted and suffused with fuscous, more broadly towards apex, before which there are three or four fuscous blotches ; six oblique ochreous lines from inner margin converging towards an orange subapical patch on hindmargin ; the first three antemedian and fine ; the last three postmedian, thicker and less concise ; a brown marginal line and three subapical marginal brown dots ; fringe brown with a pale base.

*Hindwings* : with a single ochreous antemedian line, two median lines united in the middle by a blotch of coarse brown-black scales, and two diffuse ochreous waved fasciae towards hindmargin, containing between them an irregularly waved submarginal line ; fringe ochreous.

Underside of forewings speckled with fuscous ; traces of a dark cell-spot, and abbreviated median line ; a bent broad postmedian fuscous band, preceded by a fine fuscous line and followed by a line of brown lunules ending in the yellow subapical patch. Hindwings with curved narrow antemedian and diffuse postmedian and submarginal lines. Face and palpi bright brown ; fillet white ; thorax and abdomen white ; collar and sides of shoulders marked with ochreous brown.

Expanse of wings : 35 mm.

One ♂ from Kampala, Uganda, March 1897 (Dr. Ansoerge).

The dark freckles and bands of the underside of forewings show through on the upper side, making that also appear freckled. At one-third, one-half, and two-thirds of the costa can be traced oblique dark paler-edged streaks ; these are in reality the costal endings of the first three lines, the three more conspicuous subapical spots being the endings of the last three ; the actual angulation of the lines, however, beneath the subcostal veins is in all cases obliterated, but in perfectly fresh specimens this may very likely be distinct.

### *Xenostega* gen. nov.

*Forewings* : with costa slightly curved throughout ; apex blunt ; hindmargin obliquely rounded ; a strong fovea at base.

*Hindwings* : with well rounded hindmargin.

Palpi porrect, short ; antennae of ♂ bipectinated ; tongue and frenulum present ; hind tibiae with the median spurs close to the terminal.

*Neuration* : forewings ; cell half the length of wing ; discocellular vertical ; first median at two-thirds, second close before third ; upper radial from top angle of cell, lower from discocellular just below it ; 7, 8, 9, stalked from well before angle ; 10 absent ; 11 out of 12. Hindwings with first subcostal and second median before ends of cell.

Type : *Xenostega fallax* sp. nov.

Probably allied to *Peratophyga* Warr.

37. *Xenostega fallax* sp. nov.

*Forewings* : yellowish ochreous, thickly sprinkled with fulvous and fuscous scales ; a brown discal spot ; a thick brown submarginal line from just before apex to anal angle, connected by a brown streak with hindmargin beyond cell ; a row of brown-black marginal spots between the veins ; fringe pale yellow.

*Hindwings* : with an antemedian brown line before the dark cell-spot ; submarginal line bluntly angled beyond cell and connected with margin.

Underside paler ; the submarginal line of forewings thicker and darker, traces of a central line over the cell-spot, which is probably present above in well-marked examples.

Head, thorax, and abdomen yellow, speckled with fulvous.

Expanse of wings : 22 mm.

One ♂ from Kosokwa, Unyoro, October 1897 (Dr. Ausorge).

Exceedingly like the description of *Stegania indularia* Guen., but Guenée expressly calls the antennae strongly ciliated.

38. *Xenostega tincta* sp. nov.

*Forewings* : dull yellow, thickly speckled and striated with ferruginous ; traces of a curved basal line indicated by reddish spots on the median and submedian veins ; traces also of a median line on inner margin, accompanied by reddish blotches in cell and above submedian fold ; a macular reddish shade from anal angle to vein 6, the inner edge straight, the outer waved ; a row of reddish marginal lunules between the veins ; fringe concolorous with ground colour. The outer shade, as well as the two lines, appears to be edged inwardly by a paler space, and all become obsolete towards costa.

*Hindwings* : with the reddish striae forming indistinct median and postmedian bands.

Underside paler yellow, with a broad purplish marginal fascia, containing in the forewings a yellow apical blotch and a smaller one below middle of hindmargin ; a diffuse curved purplish central shade, and the basal area tinged with the same colour. Thorax and abdomen like wings ; head and antennae reddish.

Expanse of wings : 24 mm.

One ♀ from Warri, April 1897 (Dr. Roth).

## SUBFAMILY BRACCHINAE.

*Ereunetea* gen. nov.

*Forewings* : narrow, elongate ; costa straight, convex only before apex ; hindmargin obliquely curved.

*Hindwings* : elongate ; the costa shouldered at base and somewhat convex ; inner margin short ; hindmargin rounded, but straight or slightly excised before anal angle.

Antennae of ♂ bipectinated ; palpi incurved in front of face ; tongue and frenulum present.

*Neuration* : forewings ; cell three-fifths of wing ; discocellular oblique ; subcostal bent downwards at extremity, median bent shortly upwards nearly at right angles ; first median nervule at three-fifths, second from the bend in the median



vein, third from the end and apparently therefore from the discocellular ; lower radial from close above third median ; upper from top angle of cell ; veins 7, 8, 9, stalked, 10 free ; 11 out of 12 ; submedian vein and fold both sinuous, the membrane thickened on both sides of the submedian. Hindwings : with first subcostal and second median from well before angles of cell ; the membrane thickened along the submedian fold ; a hyaline patch and slight distortion before the origin of the first median.

Type : *Ereunetca fulgida* sp. nov.

Allied to *Terina* Wlk.

### 39. *Ereunetca fulgida* sp. nov.

*Forewings* : orange-red for two-thirds ; apical third black, the edge of the black portion starting from three-fifths of costa and ending shortly before anal angle, slightly bent in cell ; fringe black.

*Hindwings* : with a much narrower black border from before apex to near anal angle, gradually attenuated to a point ; a round black cell-spot.

Underside with the marginal areas brown, in the forewings with a diffuse black cloud along the inner edge. Vertex, thorax, and abdomen orange ; patagia with a black spot in front at base ; face and palpi paler ; antennae black.

Expanse of wings : 32 mm.

Two ♂♂ from Bopoto, Upper Congo, 1898 (Rev. K. Smith).

In one example the costal edge of forewings is black, and the black border starts from near the middle of costa.

### 40. *Hylemera ansorgei* sp. nov.

*Forewings* : white ; costa and marginal two-fifths smoky grey ; the inner edge of the dark area runs obliquely outwards from the costal streak at middle of wing before the discocellular to vein 3, is then bent and runs parallel to hindmargin, forming a rounded tooth on each side of vein 2, and is again curved outwards to inner margin before anal angle ; in the dark apical area between veins 6 and 7 is a small whitish spot.

*Hindwings* : with apical area to vein 4 narrowly smoky grey ; a slight grey marginal spot just before anal angle ; a minute grey cell-spot.

Underside similar.

Thorax and abdomen whitish ; collar yellow ; head and palpi fuscous-grey ; the lower part of face tinged with whitish.

Expanse of wings : 39 mm.

One ♂ from Port Alice, Uganda, March 1897 (Dr. Ansorge).

The hindmargin of forewings is slightly indented at the end of vein 3. In *H. doleris* Plötz, this indentation, which occurs only in the ♂, is at the end of vein 2.

### 41. *Hylemera discinota* sp. nov.

*Forewings* : dull whitish ; the costal, apical, and hindmarginal areas dull brownish grey, including a large dull blackish discal spot, beyond the base of which between veins 3 and 5 the whitish ground-colour forms an irregular projection ; fringe brownish grey.

*Hindwings*: with the apical region to vein 4 narrowly brownish grey; a brownish grey blotch on margin from anal angle to vein 3; fringe brownish grey; discal spot round, blackish.

Underside duller: the markings smoky grey. Thorax and abdomen whitish; collar yellow: head (damaged) greyish.

Expanse of wings: 40 mm.

One ♀ from Fajao, Unyoro, July 1897 (Dr. Ansoerge).

Nearest to *H. octogesa* Druce, from the Cameroons.

This type specimen, though an undoubted ♀, with the retinaculum at base of cell on the *median* vein, has a strong and undivided ♂ frenulum.

#### 42. *Hylemera funesta* sp. nov.

*Forewings*: white: the costa blackish: the black marginal area begins before the middle of costa and ends at three-fifths of inner margin, with a slight projection of whitish between the base of veins 3 and 4: no white spot beyond the discocellular.

*Hindwings*: with the apical black border narrower than in *H. ansorgei*; veins 1 and 2 with a black blotch at end, vein 3 with a small dot.

Underside the same. Face blackish, with a dull orange lateral line; collar orange: shoulders at base blackish; thorax and abdomen white, the latter with thick blackish segmental rings: tips of patagia fulvous.

Expanse of wings: 36 mm.

One ♂ from Port Alice, Uganda, February 1893 (Dr. Ansoerge).

Closely allied to *H. ansorgei*, from the same locality.

#### SUBFAMILY BISTONINAE.

##### *Aphilopota* gen. nov.

*Forewings*: ample: costa straight; hindmargin curved and slightly crenulate.

*Hindwings*: with well-rounded and crenulate hindmargin.

Palpi short, thick, strongly haired beneath; tongue and fovea absent; frenulum present; antennae of ♂ plumose; of ♀ biserrate; forehead prominent below: pectus hairy.

*Neuration*: forewings, cell half as long as wing: discocellular slightly in-angulated: first median at two-thirds, second close below third: radials normal; 7, 8, 9, stalked; 10 and 11 coincident throughout.

Type: *Aphilopota interpellans* Butl. (*Caberodes*).

To this genus must be referred another African species, viz., *Scodiona inspersaria* Guen. (Phal. ii. p. 142), of which Walker's *Tephrosia delosaria* (XXVI., 1544) is the ♀.

#### 43. *Rhodophthitus* (?) *roseus* sp. nov.

*Forewings*: uniform cerise.

*Hindwings*: slightly paler; the veins and fringe deeper.

Underside the same. Face, vertex and thorax like wings; shoulders and abdomen above deep yellow; abdomen beneath and legs cerise; segmental rings of abdomen above purplish, towards the base rosy-tinged.

Expanse of wings : 52 mm.

One ♀ from Salisbury, Mashoualand.

In the forewings 10 and 11 are stalked from two-thirds ; in hindwings 6 and 7 are stalked. Both tongue and palpi are much reduced in size ; the antennae are subserrate, the tips of the joints acute.

#### SUBFAMILY ASCOTINAE.

##### 44. *Alcis simulatrix* sp. nov.

*Forewings* : grey-brown, speckled with black ; the costa shortly striated with black ; the lines black ; the first from one-fourth of costa, strongly angled outwards in cell, then curved inwards towards base of inner margin ; second from three-fourths of costa to two-thirds of inner margin, strongly angled outwards on vein 5 ; submarginal line indistinct, preceded by blackish lunules below costa and beyond cell ; hindmargin crenulate, with a fine black line swollen into a spot between the veins ; fringe concolorous ; no distinct cell-spot, but faint traces of a darker median line.

*Hindwings* : without first line ; the angle of the second blunter.

Underside whitish testaceous, speckled with blackish ; cell-spots small ; outer line on both wings marked by black dashes on veins. Face and palpi brownish ; head, thorax, and abdomen like wings.

Expanse of wings : 35 mm.

One ♂ from Kampala, Uganda, February 1897 ; a second from Masindi, June 1897 (Dr. Ansonge).

##### 45. *Calicha brunnea* sp. nov.

*Forewings* : pale brownish grey, with darker dusting, the marginal border beyond the submarginal line dark grey without any brown tinge ; first line curved, close to base, from a dark costal spot ; second from three-fourths of costa, oblique outwards to vein 6, then rectangularly bent and oblique to inner margin at two-thirds ; cell-spot black ; the veins brownish ; marginal lunules black, distinct ; fringe grey with brown base.

*Hindwings* : with the outer line curved and with a bluntly angled projection on vein 6 ; a small black cell-dot, and traces of a dark median line.

Underside greyish testaceous, speckled with darker ; the cell-spots larger ; traces of dark outer lines, not corresponding to those of the upperside. Head, thorax, and abdomen like wings ; face and palpi somewhat darker.

Expanse of wings : 30 mm.

One ♂ from Kasoha, Unyoro, August 1897 (Dr. Ansonge).

##### 46. *Ectropis crassa* sp. nov.

*Forewings* : greyish ochreous, thickly irrorated with dark fuscous and towards the base suffused with smoky fuscous ; the lines blackish and diffuse ; first at one-fourth denticulate outwards in cell and on submedian fold ; cell-spot ocelloid, black, traversed by a dark indistinct curved median shade ; outer line from three-fourths of costa to two-thirds of inner margin, distinct and black, lunulate basewards, denticulate outwards on the veins ; submarginal pale, denticulate, the teeth filled up with blackish ; a row of round marginal spots ; fringe concolorous.

*Hindwings* paler; thick antemedian, dentate postmedian and cloudy submarginal lines.

Underside whitish, without any ochreous tint, speckled with dark grey; the cell-spots and outer dentate line dark grey. Head and thorax dark grey like forewings; abdomen paler, with a double row of black spots above.

Expanse of wings: 30 mm.

One ♀ from Northdene, Natal.

#### 47. *Ectropis?* *subaurata* sp. nov.

*Forewings*: dull grey, dusted and suffused with darker; the lines blackish, thick and diffuse: first from one-fourth of costa curved to near base of inner margin; outer line from two-thirds of costa to middle of inner margin, sinuous, incurved below middle, outcurved above; a curved median shade, traversing the dark cell-spot and nearly touching outer line below the middle; submarginal line pale, wavy, parallel to hindmargin; fringe grey, with marginal black dots at base.

*Hindwings*: much paler; no first line; median shade and outer line farther apart; a dark cloudy fascia between outer and submarginal line, which is less visible, though present, in the forewings.

Head and thorax dark grey; abdomen lighter grey, with a blackish basal segment. Underside of both wings golden yellow; forewings with apex, cell-spot, and blotch at anal angle blackish; hindwings with cell-spot and marginal fascia blackish.

Expanse of wings: 30 mm.

One ♀ from Mpeta, Loangwa River, affluent of the Zambesi, November and December 1895, beginning of wet season (Coryndon). A doubtful *Ectropis*; the palpi are long and porrect.

#### SUBFAMILY SEMIOTHISINAE.

#### 48. *Gonodela alternata* sp. nov.

*Forewings*: white, slightly speckled with fuscous; the veins olive-fuscous, the markings blackish fuscous; all the lines oblique inwards, thick, and slightly wavy; first at one-fourth, second in middle, with the black cell-spot touching it; outer line at three-fifths, thickened at extremities, immediately followed by a thick broad shade; marginal area olive-fuscous, paler at apex and below vein 4; a row of dark marginal lunules; fringe white, with brown median line and chequered with dark beyond veins.

*Hindwings*: the same, without first line.

Underside like upper, but the markings rufous-brown.

Head, thorax, and abdomen ochreous-whitish, speckled with fuscous; antennae white.

Expanse of wings: 22 mm.

Two ♀♀ from Delagoa Bay.

Allied to *percolata* Wlk., from India.

#### 49. *Gonodela maculosa* sp. nov.

An almost exact facsimile of *Peridela interrupta* Warr., but distinguishable at once in all cases,—besides the difference in the ♂ antennae,—by the absence of the

black wedge-shaped blotch between veins 3 and 4 in the submarginal band of both wings. In the forewings the first and second lines are more vertical; the outer line is double in both wings, its exterior arm being followed by a more or less complete dark fuscous fascia, the edge of which forms a blackish blotch connected with another similar blotch on hindmargin between veins 4 and 5. Underside yellow; both wings with a broad brownish fuscous submarginal fascia connected with a similar-coloured subapical blotch on hindmargin.

Expanse of wings : 33 mm.

Twenty-four examples including only 1 ♀ : 16 from Luentanga, Singo, Feb. 1898; 4 from Fovira, Unyoro, May 1897; 2 from Fajao, July 1897; 1 from Wakibara, Nov. 1897; and 1 from Kiboko River, British East Africa, Nov. 1896 (Dr. Ansorge).

There are 3 examples, 2 ♀♀ and 1 ♂, in the British Museum Collection.

#### 50. *Gonodela obliquilineata* sp. nov.

*Forewings* : white, speckled with olive-fuscous; the costa strigulated with fuscous; the lines brownish fuscous, more or less parallel to each other and the hindmargin; first at one-fourth, bent in cell, then oblique; second from costa a little beyond middle, diffuse, and touching the dark cell-spot; the third darker brown, slightly incurved to costa, followed by a dark fasciaform shade, edged externally with brown on costa and containing a black spot between veins 3 and 4; submarginal line whitish, parallel to the others; a triangular brown blotch on hindmargin from vein 4 to 7; fringe fuscous, chequered with darker beyond the veins and with a distinct white basal line.

*Hindwings* : similar, but without first line; cell-spot blacker, beyond the first line.

Underside white with all the markings olive-brown. Head, thorax, and abdomen like wings; the face and palpi spotted with fuscous.

Expanse of wings : 29 mm.

Two ♂♂, 2 ♀♀, from Mnani, Uhamba, Nov. 1896 (Dr. Ansorge).

#### 51. *Gonodela unifilata* sp. nov.

*Forewings* : whitish, more or less speckled and suffused with fuscous and blackish, first line at about one-fourth, incurved in middle, forming the inner edge of an oblique fuscous-brown fascia; the basal area varied with fuscous striae, and with a dark spot above the fovea; median line from three-fifths of costa sinuous to middle of inner margin, forming the outer edge of the dark fascia which is twice as broad on costa as on inner margin, and contains a dark cell-spot; outer line at two-thirds, parallel to median and traversing a similarly curved whitish fascia, which is but scantily speckled with darker; submarginal line interrupted, whitish preceded by a broadish fuscous, black-speckled fascia, with darker blotches on its edge between veins 3 and 4, and at submedian fold; marginal spots black; fringe whitish, chequered with brown at the ends of the veins.

*Hindwings* : similar, but the dark cell-spot placed in the white fascia, which is central, the traversing line denticulate and interrupted; hindmarginal area between veins 3 and 4 whitish, more prominently than in the forewings.

Underside similar, the costa of forewings and all the veins ochreous. Head, thorax, and abdomen cinereous, varied with ochreous.

Expanse of wings : 26 mm.

One ♂ from the Katagrukwa River, Unyoro, May 1897 (Dr. Ansoerge).

Distinguished at once by the pale postmedian fascia with the brown line along its centre. The example described is rather worn ; two specimens in the British Museum Collection, apparently of the same species, are very much darker.

#### 52. *Petrodava olivata* ab. *perfusca* nov.

In this form not only is the upperside of both wings olive-grey, but the whole of the underside is dull olive, slightly freckled with darker ; the outer line blackish, thick and diffuse, straight on forewings, curved on hindwings, a pale bluish grey subapical patch on hindmargin, the apical fringes white.

One ♂ from Kaligire, Unyoro, January 1898 (Dr. Ansoerge).

This is the antithesis of the ab. *insularis* from Madagascar, in which the yellow ground colour of the underside of the type form invades the upperside also.

#### 53. *Petrodava subapicata* sp. nov.

*Forewings* : deep dull yellow, with a few brown speckles ; the costa cream-colour, strigulated with brown ; first line curved at about one-third, marked only by a brown spot at costa and inner margin ; outer line from costa at four-fifths to two-thirds of inner margin, marked only by a deep brown bilobed blotch beneath costa, and a slight oblique brown streak at inner margin ; cell-spot very faint ; fringe yellow.

*Hindwings* : with a brown cell-spot, a brown-red postmedian nearly straight macular line, followed by a few dark brown scales and a spot towards costa.

Underside the same, the frecklings more conspicuous. Head, thorax, and abdomen yellow ; forelegs and palpi speckled with brown.

Expanse of wings : 40 mm.

One ♂ from Natal.

#### 54. *Semiothisa confuscata* sp. nov.

*Forewings* : dull whitish, but the ground colour is almost hidden by dense brownish fuscous striation and suffusion ; the costal area tinged with yellowish and striated with blackish ; the lines dark brown, at one-fourth, one-half, and two-thirds respectively, the first angled in cell, the third on vein 6, the middle line thicker and more waved ; cell-spot distinct, brown ; marginal third generally more deeply suffused, the submarginal line very indistinct, but usually marked by a pale spot towards apex ; marginal line slightly darker ; fringe concolorous with a clearer base.

*Hindwings* : with cell-spot large and distinct, the median shade curved round it ; submarginal line more visible.

Underside whitish, with the striations and markings clearer ; the lines thicker and more diffuse ; both wings with a broad submarginal fascia beyond outer line. Head, thorax, and abdomen concolorous with wings.

Expanse of wings : 26—32 mm.

Twenty-five ♂♂ from various localities in Unyoro (Dr. Ansoerge).

The forewings are slightly bent at vein 4 ; the hindwings with a decided tooth in middle.

55. *Semiothisa curvilineata* sp. nov.

*Forewings*: greyish white, ochreous-tinged and dusted with darker; the lines dark brown; the first straight and vertical from one-fourth of costa; the second slightly sinuous, before one-half of costa, traversing an oblique brown cell-mark; third from two-thirds of costa to three-fifths of inner margin, strongly sinuous, incurved below, followed by a broad dark fuscous shade; a fuscous patch on hindmargin from vein 8 to 2, its inner edge evenly curved; fringe concolorous.

*Hindwings*: whitish, slightly speckled with fuscous, more thickly along inner and outer margin; a black cell-spot; very indistinct antemedian shade, and brown postmedian line angled on vein 5.

Underside whitish, mottled with pale yellow and speckled with brown: upper part of marginal blotch of forewings deep brown, with a whitish spot above it; hindwings with apex brown, and a marginal row of white, brown-speckled lunules; space along cell and submedian fold white. Head, thorax, and abdomen like forewings.

Expanse of wings: 37 mm.

One ♀ from Nandi station, March 1898 (Dr. Ansonge).

The hindmargin of forewings is elbowed at vein 4, concave above; hindwings toothed.

56. *Semiothisa fulvimargo* sp. nov.

*Forewings*: white, speckled with olive; the marginal two-fifths suffused with dark olive-fuscous; the costa darkened with fuscous strigae; a dark spot above fovea near base; an olive line near base, bent in cell, then oblique; an oblique median line, passing over a large black oblique cell-mark; outer line black, oblique from two-thirds of costa, acutely angled towards hindmargin on vein 6, then strongly curved to inner margin at three-fifths; the costal space immediately beyond this line, tinged with tawny; a small whitish spot above the angle; in the dark marginal area, a darker brown fascia is visible beyond the outer line, its edge curved from anal angle to angle of the line; fringe dark, beyond a dark marginal line.

*Hindwings*: with a brown mark at base; brown antemedian and curved, slightly waved, postmedian line, beyond which the margin is olive-fuscous, with a deeper fascia from costa beyond the line to anal angle: cell-spot small.

Underside like upper: but the whole of the marginal area of hindwings and its costal half in forewings, as well as the veins, deep fulvous; the subapical spot pure white. Head, thorax, and abdomen greyish white.

Expanse of wings: 35 mm.

One ♂ from Kasokwa, Unyoro, October 1897 (Dr. Ansonge).

57. *Tephрина dentilineata* sp. nov.

*Forewings*: whitish grey, suffused with smoky fuscous and covered with small blackish striations; costa with black spots at the commencement of the lines, and with fine yellowish striae between; a black spot near base above the fovea; the lines starting from costa at one-fourth, one-half, and two-thirds respectively, the second and third denticulate; submarginal line grey, acutely lunulate, the lunules filled in with blackish, that between veins 3 and 4 forming a prominent oval

black blotch; a row of black marginal lumps; fringe concolorous, the basal half darker, sometimes chequered with dark beyond veins; cell-spot elongated, black.

*Hindwings*: the same, without first line; median line curved round the cell-spot.

Underside white, grizzled with fuscous; the lines indistinct, denticulate; a submarginal uniformly broad black band; apex of forewings blackish. Face and palpi blackish; thorax and abdomen like wings.

Expanse of wings: 34 mm.

Four ♂♂, 3 from Masindi, April to June 1897; one from Katagrukwa River, May 1897 (Dr. Ansonge).

The antennae are shortly and evenly pectinated, much as in *T. murinaria* Schiff.

### 58. *Tephrinopsis assimilis* sp. nov.

Extremely like *Semiothisa parallacta* Warr., with which at first sight it is easily confounded. The points of difference are as follows:—the hindwings are much less strongly angulated in the middle, being, in fact, only slightly toothed at vein 4 and bent at vein 6; the fovea on forewings of ♂ is conspicuous, while in *parallacta* it is almost obsolete; the median line is slightly nearer the outer line, and approximates to it on the inner margin, especially in the hindwings, and is not curved round the cell-spot; on the underside the colour is less yellow, more dirty ochreous, and the submarginal brownish fascia of the forewings is not connected with any brownish shade on hindmargin beyond the cell; the whole surface of the wings above is more confusedly striated with darker. The ♀♀ are slightly smaller than the ♂♂, and have a darker shade marked with blackish scales beyond the outer line, which is rarely indicated in the ♂♂.

Expanse of wings: 28 mm.

A long series of ♂♂ and 4 ♀♀ from various localities in Unyoro: 11 from Warringo River, July 1897; 2 from Bullnji, July and Dec. 1897; 1 from Narnangu, May 1898; 1 from Panyaduli, May 1897; 1 from Kasoha, August 1897; 1 from Mueni, May 1897; 1 from Mribna, Usoga, Dec. 1896; 2 from Janjoki, May 1897; 3 from Fajao, Nov. 1897; 4 from Labonga, Dec. 1897; 5 from Wakibara, Nov. 1897; 1 from Kitanwa, August 1897; 4 from Fovira, Jan. 1898; 2 from Kikwero, May 1897; 1 from Kampala, Dec. 1896; 2 from Masindi, May 1897; 1 from Ufumb, Jan. 1898 (Dr. Ansonge).

### 59. *Tephrinopsis sabulifera* sp. nov.

Closely related to *T. assimilis*, but considerably larger, 35 mm. instead of 28 mm.; the fovea in the ♂ very much larger; the wings without dark marginal line; all the lines much less distinct, being accompanied and hidden by darker scales; the outer line usually double and often with a conspicuous dark patch beyond it on inner margin; a pale oblique apical patch more or less visible; the two arms of the outer line often marked with black spots beyond the angulation; in the forewings the median line is nearer the inner than the outer line.

Underside with the submarginal fascia reduced and very indistinct. Both wings are broader and the apex of forewings squarer.

Twenty-five examples, all ♂♂ from Unyoro: 6 from Labonga, July 1897; 3 from Wakibara, Nov. 1897; 1 from Kiagusi, Nov. 1897; 1 from Panyaduli, May



1897 ; 7 from Warringo River, July 1897 ; 2 from Katagrukwa River, May 1897 ; 1 from Bulhji, July 1897 ; 1 from Afindo, May 1897 ; 1 from Kasoha, August 1897 ; 1 from Mueni, May 1897 ; 1 from Pabo, Nov. 1897 (Dr. Ansoerge).

60. *Tephrinopsis semicolor* sp. nov.

*Forewings* : whitish grey, faintly freckled with darker ; first line at one-fourth, vertical, slightly waved ; median shade from just beyond middle of costa, incurved below the strongly marked black cell-spot to inner margin close to first line ; outer line from three-fourths of costa sinuous to three-fifths of inner margin, followed by a purplish fuscous shade, which fades off toward hindmargin, and is limited above by an oblique dark line from vein 6 to apex ; submarginal line denticulate, indistinct except on lower half ; fringe grey, with small black lunules at the base.

*Hindwings* : uniform whitish grey, with a fuscous central and curved post-median line ; the marginal third darker.

Underside white, thickly speckled with grey ; the veins and markings fulvous, a submarginal fulvous fascia, entire on hindwings, interrupted and greyer on lower half of forewings ; the hindmargin (sometimes the marginal third) marked with fulvous. Head, thorax, and abdomen whitish grey ; vertex and antennae white.

Expanse of wings : 32 mm.

Six ♂♂, 1 ♀, from Man, Uganda Protectorate, high and cold country, March 1898 (Dr. Ansoerge).

Differs from *T. johnstoni* Butl., from Natal, in the much less pronounced markings, the submarginal line especially being almost obsolete, though the discal spot is much blacker ; the hindwings without any dark submarginal fascia on the upperside.

The ♀ is much darker on the underside than the ♂♂. The forewings of the ♂ are without a fovea.

SUBFAMILY ENNOMINAE.

61. *Eupagia albistriga* sp. nov.

*Forewings* : dull coppery red, thickly covered with minute dark flecks, the veins towards hindmargin clearer red ; costa with some bright pale dots ; first line nearly vertical, at one-third, with a darker shade immediately beyond it ; outer line from four-fifths of costa to two-thirds of inner margin, slightly sinuous, outcurved above, incurved below, followed on vein 6 by a pure white short streak ; submarginal line denoted by black marks on veins ; fringe dark red, with the tips pale ochreous, chequered with dull red-brown at the vein ends ; cell-spot cloudy, black, distinct.

*Hindwings* : paler, more pinkish, except towards hindmargin ; a cloudy cell-spot ; faintly curved postmedian, and slight, more strongly curved submarginal line.

Underside duller red, without the coppery tinge ; cell-spots large and dark ; inner and outer lines dull ; submarginal line plainer, marked by black spots on veins, touching outer line on costa and approximated to it on inner margin. Head and thorax coppery red ; abdomen reddish grey.

Expanse of wings : 35 mm.

One ♀ from Ivohimanitra Forest, Tanola, Madagascar, October 1894 (Dr. F. Major).

62. *Omiza tortuosa* Warr., Nov. Zool. IV, p. 228 (1897).

A ♂ from Kampala, Uganda, taken in March 1897 by Dr. Ausorge, differs from the type ♀ in being wholly without red scaling on the underside; both wings being yellow, running into green towards costa of forewings, with blackish green blotches and speckles. Whether this difference always holds in the two sexes, or that the Kampala form differs in itself from the Congo form, must be left for additional material to decide.

**Sphingomima** gen. nov.

*Forewings*: elongate; straight from base, abruptly curved, almost shouldered at two-thirds, then straight to apex, which forms a bluntly rounded prominence; hindmargin very oblique, with a blunt elbow at vein 4, above and below which it is concave; inner margin slightly convex.

*Hindwings*: triangular, short and broad; hindmargin almost straight, both angles rounded off.

Abdomen of ♂ stout, and reaching far behind hindwings. Antennae bipectinated for two-thirds; palpi porrect, smooth, not reaching beyond face, which is produced below; tongue absent; frenulum present.

*Neuration*: forewings: cell half as long as wing; discocellular vertical; first median at two-thirds, second close before end; radials normal; vein 7 absent; 8 and 9 stalked, 8 strongly bent down to below apex; 10 and 11 coincident, anastomosing strongly with 12 and touching 9 at a point. Hindwings: cell two-thirds of wing; costal anastomosing with subcostal before middle of cell; first subcostal well before end of cell; first median at four-fifths, second close to third; no radial.

Type: *Sphingomima heterodoxa* sp. nov.

63. *Sphingomima heterodoxa* sp. nov.

*Forewings*: olive-brown; costa at middle lilac-tinged, and with pale ochreous patches; hindmargin diffusely lilac-grey, varied with blackish scales; no distinct lines; a blackish patch at base; a black, somewhat raised cell-spot, continued basewards as a dark patch along the fold of cell; a submarginal row of oblong blackish patches between the veins; fringe dark brown.

*Hindwings*: with basal half olive-brown, the extreme base blackish; cell-spot black, with a small white centre; outer half lilac-grey, with a dentate brown submarginal cloud from before apex to below vein 6; fringe olive-brown.

Underside dull brown, with blackish streaks between the veins in outer half of wing; a curved white marginal patch from above vein 6 to vein 3. Head, thorax, and abdomen olive-brown, the thorax flecked with black; fillet, vertex, and antennal shaft pale fawn-colour.

Expanse of wings: 32 mm.

One ♂ from Warri, Niger Coast Protectorate, April 1897 (Dr. Roth).

NEW *DREPANULIDAE*, *THYRIDIDAE*, *EPIPLEMIDAE*,  
*URANIDAE*, AND *GEOMETRIDAE*.

FROM THE ORIENTAL AND PALAEARCTIC REGIONS.

BY W. WARREN, M.A., F.E.S.

FAMILY *DREPANULIDAE*.

1. *Cobanilla continua* sp. nov.

*Forewings* : brownish ochreous, slightly speckled with fuscous, the costal edge bright reddish : lower arm of discocellular narrowly silvery white, followed by a small deeper ochreous patch ; a double dark-brown oblique line from centre of inner margin into apex, the space between dull pearly ; apical and marginal areas more or less suffused with brown ; fringe deep vinous ; on the hindmargin between veins 1 and 4 are three shining white triangular blotches, tinged with rosy brown.

*Hindwings* : with a single antemedian brown line, diffusely edged exteriorly ; traces of two postmedian angulated lines ; the apex with a narrow rosy-brown blotch ; discocellular with two white spots.

Underside yellower, more speckled ; forewings with the costal and apical regions, the fringe, and upper part of oblique line, bright rosy ; hindwings with the apical fringe only rosy. Face, palpi, pectus, and forelegs bright red ; vertex yellow ; shoulders and patagia whitish, pink-tinged ; abdomen like wings, with a brown median band continuing the oblique line of wings.

Expanse of wings : 44 mm.

One ♂ from Milne Bay, British New Guinea, December 1898 (A. S. Meek).

Allied to *C. unilinea* Warr., from Ron Island, the type of which is a ♀. In the present ♂ the apex of forewing is more produced, and the underside different.

2. *Phalacra semiprotrusa* sp. nov.

*Forewings* : ochreous drab, the ochreous tinge predominating along the costal half ; the lines very indistinct, the only plain ones being those towards the hindmargin, to which they all run parallel ; a grey line from costa at four-fifths to middle of inner margin, followed by a pale fascia outwardly edged by a dark grey crenulated line ; submarginal line pale ochreous, waved, traversing the somewhat darker marginal area ; an interrupted black marginal line : fringe ochreous, mottled with brown ; a black cell-spot, and some scattered black scales towards base below the median vein ; along the inner margin towards base are visible the ends of oblique lines.

*Hindwings* : with traces of four straight transverse lines, of which the first, basal, and fourth, postmedian, are darkest ; marginal area slightly darker, with an indistinct paler submarginal line ; marginal line and fringe as in forewings.

Underside dull ochreous-grey, with a pinkish tinge ; marginal area and curved postmedian line of both wings purplish fuscous ; fringes paler, chequered with purplish fuscous. Face and palpi deep brown ; head, thorax, and abdomen like wings ; vertex of head and shaft of antennae both paler.

Expanse of wings : 26 mm.

One ♂ from Sula Mangoli, October 1897 (Doherty).

Distinguished by the prominently blunt elbow at end of vein 3 of forewings ; the hindmargin of hindwings is straight from anal angle to end of vein 6 ; vein 7 appears to become coincident with 8 from close to base.

### **Pseudemodesa** gen. nov.

*Forewings* : triangular : the costa strongly curved before apex, which is depressed and minutely produced ; hindmargin sinuous.

*Hindwings* : with both angles blunt ; hindmargin produced at vein 5 forming a strong angulation.

Palpi very small ; tongue and frenulum invisible ; antennae of ♂ strongly bipectinated almost to tip ; hind-tibiae with terminal pair of spurs.

*Neuration* : forewings, cell one-half of wing ; discocellular oblique ; first median at one-half, second at four-fifths ; lower radial from shortly above third median, upper stalked with 7, 8, 9 : 10 and 11 from cell, 10 anastomosing with 8, 9. Hindwings with 6 separating half way down cell.

Type : *Pseudemodesa plenicornis* sp. nov.

### 3. **Pseudemodesa plenicornis** sp. nov.

*Forewings* : silky white, the lines ochreous fuscous ; antemedian and postmedian wavy and denticulated lines ; a fuscous mark on discocellular between them, traversed by an undefined dark line ; a double submarginal row of ochreous lunules ; costa slightly dusted with fuscous ; fringe whitish ; distinct black dots at the ends of the veins, joined by a dark line above vein 5.

*Hindwings* : like forewings, but the discocellular not marked.

Underside white ; costa of forewings discoloured towards base. Head, thorax, and abdomen white.

Expanse of wings : 24 mm.

One ♂ from Rossel Island, Louisiade Archipelago, March 1898 (Meek).

### 4. **Teldenia pura** sp. nov.

Pure white throughout, the under surface of both wings glossy ; face with upper two-thirds dark brown.

Expanse of wings : 18—20 mm.

Two ♂♂ from Milne Bay, British New Guinea, December 1898 (Meek).

## FAMILY THYRIDIDAE.

### 5. **Addaea fragilis** sp. nov.

*Forewings* : pale shining ochreous, crossed by numerous wavy reddish ochreous lines ; a small brown discal spot ; costa minutely dotted pale and dark ; fringe pale.

*Hindwings* : the same.

Underside paler ; cell-spot of forewings conspicuous. Head, thorax, and abdomen like wings.

Expanse of wings : 14 mm

Five examples, all ♀♀, from Dummer Island, November and December 1898 (H. Kühn).

Smaller and narrower-winged than *trimeronalis* Wlk., to which it is closely related; hindmargin of forewings more oblique, the apex being therefore less rectangular.

#### 6. *Banisia hieroglyphica* sp. nov.

*Forewings*: shining whitish ochreous, with pale grey and dark brown markings and reticulations; an olive-grey basal patch, containing several fine darker lines; two olive-grey costal blotches; the inner edge of the first forms a small deep brown spot above the median vein and a larger balloon-shaped one obliquely below it, these two being sometimes confluent; its outer edge and the inner edge of the second costal spot approximate on the median; this second spot is developed into the usual bifurcate fascia, which is only slightly darker than the ground-colour except the lower part of the inner arm below the median vein, which forms a deep brown bifurcate blotch from inner margin, its inner edge running in basewards towards the basal patch; apical triangular area brown, deep brown along its inner edge; all the pale interspaces with dark wavy lines through them; fringe glossy, ochreous varied with brown.

*Hindwings*: darker, more suffused with brown, with many curved brown lines, forming fasciae which are more distinct towards costa: of these the central one is most prominent, and contains a lustrous grey discal spot beyond the discocellular.

Underside brownish ochreous, with all the mottlings and fasciae dark and distinct. Palpi, top of face, and forelegs bright ferruginous; face itself, thorax, and abdomen, shining ochreous-grey, the abdomen marked along the back with brown.

Expanse of wings: 30—33 mm.

Two ♀♀ from Milne Bay, British New Guinea, January and February 1899 (A. S. Meek).

Forewings with both outer and inner margin sinuous; hindwings with the margin produced at vein 7, excised strongly below it and bulging in the middle. Easily distinguished by the pale ground-colour, and deep brown blotches.

#### 7. *Banisia multifenestrata*, Warr., Nov. Zool. III. p. 341 (♂).

*Banisia angustifascia* Warr., Nov. Zool. IV. p. 378 (♀).

The type of *angustifascia* described from Amboina is a ♀ and without the hyaline spots of the ♂: it is undoubtedly only the other sex of *multifenestrata* from New Guinea. I have lately seen a series of four ♂♂ and three ♀♀ from Milne Bay, New Guinea, collected by A. S. Meek, the ♀♀ of which cannot be separated from *angustifascia*, which must therefore sink.

#### 8. *Banisia ordinaria* Warr., Ann. Mag. N. H. 1896, II. p. 228.

*Banisia ordinaria* Warr., Nov. Zool. IV. p. 197 and aberrations.

Four specimens received from A. S. Meek from Milne Bay, British New Guinea. In two, a ♂ and ♀, the dark markings that characterise the aberrations *hyphenata* and *nigristriata*, from Queensland, are combined with several more, so that the whole surface of the wings is mottled with oblong blackish spots.

#### 9. *Banisia rectiviata* Warr., Nov. Zool. V. p. 5 (♀).

The ♂ of this species, like *tetragonata* Wlk., and *multifenestrata* Warr., has small hyaline spots which are absent in the ♀. In the forewing the hyaline spot

touches the outside of the second (the straight) line, between veins 2 and 3; and sometimes there is a smaller spot between the same veins beyond the next line; in the hindwings there is a small spot beyond cell beyond the third line, and two small spots obliquely below it between veins 2 and 3. The three ♂♂, from which this further description is taken, are from Milne Bay, British New Guinea, collected by A. S. Meek in December 1898.

#### 10. *Banisia ypsilon* sp. nov.

*Forewings*: pale greyish ochreous, the lines and reticulations brown; the latter very fine; a brown line from costa at one-third, below which it is curved, to two-fifths of inner margin; at two-thirds of costa a straight brown line to four-fifths of inner margin, shortly forked at costa; an oblique line from five-sixths of costa to middle of inner margin, also forked at costa; a waved line from anal angle not reaching costa; a fine marginal line.

*Hindwings*: with a nearly straight brown line a little before middle; a finer line from two-thirds of costa to before middle of hindmargin; a curved line between these, forked on hindmargin.

Underside the same, the chief lines edged with rusty suffusion. Head, thorax, and abdomen concolorous.

Expanse of wings: 22 mm.

One ♂ from Dammer Island, December 1898 (H. Kühn).

A larger specimen is in the British Museum Collection from Gayndah, N. Australia.

#### 11. *Camptochilus decorata* sp. nov.

*Forewings*: ground-colour whitish, with the base, and three fasciae, antemedian, postmedian, and submarginal, reddish-brown; these fasciae have sinuate dentate edges, the brown tint running out slightly along the veins, so that the intervening pale fasciae are composed of contiguous flattened globular spaces between the veins, the centres of which are filled in with paler brown, leaving small lunulate spaces at their edges of the white ground-colour; the postmedian fascia contains a small pale costal space; fringe wide, pale brown.

*Hindwings*: similar.

Underside like upper, but the brown tints somewhat paler. Head, thorax, and abdomen reddish brown.

Expanse of wings: 30 mm.

Three ♀♀ from Rossel Island, February—March 1898 (Meek).

The costa of forewings is strongly insinuate beyond middle and convex before apex.

#### 12. *Letchena angulata* sp. nov.

*Forewings*: shining mouse-colour, with numerous short black dots and striae, more or less horizontally disposed between the veins; an oblique whitish hyaline blotch beyond lower angle of cell, extending from the submedian fold to vein 5, consisting of from three to five contiguous small spots; fringe concolorous; the hindmargin is produced into a blunt tooth from veins 3 to 5, above and below which it is irregularly excised.

*Hindwings*: with three rows of detached round white spots between veins 2 and 5; in one example each row consists of two white spots; in the other the top

row contains four smaller white spots, the middle two, and the lower one only ; fringe of the inner margin full and pale.

Underside duller ; the costa of forewings with an oblique black blotch nearly reaching the hyaline blotch. Head, thorax, and abdomen concolorous ; pectus and legs excessively hairy. Palpi very long, straight, porrect upwards.

Expanse of wings : 30 mm.

Two ♂♂ from Milne Bay, British New Guinea, December 1898—January 1899 (A. S. Meek).

A remarkable development of the typical form of the genus.

### 13. *Pharambara commanotata* sp. nov.

*Forewings* : dull brownish grey, with obscure reticulations and markings ; the costa marked with dull brown spots differing in size ; the fasciae pale brownish ; first at one-third, broad in the cell, below the median inclined towards base ; second about middle, obscure, broadened like the first below costa, then interrupted and forming a triangular blotch on the submedian fold ; marginal area rather darker, but without distinct markings ; a curved white comma-shaped mark at apex, below which there is a dark brown spot near hindmargin. The intervening spaces are paler, with obscure clouds and reticulations.

*Hindwings* : paler, with a straight brown median fascia from costa before middle to middle of inner margin, and a brownish grey marginal shade, the inner edge of which is fairly straight ; fringes concolorous.

Underside paler, especially along costa, with the markings deep brown ; a patch of mixed brown and metallic scales in the cell, and another beyond it ; the white apical mark plainer and longer, edged inwardly with darker. Head brown ; thorax and abdomen like wings. Hindmargin of both wings sinuous.

Expanse of wings : 22 mm.

One ♀ from Mt. Dulit, Borneo.

### 14. *Pharambara nitens* ab. *atribasalis* nov.

Among a series of ten examples of *P. nitens* Butl., collected by A. S. Meek at Milne Bay, British New Guinea, in November and December 1898, occur two specimens (♂ ♀) which must be named as an aberration. In these the whole of the basal half of forewings as far as and including the central fascia, with the exception of the costal area, is filled up with deep brown-black. In all other respects they agree with the typical form.

The comparison of numerous specimens from New Guinea (Milne Bay and Kapaur), as well as from the islands St. Aignan, Ron, Sudest, Rossel, and Dorei, all agreeing with typical *P. nitens* Butl., from Alu, tends to confirm the view that this form is appreciably distinct from the Indian *hamifera* Moore.

### 15. *Striglina leprosa* Warr., Nov. Zool. V. p. 225 (♂).

Among the insects sent in by Mr. A. S. Meek from Milne Bay, British New Guinea, are eight examples of *Striglina leprosa*, of which three are ♀♀. This sex differs from the ♂ in having the ground-colour darker, greyish pink or dull liver-colour instead of yellow ; the outer curved line of white spots is much broader, consisting of three spots in a row between the veins instead of a single spot. The hindwings are more uniformly coloured than in the ♂. All three examples are a little larger than the ♂♂.

16. *Striglina reversa* sp. nov.

*Forewings* : bright brick-red, strigulated and reticulated with olive-fuscous; the costa olive-fuscous; two more prominent transverse lines or shades of the same colour; one from before middle of costa to beyond middle of inner margin, slightly waved; the other from three-fourths of costa towards hindmargin, before which it ramifies and is retracted to inner margin before anal angle; a series of marginal black spots; fringe red.

*Hindwings* : with the outer line only, which appears as a continuation of the inner line of the forewings; the veins towards hindmargin in both wings marked with deeper red and olive-fuscous.

Underside paler, with the markings as above. Head, thorax, and abdomen concolorous with wings; the tips of the shoulders olive-fuscous, continuing the costal streak.

Expanse of wings : 27 mm.

Two ♂♂ from Milne Bay, British New Guinea, October and November 1898 (A. S. Meek).

The legs are less hairy than usual in the genus.

17. *Striglina variegata* sp. nov.

♂ *Forewings* : pale ochreous, dusted with darker; the markings greyish or rufous; costa with six distinct black blotches, the sixth connected with a subcostal black blotch obliquely below it; a curved antemedian and median fascia, which sometimes coalesce, when the whole basal half becomes rufous or grey; submarginal fascia represented by an irregular cloud above anal angle, preceded on inner margin by a small triangular mark with black edges; fringe rufous, with a brown or blackish spot at apex.

*Hindwings* : with an antemedian and broad submarginal rufous fascia, in some cases more or less confused except along costa.

Underside with the markings darker and more concise; costa of forewings without black blotches. Thorax and abdomen of the pale ground-colour of wings; face and vertex white; palpi rufous.

♀ differs from ♂ in having the ground-colour darker and the costal blotches of forewings brown or rufous; and in particular by the narrower median fascia being connected with the submarginal fascia by an oblique arm running towards apex.

Expanse of wings : ♂, 28—30 mm. ; ♀, 32—36 mm.

Four ♂♂, two ♀♀, from Milne Bay, British New Guinea, November 1898—January 1899 (A. S. Meek).

The species may be recognised by the outline of the hindwings which protrude and are bluntly bent at middle of hindmargin; in the ♀ the hindmargin of forewings is also strongly rounded below, and incised before the apex which is produced; the ♂ shows the same peculiarities in a less degree.

18. *Symphleps ochracea* ab. *pallida* nov.

*Forewings* : pale straw-yellow, crossed by slightly darker rippled lines; costa deep brown at base; costal edge dark brown between the white spots which are more numerous than in *S. ochracea*, Pag.; cell-spot small, dark brown, at lower end of cell; fringe very pale brown.



*Hindwings* : with the lines single and sparsely distributed : a minute dark cell-dot.

Underside with the dark markings plainer ; discal spot double, as in *ochracea*, with more brown scales intermixed : hindwings with small cell-dot. Thorax and abdomen pale, like the wings ; shoulders and head brown.

Expanse of wings : 28 mm.

One ♂ from Mount Mada, Burn (3000 ft.), September 1898 (Dumas) ; also from Kapanr, New Guinea.

The species described by me in *Nov. Zool.* iv, p. 383 as *Symphleps atomosalis*, had been already described by Sir G. Hampson in the *Pr. Z. S.* 1897, p. 621, as *Rhodanera atomosalis* : but Pagenstecher's *ochracea*, described in 1886, is undoubtedly the same insect, and his name will stand.

#### FAMILY URANIIDÆ.

##### 19. *Micronia discata* sp. nov.

*Forewings* : white ; the costa marked with fine dark linear strigæ ; the wings crossed by rows of fuscous thickened striae between the veins, which tend to arrange themselves in more or less regular lines ; a fuscous marginal line ; fringe rufous-fuscous with the apices paler ; a distinct fuscous discal spot.

*Hindwings* : with the transverse striae fewer and restricted to the inner-marginal area ; the postmedian series elongated between the veins, not transverse ; a submarginal row of fine striae ; marginal line black, ending on each side of the tail in a black spot ; the tail with a large black spot ; fringe rufous, white along upper edge of tail ; discal spot larger.

Underside white, with a fine dark marginal line : the hindwings with the dark spot of the tail marked. Head, thorax, and abdomen all white ; legs white, internally fuscous-tinged ; palpi minute, dark externally.

Expanse of wings : ♂ 22 mm. ; ♀ 30—35 mm.

One ♂, two ♀, from Toowoomba, Brisbane District, Queensland.

In the forewings the costa is strongly arched, the apex prominent, and the hindmargin oblique and straight ; the venation alike in both sexes. The smaller ♀ is marked bred, December 31st, 1896 ; probably all three are bred specimens.

#### FAMILY EPIPLEMIDÆ.

##### 20. *Decetia dichromata* Wlk. xxxv. p. 1558.

The variations to which this species is liable are well shown in a series lately received from Sudest and Rossel, islands of the Louisiade Archipelago, where they were collected by A. S. Meek ; of these nineteen, including one ♀, are from the former, the remaining seven, all ♂ ♂, from the latter. The ground-colour is generally either ochreous yellow or stone-grey ; and similar variations occur in each colour series. The oblique line may be all but obsolete, or very fine, and then generally bright ferruginous, or thick and deep brown or black. The cell-spot of forewings is sometimes obsolete, at others a grey or black speck or spot, or ocelloid with paler centre. In some cases the apical region of forewings is blackish ; the row of white subapical spots is often quite wanting ; while the black submarginal spots of the hindwings are sometimes absent, or on the other hand swollen into

black blotches, which may become confluent and more or less reproduced on the forewings as well. The transverse darker striae are at times quite absent, while in other cases they darken the whole of the wings. In a few instances a dark basal streak runs along the subcostal and is more or less forked in the cell. In two examples the ground-colour is different, being a mixture of pinkish grey, reddish fulvous and olive brown. The hindmargin of forewings in the ♂ is bluntly bent at vein 7, then straight to anal angle; in the ♀ strongly gibbous throughout; the single ♀ has the ground-colour yellow.

#### 21. *Dirades albilinea* sp. nov.

*Forewings*: dull brownish grey, with numerous minute dark dots and striae; costa dotted, ochreous and fuscous; a dark grey suffusion on inner margin deeper towards anal angle, before which on inner margin is a blackish blotch, externally white-edged; a submarginal row of minute black dots with white scales internally; fringe iron-grey.

*Hindwings*: browner; the basal area speckled with whitish ochreous and brownish, and edged by a conspicuous sinuous white line from one-third of costa to two thirds of inner margin; marginal area beyond the line olive-brown, towards anal angle dark grey; an indistinct submarginal line of dark purplish lunules from upper tooth to anal angle.

Underside pale dull grey, with fine striations; hindwings lighter. Face and palpi dark brown. Thorax and abdomen pale ochreous grey; vertex and shaft of antennae white.

Expanse of wings: 18 mm.

One ♂ from Milne Bay, British New Guinea, January 1899 (A. S. Meek).

Though a *Dirades* in venuration, this species presents several points of difference: though an undoubted ♂, the submedian fold of hindwings is coloured and scaled like the rest of the wing, and bears no tuft of hair whatever. The apex of forewings is truncate from vein 8 to 7, the hindmargin between veins 6 and 7 being slightly prominent, thence sinuous to anal angle; the inner margin has a strong incision beyond middle, and the anal angle is deeply lobed; hindwing with small teeth at veins 4 and 7; the antennae have short close clavate teeth.

#### 22. *Dirades erectinota* sp. nov.

Like *canifera* Moore, but greyer, with the dark chocolate mark on inner margin more pointed and recurved at its apex which reaches vein 2. The tufts of hair in the furrow of hindwings silky ochreous.

Two ♂♂, one ♀, from Ron Island, July 1897 (Doherty); one ♀ from Dorei, June 1897 (Doherty).

#### 23. *Dirades vespertilio* sp. nov.

*Forewings*: dull brown, becoming dark grey towards costa; first line at one-third, curved below costa, second at two-thirds, parallel to hindmargin, and partially double; the included space, as well as the base, much clouded with blackish, especially along the costa; outer line with a pale edging; apical area whitish grey, with black speckles and a black costal spot; fringe iron-grey; the hindmargin very narrowly dark brown, with an obscure row of dark marks on its inner edge.

*Hindwings* : dull reddish brown, without any markings ; the abdominal fold silvery white.

Underside of forewings dull red-brown ; the hindwings almost wholly overlaid with whitish. Abdomen brown ; head and thorax darker ; antennae blackish brown.

Expanse of wings : 19 mm.

One ♂ from Sudest Island, April 1898 (Meek).

#### 24. *Epiplema concinnula* sp. nov.

*Forewings* : chalk-white, with slight brownish speckles in parts ; the basal area almost pure ; the lines pale brown ; first from nearly one-third of costa to one-third of inner margin, sharply angulated almost in midwing ; second from three-fifths of costa to two-thirds of inner margin, sinuous, outcurved above and more faintly incurved below, the central fascia between the lines more thickly speckled ; a row of five black dots from apex to below middle of hindmargin ; a faint brownish cloud at middle of hindmargin ; marginal line brown ; fringe brownish with white base.

*Hindwings* : with an interrupted antemedian dark line and a curved postmedian brown line, the latter preceded by a brownish blotch on inner margin ; two clear black white-edged lunules between the teeth and a white-edged brown spot below lower tooth ; fringe as in forewings.

Underside white, with slight speckling ; forewing, except along inner margin, suffused with pale brownish yellow ; a straight oblique dark line from middle of costa to two-thirds of inner margin ; hindwings with slight dark mark above anal angle. Head, thorax, abdomen, and antennae white ; forelegs and palpi brown.

Expanse of wings : 17 mm.

One ♂ from Woodlark Island, March 1897 (A. S. Meek).

Hindmargin of forewings entire ; inner margin concave in middle ; hindwings with two curved teeth at veins 4 and 7 ; palpi long, the third joint bent downwards, as long as second ; antennae thick, with close clavate teeth.

#### 25. *Epiplema pallidistriata* sp. nov.

*Forewings* : dull brownish grey, dotted and dappled with darker, and varied with ochraceous ; the veins all pale finely edged with dark scales, with pale horizontal streaks in the intervals, likewise edged with dark ; costa with oblique black striae with paler interspaces ; first line from costa at one-fourth to inner margin at one-third, pale with blackish outer edge, twice acutely angled outwards, once in cell, and again on submedian fold ; outer line from three-fifths of costa to four-fifths of inner margin, strongly outcurved to near hindmargin below middle, then oblique inwards, pale, preceded by an irregular black line and followed by a fuscous one ; below the middle this black line is preceded by a blackish shade widening to the middle of inner margin ; marginal area towards costa grey, with three black costal streaks before apex ; marginal line thick, dark grey, preceded by a dull ferruginous band, diminishing in width to anal angle and very irregularly dentated inwardly, preceded on inner margin by a dark cloud ; fringe fuscous with fine pale basal line and pale apices.

*Hindwings* : with black waved basal line, followed below the median vein by a mixture of pale and dark grey scales, and above the median by an ochraceous-tinged pale space, which is edged by a thick oblique velvety black streak, followed again

by grey and fulvous scales which become ochreous towards vein 4 ; outer line sinuous from two-thirds of costa to vein 4, where it is angled, then again sinuous to three-fourths of abdominal margin ; yellowish white edged with purplish brown on both sides, and in its lower half preceded by dark lunulate blotches, followed by a broad lustrous pearly line ; apical area occupied by a large purplish blotch ; that before anal angle by a pearly grey space ; marginal lunules lustrous olive, finely edged with black and preceded by white blotches, crossed by a fine white streak at vein 4 ; fringe as in forewings.

Underside of forewings dull pale grey, of hindwings whitish grey, both much freckled with blackish towards hindmargin. Face and palpi black ; vertex and thorax grey ; shoulders paler ; abdomen dark grey above.

Expanse of wings : 30 mm.

One ♀ from Penang, February 1897 (Curtis).

Hindmargin of forewings slightly excised between veins 4 and 6, which are shortly toothed ; hindwings with a hook at vein 7, and a curved tail at vein 4.

#### 26. *Epiplema simplex* sp. nov.

*Forewings* : brownish grey, with brown striae, which are most prominent along the costal edge ; the lines brown : the first well curved, from two-fifths of costa to middle of inner margin ; the second from three-fifths of costa to two-thirds of inner margin, bent outwards on veins 6 and 4 and inwards on the submedian fold, where it is nearest to the first line : the included space slightly deeper tinged than the ground colour ; a darker cloud on middle of hindmargin limited by a curved brown line : fringe concolorous.

*Hindwings* : with the two lines nearly parallel ; from one-fourth and two-thirds of costa respectively, the inner one acutely bent on vein 2 and the outer on vein 4, the latter edged externally with ochreous ; marginal area tinged with brown ; extreme margin between the tails pale ochreous, internally edged by two brown curves ; a black spot below lower tail.

Underside grey, with darker striae ; the hindwing more whitish. Thorax and abdomen like wings ; vertex and antennae white ; face, palpi, and forelegs fuscous.

Expanse of wings : 26 mm.

Two ♀♀ from the Nilgiris.

Wings broad ; hindmargin of forewings simple ; of hindwings with two short tails at veins 4 and 7 ; palpi quite short.

#### 27. *Epiplema spissata* sp. nov.

*Forewings* : greyish fawn-colour, thickly dusted with darker, especially towards base ; the lines brown, somewhat obscure : first at one-third, bent on subcostal vein ; second from costa just beyond middle to three-fourths of inner margin, oblique to vein 6, vertical to vein 4, then concave to submedian fold and again vertical and thickened ; a conspicuous black-edged chestnut-brown marginal blotch from apex to vein 3 ; fringe grey.

*Hindwings* : darker grey ; a biangulated basal line ; a brown postmedian line sharply angled on vein 4, each half uniformly concave outwards, the lower half followed by a broad pale space ; an obscure dark line from above upper tail to below lower tail, forming two dark spots at the base of the latter ; a pale brown discal mark and some white and black scales mixed along the median vein.

Underside whitish, suffused in forewings with dull grey, with fuscous and black transverse striae between the veins. Head, thorax, and abdomen grey; face and palpi brown-black.

Expanse of wings : 27 mm.

One ♀ from Sudest Island, April 1898 (Meek).

Distinguished by the dull mealy appearance and almost entire absence of lustrous scaling in hindwings.

#### 28. *Monobolodes fuscibrunnea* sp. nov.

♀ *Forewings* : whitish, densely dusted and suffused with purplish fuscous scales in the costal half of wing; the lower half strongly tinged with brown; lines as in *rectifascia* and *pallens*; central area followed by a pale spot on costa; an indistinct submarginal line of dark streaks; fringe iron-grey, varied below middle, like the wings, with brown.

*Hindwings* : grey; the central fascia and the fringe tinged with brown.

Underside dark grey. Head and palpi black; thorax and patagia tinged with brown; abdomen grey.

♂ with the brown suffusion more prominent; the whole hindwing being brown with a single central dark brown interrupted line; fringe dark brown; underside of hindwings whitish.

Expanse of wings : ♂ 24; ♀ 26 mm.

Two ♂♂, two ♀♀, from Milne Bay, British New Guinea, December 1898—February 1899 (A. S. Meek).

Distinguished by the brown intermixture.

### FAMILY GEOMETRIDAE.

#### SUBFAMILY OENOCHROMINAE.

#### *Callipotnia* gen. nov.

*Forewings* : with costa nearly straight, curved before apex, which is prominent; hindmargin faintly sinuous.

*Hindwings* : with hindmargin well rounded; anal angle square.

Antennae of ♂ finely ciliated; palpi laterally flattened, curved obliquely upwards in front of face, second joint broad, third blunt; tongue and frenulum present; hind-tibiae thickened, with two pairs of spurs, the outer middle spur short. A fovea at base of forewings concealed above by hairs; hindwings hairy at base and with tufts of hair beneath the median nervure and along veins 2 and 3.

*Nervation* : forewings; cell half as long as wing; discocellular straight; first median nervure at about one-half, second shortly before third; radials normal; veins 7, 8, 9, 10, stalked; 11 anastomosing with 12, 10 with 11 and again with 8, 9.

*Hindwings* : with costa divergent from base; vein 7 just before end of cell; medians as in forewings; radial from the centre of discocellular.

Type : *Callipotnia multicolor* sp. nov.

#### 29. *Callipotnia multicolor* sp. nov.

*Forewings* : greyish flesh-colour, suffused with olive, and sparsely sprinkled with dark scales; costal edge narrowly red, red-brown towards base; first line indicated by an oblique red-brown costal streak at one-third, and a dot nearer base

on median and submedian veins: second line from a brown-red costal spot at two-thirds, outcurved on veins 6 and 4, and there marked by a sinuous red-brown line preceded by an olive brownish blotch, incurved below vein 4 to two-thirds of inner margin and marked by red-brown dots on veins, that on the submedian forming a large spot; a submarginal row of brown spots on the veins parallel to hindmargin, starting from a brown costal blotch before apex; fringe red-brown, with a row of small marginal dots before the base; cell-dot small.

*Hindwings*: with outer and submarginal lines only; the outer line curved and marked by dots on veins; the submarginal with the spots obscure.

In both wings the basal two-thirds is slightly more suffused with olive than the marginal third.

Underside deep coppery red, coarsely speckled with black, and with all the markings black; a black marginal line; hairs at base of hindwing and fringe of inner margin bright reddish; tuft of hair below median brown-black; those on veins 2 and 3 ochreous and fulvous. Face and palpi coppery red; vertex, thorax, and abdomen like wings; basal third of antennae pale, the rest dark; femora red; fore-tibiae and tarsi alternately ochreous and dark brown; middle-tibiae dark brown; hind-tibiae reddish, becoming brown towards end like the tarsi.

Expanse of wings: 36 mm.

One ♂ from Dorei, April 1897 (Doherty).

### 30. *Taxeotis semifusca* sp. nov.

*Forewings*: greyish white, with coarse and thick fuscous-grey speckling; a diffuse dark fuscous line from below one-fourth of costa to one-third of inner margin, minutely angled outwards on median and submedian veins; a small black discal dot; outer line fuscous, from three-fourths of costa, where it is indistinct, to two-thirds of inner margin, curved outwards from vein 6 to vein 2, where it is bluntly bent; followed below vein 6 by a second dark line which is thickened above inner margin, the space between them faintly tinged with rusty; marginal area wholly filled up with dark fuscous, edged above by an oblique line from apex; minute black dots along margin between the veins; fringe with basal two-thirds fuscous-grey, outer third pale.

*Hindwings*: without first line; a central curved line followed by a darker fuscous shade before the dark marginal area.

Underside whitish grey, densely fuscous-speckled. Face and palpi blackish, the palpi white at base; vertex and thorax grey; abdomen pale grey speckled with darker.

The hindmargin of forewings is sinuous.

Expanse of wings: 28 mm.

One ♀ from Dawson district, Queensland (from the Barnard Collection).

### SUBFAMILY ORTUOSTIXINAE.

### 31. *Bociraza latiflava* ab. *restricta* nov.

Differs from typical *latiflava* Warr., in having the large yellow semicircular area on inner margin on forewings restricted to a small basal blotch, much dusted with fuscous scales, and only reaching to one-third of wing. In the hindwing the

inner margin is broadly smoky fuscous. Collar black; thorax and abdomen smoky fuscous.

Expanse of wings: 44 mm.

One ♀ from Milne Bay, British New Guinea, December 1898 (Meek).

### 32. *Celerena aurata* sp. nov.

♂ *Forewings*: wholly yellow; costa from base to near middle deep purple; two oblique thick purple lines, the first from the end of the dark costal streak nearly straight to before the anal angle, the second from below three-fourths of costa, slightly sinuous, its lower half being outer-curved and bent round near middle of hindmargin; the apex of wing slightly purplish tinged; fringe yellow.

*Hindwings*: with a single curved purple submarginal line, not reaching anal angle.

Underside similar, but all the dark markings thicker and blurred. Head, thorax, and abdomen yellow; palpi yellow with the terminal joint purplish; legs yellow with the joints purplish; hind-tibiae much thickened with hairs, the tuft at the end on the inner side fuscous purplish; antennae of ♂ simply lamellate, with very short bristles, without tuft.

♀ differs from ♂ in having the costal streak interrupted before the first cross-line; in having the second line nearly straight and not so closely approximating to the hindmargin, and the apex not purplish.

Expanse of wings: ♂ 52 mm.: ♀ 48 mm.

Two ♂♂, one ♀, from Rossel Island, February 1898 (Meek).

Allied to *C. cana* Warr., from Fergusson Island.

### 33. *Celerena exacta* sp. nov.

*Forewings*: deep yellow; the costa black to middle whence an oblique black bar with diffuse inner edge runs to join the black marginal border above inner margin; the marginal border occupies one-third of costa, but becomes narrower below middle, its inner edge being strongly curved; it is traversed along the middle by a distinct curved slaty-blue band.

*Hindwings*: yellow, with black hindmarginal border of nearly uniform width throughout, traversed by a slaty-blue band; the inner edge bluntly rectangular in the middle.

Underside like upper, but, instead of the oblique bar of forewings, a broad round-edged blotch from costa to median vein only. Head, thorax, and abdomen all yellow; terminal joint of palpi dark.

Expanse of wings: 60 mm.

One ♀ from Tugela, Solomon Islands (Woodford).

Distinguished by the greater obliquity of the bar of forewings, and its interruption on the underside.

### 34. *Celerena mitis* sp. nov.

*Forewings*: pale yellow; costa from base to middle smoky grey, joining a blackish bar from middle to anal angle, slightly curved at costa and with its inner edge diffuse; hindmargin from anal angle narrowly slaty black and with a crenulate edge as far as vein 4, which then passes obliquely to costa at three-fourths, delimiting a large oblong yellow patch; fringe paler slaty.

*Hindwings* : with a narrow marginal border of slaty black, uniform from apex to anal angle, with waved inner edge.

Underside similar : the costal streak and cross-bar thicker and blacker ; the margins also blacker. Head, thorax, and abdomen all yellow ; third joint of palpi dark.

Expanse of wings : 52 mm.

One ♀ from Sudest Island, Louisiade Archipelago, April 1898 (Meek).

Nearest to *C. pallidicolor* Warr., from Waigiau Waigeu.

### 35. *Eumelea aureliata* ab. *attenuata* nov.

♀ Differs from typical *aureliata* in being paler yellow, dusted with finer speckles, with all the markings paler ferruginous and much thinner and less continuous.

♂ With ground-colour, where visible, olive-ochreous, instead of yellow, uniformly covered throughout with deep rosy confluent striae.

Expanse of wings : ♀ 56 mm. ; ♂ 52 mm.

Two ♂♂, one ♀, from Milne Bay, British New Guinea, November 1898—January 1899 (Meek).

## SUBFAMILY PSEUDOTERPNIINAE.

### 36. *Hypochroma perfulvata* sp. nov.

*Forewings* : pale green densely speckled with dark green ; the costa pinkish ochreous, with black striae and spots ; the lines dark green varied with black and reddish scales ; a dark spot at base, and an oblique line from near base of inner margin not reaching costa ; inner line from a black costal spot at about one-fourth, incurved in cell and on submedian fold to inner margin before middle, its lower part strongly marked with black and red scales ; outer line from a black costal spot at two-thirds, incurved beyond cell and there forming three sharp teeth on veins 4, 5, 6, then incurved to inner margin just beyond inner line ; the teeth all marked with black, and filled in with reddish ; a large dark green cell-spot, with a black dash in it on the median and another above it on the subcostal ; a red line from it along vein 4 to outer line ; submarginal line pale green, inwardly edged by dark green blotches varied with red scales ; a row of black spots between veins before margin ; fringe green, darker beyond veins and tipped with reddish.

*Hindwings* : similar, but without first line ; the outer line distinct and strongly angled on vein 4 ; a patch of pinkish scales on inner margin near base ; fringe of inner margin yellow.

Face and vertex pale green ; collar pink-finged ; shoulders green, the tips with black and red scales ; thorax and abdomen green, varied with black and red scales.

Underside : wholly dull deep yellow ; with a broad blackish marginal border, leaving a small pale spot below vein 4 and the apex of forewings pale yellowish ochreous ; fringe ochreous, with dark patches ; forewing with a round cell-spot, some costal marks, and a row of transverse striae from base along submedian fold, black ; abdomen beneath and legs yellow-ochreous ; forelegs dark fuscous-green above.

Expanse of wings : 50 mm.



Two ♂♂ from Milne Bay, British New Guinea, November 1898—January 1899 (Meek).

Distinguished by the angulated second line of hindwings, and the uniform yellow colouring below. In forewings vein 11 is free.

SUBFAMILY GEOMETRINAE.

27. *Agathia punctata* sp. nov.

*Forewings* : pea-green, the costa diffusely ochreous-grey with fuscous strigae ; the lines represented by reddish brown spots on the veins ; a spot at base of costa and of median vein ; a costal spot at one-eighth ; first line from one-third of costa to one-third of inner margin, angled at origin of veins 3 and 4, marked by spots on costa, subcostal vein, a double one at the angle, one on vein 2, and on inner margin ; outer line from two-thirds of costa to two-thirds of inner margin, the spots at origin of vein 7 and those on veins 6 and 5, lying in an oblique line outward, those on veins 1 to 4 in an oblique line incurved ; a row of marginal spots at end of veins, that on vein 4 the largest ; a darker red-brown apical blotch ; fringe (worn) yellowish green.

*Hindwings* : with outer and marginal spots as in forewings ; the spot on tail at vein 4 largest ; inner line represented by a spot on vein 2 and one at junction of 3 and 4.

Underside whitish green, the lines of spots showing through ; the apical spot of forewings and tail spot of hindwings both blackish red. Face and palpi red above, pale below ; fillet and antennae red ; vertex, thorax, and abdomen green ; the abdomen with red-brown dorsal spots.

Expanse of wings : 36 mm.

One ♀ from Dammer Island, December 1898 (H. Kühn).

38. *Anisogamia subliturata* sp. nov.

♂ *Forewings* : greenish white ; the markings much the same as in *A. subrenusta* Warr. ; the green basal and central areas more strongly rippled with whitish ; the pale band beyond central fascia broad and continuous, greenish white, followed by two regular series of greenish white wedge-shaped spots, all edged with darker green and tinged with yellowish ; marginal lunules deep green ; fringe green tipped with brownish.

*Hindwings* : with basal area dark green, freckled with pale ; the rest as in forewings, but the wedge-shaped spots below costa edged with blackish.

Underside, basal half dull olive-green, with the veins paler ; the costal area pale ochreous ; a dark olive strongly denticulated submarginal fascia, emitting a dark blotch inwards above vein 4 ; blackish green marginal lunules ; fringe whitish, chequered with fuscous beyond veins. Face above, collar, thorax, and abdomen dark green, the abdomen speckled with whitish scales ; vertex, shaft of antennae at base, and lower third of face snow-white ; palpi externally olive-brown ; antennae dark brown.

♀ *Forewings* : ground-colour deep green ; costa, lines, and marginal third pale ochreous ; the costa and margin speckled with blackish and fuscous ; the lines as in ♂ ; a short ochreous projection from costal area along upper half of discocellular ; upper third of marginal area green, with the veins across it, a curved submarginal

line, and the extreme hindmargin ochreous : a green patch at anal angle ; marginal lunules green above vein 4, black and finer below ; fringe pale and dark ochreous.

*Hindwings* : basal half green, with inner margin narrowly ochreous ; ochreous marginal area thickly speckled with black, with two green patches above anal angle only ; marginal lunules all black.

Underside pale ochreous ; all the markings of the ♂ intensified and dark fuscous ; vertex and antennae ochreous, the latter annulated with brown ; abdomen ochreous speckled with brown, and with two brown rings on anal segments ; thorax and palpi as in ♂.

Expanse of wings : ♂ 35 mm. ; ♀ 40 mm.

Four ♂♂, two ♀♀, from Milne Bay, British New Guinea, December 1898—February 1899 (Meek).

### 39. *Anisogamia subvenusta* sp. nov.

♂ *Forewings* : deep green ; the costa whitish with deep fuscous strigulae ; subcostal area for two-thirds marked with hoary white scales ; basal area crossed by indistinct series of white scales ; first line from one-sixth of costa to two-fifths of inner margin, oblique outwards to subcostal, then wavy ; cell mark deep green preceded by whitish scales ; outer line white, dentate, developed into three large white blotches, one between veins 5 and 7, a second between 3 and 4, the third on inner margin reaching vein 1 : this line forms sinuses inwards beneath costa, at middle, and on inner margin where it approaches the basal line : two submarginal series of irregular white spots, those between veins 6 and 7, and 4 and 5 in each series larger and subconfluent, fringe green and white.

*Hindwings* : with cell and basal portion of submedian area whitish ; the rest as in forewings, but the outer edge of outer line marked with a black lunule beneath costa.

Underside bluish white ; basal two-thirds of forewings washed with yellowish olive-green ; the cell-spot and two denticulate shades dark olive-green, the outer one becoming black at anal angle ; a marginal series of olive lunules between the veins ; fringe white, with dark green mottlings at the vein ends ; hindwings with a patch of pale olive at middle of costa and a black blotch at apex shading into green below ; marginal spots small.

♀ quite different ; deep green without any whitish scales ; costa broadly ochreous, dusted and spotted with fuscous ; first and second lines placed as in ♂ but pale ochreous, the first not wavy, the second wavy but not denticulate ; this last widened into ochreous blotches at extremities ; marginal area beyond brownish ochreous dusted with dull brown scales, except an irregular green patch from vein 8 to 5 touching outer line, and a small green blotch between veins 2 and 3 ; marginal lunules and a costal spot before apex blackish ; fringe ochreous.

*Hindwings* : without first line ; outer line swollen only on costa, with three small green blotches beyond it in the ochreous marginal area, one on inner margin, the second between veins 2 and 3, the third beyond cell.

Underside wholly ochreous ; both wings with submarginal dentate-edged blackish fasciae and series of marginal lunules ; basal two-thirds of forewings tinged with olive and fuscous, and edged with darker. Face in both sexes dark green above, white below ; patagia and shoulders green ; vertex and palpi in ♀ ochreous, in ♂ the vertex snow-white, the palpi bright pale brown ; abdomen in ♀ ochreous,

dusted with brown and with lateral green marks on basal segments : in ♂ dark green flecked with silvery white.

Expanse of wings : ♂ 31 mm. : ♀ 33 mm.

Nine ♂♂, five ♀♀, from Milne Bay, British New Guinea, November 1898—February 1899 (Meek).

#### **Chloromachia** gen. nov.

*Forewings* : with costa convex at base and before apex : hindmargin bluntly bent in middle.

*Hindwings* : with hindmargin dentate at middle, crenulate on each side. Palpi with second joint rough-scaled, third naked, moderate, longer in ♀ than in ♂ : antennae of ♂ with fascicles of cilia ; hind-tibiae of ♂ dilated, with a fold containing tuft and with two pairs of spurs : tongue and frenulum present.

*Neuration* : first subcostal of forewings free ; the other four-stalked ; last two medians from lower end of cell : hindwings with the two subcostals and last two medians stalked.

Type : *C. divapala* Wlk. (*Comibaena*).

Distinguished from *Chlorostrota* Warr., by the ♂ antennae.

#### 40. **Chloromachia(?) pallidata** sp. nov.

*Forewings* : whitish, varied with very pale bluish green : the costa broadly ochreous striated with brownish ; basal edge brown ; first line near base, oblique outward to subcostal, then vertical ; outer line from three-fourths of costa to middle of inner margin, irregularly crenulate ; submarginal line outcurved from costa to vein 7, then straight to anal angle ; all three lines white ; marginal area washed with white, with a row of rather large dark green spots between the veins ; fringe white.

*Hindwings* : with a broad white antemedian band, within which the basal area is green, containing a white discal spot, and becoming white itself at base ; marginal area white, narrowed to a point at apex and anal angle, with the marginal spots as in forewings.

Underside white ; costal area ochreous-brown ; subcostal area greenish ; a green blotch on discocellular, partly showing through on upperside ; marginal spots fuscous. Palpi varied with fuscous and green ; face dark green, white below ; vertex and antennal shaft white ; thorax and abdomen green and white.

Expanse of wings : 30 mm.

One ♂ from Milne Bay, British New Guinea, January 1899 (Meek).

The specimen is somewhat worn, and the description is unavoidably deficient in exactness. It differs from typical *Chloromachia* in having the hindmargin of forewings nearly straight, and in respect of the palpi and hind-tibiae it is nearer *Chlorostrota* Warr., which, however, has the antennae of ♂ pectinated.

#### 41. **Episothalma subaurata** sp. nov.

*Forewings* : like *E. obscurata* Warr., but yellower green ; the outer line followed by a thick blackish green shade above inner margin.

*Hindwings* : with the blackish shade broader and extending from costa to inner margin ; the outer line preceded also by a narrower black shade.

Underside of both wings golden yellow, with a broad velvety black submarginal

shade gradually narrowing from anal angle of hindwings to costa of forewings, which it does not reach ; cell-spots and marginal spots blackish. Face dark brown ; palpi ochreous-yellow beneath, the terminal joint dark fuscous ; thorax and abdomen green ; third and fourth segments of abdomen marked with red and black scales.

Expanse of wings : 40 mm.

One ♀ from Milne Bay, British New Guinea, December 1898 (Meek).

Received with a series of *E. obscurata* : the forewings have the hindmargin more deeply excised below the apex.

#### 42. *Gelasma* (?) *perlineata* sp. nov.

*Forewings* : mealy green, the costal edge whitish ; the lines dark green, regularly dentate ; the first curved from one-fifth of costa to one-third of inner margin, the second from two-thirds of costa to just beyond middle of inner margin, both ending in red spots ; cell-spot round, dark brown, edged with reddish ; marginal line fine, red, broadly interrupted at the ends of the veins ; fringe apparently green.

*Hindwings* : with outer line curved ; no inner line.

Underside whitish green. Head, thorax, and abdomen pale green.

Expanse of wings : 32 mm.

One ♀ from Tugela, Solomon Islands (Woodford).

Almost exactly like *Anoplosceles nigripuncta* Warr., from W. Java, but the hindwings are not acutely tailed at middle. In appearance more like a *Hemistola*. Till the ♂ can be compared I leave it provisionally in *Gelasma*.

#### 43. *Helicopage velata* Warr., Nov. Zool. IV. p. 390.

There appear to be two forms of this insect. In the typical form from Woodlark Island, which occurs also in Rossel Island, the anal region of hindwings is occupied by a squarish dark olive-green blotch above, partially shown as a fuscous blotch below, the outside edge, darker than the rest, running from anal angle to radial and there stopping. In the other form, from Sner, Mefor, and from Sudest Island, the dark anal blotch is absent above, and below the submarginal line is shown by a row of rusty spots on the veins from anal angle to apex. The ♀ of this latter form differs considerably from the ♂ ; all the lines and shades are much more defined in greyish buff, this colour forming a broad postmedian fascia containing a postmedian line marked by black spots on veins from two-thirds of costa to three-fourths of inner margin, bent at vein 4, the fringe being buff, with a dark basal line towards anal angle. In the hindwings the outer third of wing, except the extreme apex, is buff speckled with darker, the postmedian line is dentate but marked by black points only on veins 3 and 4, and there is a smoky black submarginal shade from before apex, which in one strongly marked example develops into a coal-black blotch towards anal angle. The dark fuscous markings of the underside are much more developed than in the ♂. The largest ♀ from Sudest Island expands to 39 mm.

#### 44. *Cenospila* (?) *simplex* sp. nov.

*Forewings* : apple-green ; a curved, strongly zigzag pale line at two-thirds, before which the green tint is slightly deeper ; cell-spot red-brown ; fringe yellow, with a fine interrupted red-brown basal line.

*Hindwings* : the same, the cell-spot larger.

Underside pale green ; the fringes green.

Head and thorax pale green : abdomen wanting.

Expanse of wings : 24 mm.

One ♀ from West Java.

Forewings, with the hindmargin straight and oblique ; hindwings with the inner margin longer than the costal : apex rounded, rectangular : hindmargin sinuous, slightly inflected opposite cell.

Referred to *Enospila* provisionally.

#### 45. *Tanaorhinus unipuncta* sp. nov.

Differs from *T. lateocirridata* Wlk., in having a single elongated large blackish cell-spot on both wings.

Expanse of wings : 65 mm.

Two ♂♂ from Milne Bay, British New Guinea, February 1899 (Meek).

Of these two specimens one is in good condition and has the underside of forewings pinkish green to the transverse line, which is edged outwardly by a diffuse pale green shade, the marginal area mixed fulvous and green : the other, which is worn, has the whole underside of the forewings yellow as in the hindwings ; the transverse line followed by a distinct broad crenulate-edged pearl-green shade, and the hindmargin with an obscure row of greenish triangles, as if the pinkish green scales of the fresher specimen had been rubbed off.

### SUBFAMILY STERRIHINAE.

#### 46. *Chrysolene flavipuncta* sp. nov.

*Forewings* : dull brick-red, deeper towards hindmargin and anal angle, towards costa and base more pinkish grey with reddish speckles ; costa deeper red, but tinged with yellow in apical fourth ; hindmargin narrowly deep yellow, the edge of the red ground-colour irregularly jagged ; at three-fourths a paler postmedian line, bluntly angled outwards at vein 4, then curved inwards, more distinct in upper half owing to its being margined internally by deeper red ; a deep red cell-spot, before which there appears an indistinct deep red blotch from costa, probably representing first line : fringe yellow.

*Hindwings* : similar ; the outer line more prominently angled in the middle ; cell-spot yellow ringed with red.

Underside dull red ; the hindmargin and fringes yellow ; cell-spot of hindwing pale. Head, thorax, and abdomen red ; the thorax and vertex tinged with grey.

Expanse of wings : 25 mm.

One ♀ from Samar Island, Philippines, June, July 1896 (J. Whitehead).

Closely resembles *Chrysocraspeda croceomarginata* Warr., from S. Java.

#### 47. *Chrysolene insolita* sp. nov.

*Forewings* : cream-colour, slightly yellow tinged and dusted with reddish atoms chiefly along the veins ; the costa, veins, and cross lines snuff-brown ; a triangular patch of ground-colour at base, much suffused with reddish, and traversed by the brown veins ; costal area broadly snuff-brown with darker specks ; first line from one-fourth of costa, oblique outwards to subcostal, then irregularly oblique inwards, somewhat bent to one-third of inner margin, preceded by a broad snuff-brown band ; median and outer lines parallel, excurved from costa to vein 4, then incurved.

strongly dentate and lunulate, interlacing on the veins, and so forming three pale blotches of ground-colour; subterminal and submarginal lines dentate and diffuse, partially confluent along veins, both interrupted between veins 3 and 5; a blotched marginal line; fringe pinkish cream-colour, with brown mottlings beyond veins; cell-mark irregularly rhomboid, whitish, edged with brown, and connected with the brown costa.

*Hindwings*: similar; the cell-spot silvery white, the lunules of the median line touching it; the whole of the anal area below median vein beyond outer line snuff-brown.

Underside straw-yellow, with all the markings pale purplish. Face, palpi, vertex, and antennae creamy yellow; thorax in front snuff-brown; patagia yellowish dusted with red and brown scales; abdomen pale yellow, with brown dorsal patches: the first two segments almost wholly snuff-brown, like the centre of thorax.

Expanse of wings: 26 mm.

Two ♂♂ from Milne Bay, British New Guinea, December 1898 (A. S. Meek).

#### 48. *Chrysolene miniosa* sp. nov.

*Forewings*: bright blood-red, slightly varied with yellow; a slight yellow line near base, most distinct on inner margin; a sinuous postmedian much interrupted line; cell-spot dark brown-red; costal area duller red; hindmargin narrowly yellow except at vein 4, where the red touches the margin; fringe yellow.

*Hindwings*: the same, but the lines not indicated; the cell-spot elongated, oval.

Underside duller red. Head, thorax, and abdomen like wings.

Expanse of wings: 22 mm.

One ♂ from Penang, January 1897 (Curtis).

Also from N. China, in the British Museum Collection.

#### 49. *Craspedia exangulata* sp. nov.

*Forewings*: bone-colour, the costa and lines greyish ochreous; first line obscure, curved, at one-third; median line from quite two-thirds of costa to middle of inner margin, irregularly denticulate, and with one acute tooth outwards on vein 6; outer line from costa at four-fifths to three-fourths of inner margin, similarly denticulate, the teeth marked with blackish, especially that on vein 6; subterminal and submarginal interrupted greyish ochreous lines, the subterminal with acute angle on vein 6 reaching hindmargin; fringe bone-colour; marginal and discal spots distinct, black.

*Hindwings*: without first line; cell-spot large.

Underside greyish tinged; cell-spots, outer line, and marginal spots distinct. Face and palpi blackish above, bone-colour below; vertex, thorax, and abdomen bone-colour; collar rufous.

Expanse of wings: 18 mm.

One ♂ from Milne Bay, British New Guinea, December 1898 (Meek).

Akin to *C. desita* Wlk., but paler, and with broader, shorter wings.

#### 50. *Craspedia nigrocellata* sp. nov.

*Forewings*: bone-colour, with minute black atoms; costa and lines dull grey; first line, from quite one-third of costa to barely one-third of inner margin, marked

also by aggregations of black atoms on the veins; median shade obscure, denticulate; the whole basal half of wing as far as this shade more or less suffused with dull grey; outer line thread-like, lunulate, the teeth externally marked by blackish vein-dots; submarginal line pale, distinct, between two dull grey shades, and forming a sinus inwards opposite cell and on submedian fold; marginal spots black, distinct; fringe colorous; cell-spot a round black annulus.

*Hindwings*: the same, without first line.

Underside paler; only the outer line and marginal dots expressed. Palpi and face black; vertex, shoulders and antennae, bone-colour; thorax and abdomen the same, but both thickly sprinkled with black atoms.

Expanse of wings: 21 mm.

One ♂ from Dammer Island, December 1898 (H. Kühn).

#### 51. *Craspedia ocellata* sp. nov.

*Forewings*: dull whitish, finely dusted with dark atoms; costa tinged with grey; the lines grey, diffuse, thickened on costa, sometimes ochreous tinged; first at one-fourth, slightly dentate on subcostal and median veins; median strongly dentate, outcurved beyond cell and inflected below; cell-spot large and blackish, preceded by a curved grey line, but surrounded by pale scales so as to appear ocellated; exterior line at three-fourths, finer and denticulate, marked by black dots on veins externally, and inflected beyond cell and on submedian fold; space between it and the pale submarginal line filled up by a lunulate grey fascia, which is interrupted beyond cell and on submedian fold; a row of black marginal lunules; fringe colorous, with a broad darker interrupted line near base.

*Hindwings*: the same, but without first line.

Underside smooth; grey in forewings, paler in hindwings, with dark cell-spots; fringe paler beyond a slightly darker basal line. Face and palpi blackish; vertex white; thorax and abdomen like wings.

Expanse of wings: 19 mm.

A series from Tambora, Sambava, April—May 1896, 2500—4000 feet (Doherty.)

Worn specimens appear very much whiter.

#### 52. *Craspedia spissitarsata* sp. nov.

*Forewings*: ochreous, thickly but very finely dusted with blackish; costal edge blackish from base; the lines dark grey; first at one-fourth, curved, rarely plain; second and third nearly parallel to one another from three-fifths and three-fourths of costa to three-fifths and five-sixths of inner margin respectively, both angled on vein 6, the latter marked by distinct black vein-dots, and slightly bent outwards below; submarginal line pale, very indistinct; marginal spots black, linear; cell-spot black, distinct; fringe ochreous.

*Hindwings*: similar, but without first line.

Underside ochreous, without dusting, the forewings slightly grey-tinged; the two outer lines grey. Face and palpi blackish; vertex and shaft of antennae white; collar brownish; thorax and abdomen ochreous speckled with fuscous; hind-tibiae and tarsi of ♂ enormously thickened and flattened, containing an expansile tuft of thick dark grey down.

Expanse of wings: 27 mm.

One ♀, seven ♂♂, from Loeboc Rajah, W. Sumatra, April—May 1897 (Ericsson).

53. **Dizuga sordida** sp. nov.

*Forewings*: dingy greyish ochreous, with traces of lines at one-fourth and three-fourths indicated by dark vein-dots; a black cell-dot and row of black marginal dots; submarginal line indistinctly paler; fringe concolorous.

*Hindwings*: similar, but somewhat darker.

Head, thorax, and abdomen like wings; face shining white; palpi white.

Expanse of wings: 19 mm.

One ♂, two ♀♀, from Rossel Island, Louisiade Archipelago, February 1898 (Meek).

54. **Eois (?) rufula** sp. nov.

*Forewings*: rufous-ochreous, finely and thickly dusted with darker rufous, the lines nearly vertical: first from beyond one-third of costa to one-third of inner margin, slightly waved; median from beyond middle of costa to middle of inner margin, dentate; outer line from three-fourths of costa to two-thirds of inner margin, distinctly dentate; all these deeper rufous, the last followed by a paler band; submarginal pale, waved, between darker rufous shades; marginal line slightly darker, interrupted at the veins; fringe concolorous; cell-spot rufous.

*Hindwings*: similar.

Underside uniform ochreous flesh-colour. Head, thorax, and abdomen rufous; vertex white; collar deep rufous.

Expanse of wings: 18 mm.

Three ♀♀ from Tugela, Solomon Islands (Woodford).

Hind-tibiae of ♀ with terminal spurs only.

55. **Erythrolophus bipunctatus** sp. nov.

*Forewings*: pinkish stone-colour, dusted with fine grey and blackish scales; the lines grey; first curved, at one-fourth, marked by black dots on the veins; median from two-thirds of costa to middle of inner margin, regularly dentate; outer line at five-sixths, dentate, the teeth marked by black points on veins, that on vein 6 approaching hindmargin; a row of triangular black marginal spots; fringe concolorous, with a line of grey scales near base; cell-spot black.

*Hindwings*: similar; but the cell-mark formed of two snow-white spots edged with black scales; the fringe with minute black dots at base beyond veins.

Underside grey, suffused with rosy, especially in and below cell; the lines all dark grey. Face and palpi dark brown-red; vertex and antennae whitish; thorax and abdomen like wings; abdomen with black dorsal spots, and two on basal segment continuing the inner line of hindwings.

Expanse of wings: 30 mm.

One ♂ from Milne Bay, British New Guinea, December 1898 (A. S. Meek).

Resembles *Discoglypha hamptoni* in the cell-spot of hindwings, but that has different antennae.

56. **Hemipogon simplex** sp. nov.

*Forewings*: dingy greyish ochreous, entirely without markings; fringe concolorous.

*Hindwings*: darker, dark grey towards anal angle, where the fringes are the same.



Underside slightly yellower ; hairs of hindwings thickened and tufted towards anal angle, causing a slight folding under of the fringe there.

Head, thorax, and abdomen concolorous.

Expanse of wings : 15 mm.

One ♂ from Sudest Island, April 1898 (Meek).

Both the costa and inner margin of hindwings are slightly concave, the hindmargin being convex.

#### 57. *Leptomeris postlineata* sp. nov.

*Forewings* : white, with exceedingly fine black atoms ; no antemedian lines ; cell-spot small, black ; four postmedian lines ochreous-grey ; first from two-thirds of costa to beyond middle of inner margin, perfectly straight and oblique ; the outer line and two submarginal lines irregularly waved, the inner of the submarginal lines the thickest of the four ; minute black marginal dots at the ends of the veins ; fringe white.

*Hindwings* : the same, without the cell-spot.

Underside white, without markings.

Vertex, top of face, upperside of palpi and forelegs rufous ; rest of face, collar, thorax, and abdomen white.

Expanse of wings : ♂ 26 mm. ; ♀ 30 mm.

A pair marked simply India.

In the ♀ the lines are all finer, and the outer (second) line is altogether wanting.

#### 58. *Plocucha cristata* sp. nov.

*Forewings* : pale ochreous, slightly dusted with darker ; the costa at base marked with black-brown ; first line near base, marked by black vein-dots ; an indistinct curved central shade ; outer line from three-fourths of costa to two-thirds of inner margin formed of blackish dots on veins, parallel to hindmargin ; submarginal line obscure, between two darker incomplete shades ; marginal spots large, black ; fringe concolorous ; the basal end of the costal flap black-brown.

*Hindwings* : the same, the basal line marked by black dots in a straight line ; median shade more distinct ; cell-mark large, angulated, with a thick black edge.

Underside pale ochreous, without any markings. Head, thorax, and abdomen ochreous, abdomen with black dorsal spots. Face and palpi brownish red.

Expanse of wings : 35 mm.

One ♂ from Tugela, Solomon Islands (Woodford).

The costa of forewings is strongly shouldered at two-fifths from base, the middle third of costa being occupied by a thick scaly fold, the outer portion of which reaches to below middle of cell. The venuration is abnormal ; the cell is only one-fourth of the length of the wing ; the discocellular vertical ; the first median rises at one-half, the second and third are stalked ; radials normal, but the upper one slightly bent beyond cell ; veins 7 and 8 are stalked from one-half of cell, and somewhat distorted ; 10 and 11 are stalked, and both much thickened, from near base ; 9 apparently absent ; 10 and 11 run into the shoulder, 7 and 8 to apex.

59. *Perixera ampligutta* sp. nov.

In Nov. Zool. III. p. 376, I made this form an aberration of *P. pallida* Moore. I have since seen the same form from St. Aignan and other islands, and again lately from Milne Bay, British New Guinea. They are uniformly smaller than the type form, and the discal spot of hindwings is never variable in shape, so that I am forced to consider them a distinct species.

60. *Perixera grisea*.

*Pisoraca (?) grisea* Warr., Nov. Zool. V. p. 427 (♀).

The type ♀ was referred to *Pisoraca* with a query, from its great resemblance to *Pisoraca sordidata* Warr. It must, however, be transferred to *Perixera*, as the comparison of a ♂ from Milne Bay, British New Guinea, shows. This specimen, sent by A. S. Meek, and dated November 1898, agrees exactly in size and markings with the ♀. *P. sordidata*, which also comes from New Guinea (Humboldt Bay), is larger, 34 mm. as against 30 mm., and with a more ochreous ground-colour.

61. *Perixera multipunctata* sp. nov.

*Forwings*: dull reddish grey, the tint being due to very fine red dusting on a pale grey ground: all the lines except the median represented by rather large black spots on the veins: two black dots at base, on the median and submedian veins respectively: six black spots beyond, arranged in series of three, the middle one in each series farthest from base: in the first series one above subcostal vein, on median vein, and on inner margin: in the second, one on subcostal vein, one in cell, and on submedian fold: discal spot ocelloid, consisting of a large black spot at each end of discocellular, united by fine black lines; median shade zigzag, clearly marked, nearly touching cell-spot, and forming outward angles on veins 1, 3, and 4; outer line at three-quarters, twice sinuate inwards, the spots on vein 5 and on submedian fold nearer the base: subterminal line close beyond, indistinct, forming cloudy blotches below costa, beyond cell, and above inner margin; submarginal and marginal series of black spots: fringe concolorous.

*Hindwings*: similar: the discal ring with white centre, and only four black spots near base.

Underside of both wings dull red, the marginal spots expressed, the others all showing through. Face and palpi red above, paler beneath, vertex and antennae pale: thorax and abdomen like wings; thorax with a black spot in front, patagia with a large black spot in middle: abdomen with dorsal black spots, and the anal segments with black rings; basal segments laterally red.

Expanse of wings: 28 mm.

One ♂ from Milne Bay, British New Guinea, December 1898 (A. S. Meek).

The hindwings are bluntly elbowed at vein 4; the hind femora are sinuous, with a deep reddish tuft of hairs.

*Problepsiodes* gen. nov.

Differs from *Problepsis* Led., in the structure of the ♂ antennae; these are armed with long curling fascicles of cilia, instead of being pectinated.

Type: *Problepsiodes conpuctera* Warr. (*Problepsis*).

62. *Problepsiodes argentisquama* sp. nov.

*Forewings*: white; the costa ochreous-grey for two-thirds from base, the costal edge blackish; a large fig-shaped discal patch, ochreous-fulvous externally, mixed with grey and blackish internally, traversed near its edge by a line of metallic silvery scales; the discocellular in the centre followed by a straight line of similar scales toothed along the veins; a patch of silvery scales at base beneath the median vein; postmedian line ochreous, followed by a curved series of grey lunules and another finer ochreous-grey line before the margin; fringe white, with a faint grey median line.

*Hindwings*: with an oval ochreous-fulvous discal patch reaching from vein 6 to the submedian fold, its edges traversed by a line of silvery scales not connected above; a dark patch below it on inner margin; patches of silvery scales along veins 1, 2, and 3; outer lines as in forewing; a fine ochreous marginal line, bent at ends of veins 4 and 6.

Underside with the discal markings, a postmedian diffuse shade, and the costa of forewings smoky grey. Head blackish, thorax and abdomen white.

Expanse of wings: 30 mm.

One ♂ from Penang, January—April 1898 (Curtis).

63. *Ptochophyle laeta* sp. nov.

*Forewings*: yellow, thickly dusted with reddish, and along the costa with fuscous strigae; the costal area grey-tinged; basal line hardly marked; central line blurred, greyish, slightly outcurved round the dark cell-spot; outer line reddish fuscous, parallel to hindmargin, thickened beyond cell and on submedian fold, and there joined by a dark cloud to hindmargin; a row of reddish marginal spots between the veins; fringe yellow with minute red dots beyond veins.

*Hindwings*: with a round snow-white cell-spot on a blurred grey central line; outer line curved; a large dark reddish fuscous blotch at anal angle.

Underside dull yellowish, with the lines and markings rosy. Palpi reddish; face brownish red; head, thorax, and abdomen yellowish.

Expanse of wings: 22 mm.

One ♂ from Tambora, Sambava, low country, April, May 1896 (Doherty).

Also from Dongala, south of Palos Bay, Celebes.

64. *Ptychopoda sublactifera* sp. nov.

*Forewings*: pale olive-ochreous; first and second lines very fine, at one-third and two-thirds, parallel to hindmargin and slightly crenulate, starting from black costal dots; a faint submarginal and subterminal shade; cell-spot and marginal spots minute, black.

*Hindwings*: without first line.

Underside without lines; the hindwings of the ♂ clothed with rather coarse flaky white scales. Head, thorax, and abdomen concolorous; face and palpi dark brown.

Expanse of wings: 17 mm.

Seven ♂♂, two ♀♀, from Rossel Island, February, March 1898 (Meek).

Closely resembling *P. actiasaria* Wlk.

65. *Ptychopoda subrubellata* sp. nov.

*Forewings* : glistening, olive-ochreous ; the lines darker, and sometimes the veins towards the hindmargin ; costal region dusted with fine reddish scales, the costal edge red : the inner, median, and outer lines at even distances, starting from dull purplish costal spots at one-third, one-half, and two-thirds respectively, the median and outer slightly waved or denticulate, and all three, when the insect is fresh, marked with rufous ; subterminal and submarginal darker shades ; fringe concolorous, with slight rufous spots at ends of veins ; cell-spot rufous.

*Hindwings* : the same, without first line.

Underside of forewings, except the fringe and inner marginal area dull red ; of hindwings dull yellowish, with two curved submarginal reddish bands. Face, palpi, and forelegs reddish ; vertex pale ochreous ; collar reddish ; thorax and abdomen ochreous ; hind-tibiae thickly tufted, ochreous and reddish.

Expanse of wings : 14 mm.

Three ♂♂ from Milne Bay, British New Guinea, December 1898 (A. S. Meek). Closely related to *Pt. sericeipennis* Warr., from Fergusson Island.

66. *Symmacra inconspicua* sp. nov.

*Forewings* : grey, dusted with darker ; the lines very obscure, and marked by black vein-dots : first at one-quarter, curved ; second at five-sixths, the teeth on veins 4 and 6 slightly prominent ; an indistinct dark median shade ; cell-spot black ; marginal line blackish, suberulate ; fringe pale ochreous-grey, with a blackish spot at base beyond veins.

*Hindwings* : similar, but the cell-mark linear, black, ending at each end of discocellular in a snow-white dot.

Underside uniform dark cinereous ; the outer and marginal line shown. Face and palpi dark brown ; vertex white ; thorax and abdomen grey.

Expanse of wings : 24 mm.

One ♀ from Milne Bay, British New Guinea, December 1898 (A. S. Meek).

In this example vein 11 of forewing anastomoses at a point only with 7, 8, 9, 10, not strongly as in the type species.

## SUBFAMILY TRICHOPTERYGINAE.

67. *Carige absorpta* sp. nov.

*Forewings* : pale ochreous, finely dusted with brownish ; a curved brown-grey line at one-third, and another at two-thirds, both slightly and irregularly crenulate ; fringe glossy brown-grey ; a brown cell-spot.

*Hindwings* : without first line.

Underside similar, but more thickly dusted with brownish. Head, thorax, and abdomen like wings.

Expanse of wings : 30 mm

Numerous examples from Japan.

Forewings with apex little produced ; hindmargin obtusely bent at vein 4.

Hindwings with hindmargin excised between veins 4 and 6.

68. *Holorista marginepunctata* sp. nov.

*Forewings* : pale glossy ochreous, crossed by a succession of uniformly disposed darker ochreous lines, fifteen in number, with pale shining scales between them ; those forming the edges of the central fascia and the lines beyond marked on costa by five blackish dashes ; a pair of contiguous dark spots along margin at the ends of the veins ; fringe concolorous.

*Hindwings* : pale ochreous with the terminal lobe dark fuscous.

Underside uniform rufous-ochreous. Head, palpi, and abdomen ochreous ; the thorax greener ; apical segments of abdomen greenish grey ; antennae black, annulated.

Expanse of wings : 30 mm.

One ♂ from Negros, Philippine Islands, March—April 1896 (J. Whitehead).

In the fresh state, the ground-colour is probably pale green and the lines darker green, the tints recorded being due to fading.

69. *Hypocometa rufulata* sp. nov.

Differs from *H. clauda* from India in the black markings being much reduced and replaced by dark green ; the central space greener, and the cell-spot less conspicuous ; hindwings paler, whitish along costa, rufous-grey towards hindmargin ; antennae and abdomen greenish ochreous, without any black markings. Underside of both wings greenish ochreous-grey with a rufous tinge towards margin, the dark and pale markings of the upper side showing through.

Expanse of wings : 40 mm.

Two ♀ from S. Flores, October 1896, dry season (Everett).

70. *Sauris nitidula* sp. nov.

*Forewings* : pale shining green ; first line close to base, marked with purplish throughout, and thickened at costa ; followed by two waved olive-green lines ; central fascia with its inner band double at costa and marked with purplish grey throughout, angled inwardly in cell and on submedian fold ; the outer band consisting of three dentate green lines, marked with purplish grey on costa and below the median to vein 1, the outside two becoming confluent below middle ; centre of fascia silvery green with a black discal spot ; a pale silvery green band beyond central fascia, traversed by a faint green line and succeeded by a waved green line which below vein 6 is developed into five purplish black and prominent blotches, the minutely pointed ends of which fit into the teeth of the outer edge of a marginal grey-green fascia traversed by the pale veins, which have a large purplish spot at their extremities ; fringe grey-green, with a pale spot beyond the black marginal spots.

*Hindwings* : grey.

Underside dark olive-grey ; costa of forewings with a small dark triangle at middle. Head, palpi, and thorax greenish ; abdomen ochreous-grey ; antennae greenish grey, ligulate ; the upper edge roughened.

Expanse of wings : 24 mm.

One ♂ from Milne Bay, British New Guinea, February 1899 (Meek).

Distinguished from *abnormis* Moore, to which it is most allied, and from *nigrivincta* Warr., by the grey-green, not black, antennae, the smaller size, and pale outer band.

## SUBFAMILY TEPHROCLYSTHINAE.

71. *Opistheploce rufula* sp. nov.

Like *Opistheploce cinerea* Warr., from Batehian, but the ground-colour rufous-ochreous, the lines and shades brown. Hindwing with a dark antemedian and postmedian brown line.

Underside ochreous with the shades black.

Expanse of wings : 18 mm.

One ♂ from Milne Bay, British New Guinea, January 1899 (Meek).

72. *Tephroclystia basichlora* sp. nov.

*Forewings* : with a narrow basal area, an exterior fascia and an oblique streak from apex pale green; the rest of the wing reddish fuscous; a dark spot on costa in the green basal area, which towards inner margin is edged with white; central fascia broad, crossed by eight darker lines all angled on subcostal, the space between the first and second and between the fourth and fifth darkened to form an internal and median band; the outer edge forming a bluntly rounded projection towards hindmargin between veins 3 and 4, then strongly inflected; the pale green postmedian band which follows it widened on inner margin and traversed by a darker line which becomes blackish at inner margin; the internal edge of the green band next the central fascia whitish; the green band is followed below costa by three or four black wedge-shaped marks with paler edges; a row of black marginal marks; fringe reddish fuscous, with distinct pale greenish flecks beyond the dark marks.

*Hindwings* : cloudy reddish fuscous, with black marginal line; fringe as in forewings. A curved paler postmedian fascia is faintly traceable.

Underside dark grey, with all the markings reproduced

Face, palpi, vertex, and thorax pale green; the palpi fuscous-tinged towards the tips; abdomen darker, grey-green, with anal segment ochreous, probably green when fresh.

Expanse of wings : 22 mm.

One ♂ from Negros, Philippine Islands, March—April 1896 (Whitehead).

Allied to *chlorophora* Swinh., and *biviridata* Warr.

73. *Tephroclystia olivacea* sp. nov.

*Forewings* : shining olive-green, the markings deeper green; the green darkest on costa and inner margin; a basal patch, a broadish antemedian fascia, constricted in cell, a narrower postmedian fascia, outcurved in middle, and a duller submarginal fascia; the edges of all these fasciae are darker and are margined narrowly with a pale and then a dark fine line; marginal line fine, black; fringe green.

*Hindwings* : cinereous brown, with faint traces of two or three curved lines.

Underside greyish ochreous towards base, becoming darker grey towards hindmargin, with the lines still darker; hindwing with the lines distinct. Head and thorax olive-green; palpi pale green above, ochreous below; abdomen ochreous at base and on anal segments, blackish between, the segments finely edged with pale.

Expanse of wings : 24 mm.

One ♀, seven ♂♂, from Milne Bay, British New Guinea, November 1898—February 1899 (Meek).

The costa of forewings is slightly rounded near base.

## SUBFAMILY HYDRIOMENINAE.

74. *Camptogramma squamulata* sp. nov.

*Forewings* : grey, thickly dusted with dark grey, so as to present a somewhat mealy appearance; basal patch and central fascia darker; edge of basal patch faintly waved, from nearly one-third of costa to one-fifth of inner margin; a similar line nearer base; inner edge of central fascia parallel, but slightly angulated on subcostal; outer edge irregularly waved, bent on veins 6 and 4, from three-fourths of costa to two-thirds of inner margin, preceded by three dark waved lines; the fascia is preceded and followed by a similarly waved pale band with a dark line through it; submarginal line finely waved, pale, preceded by two dark shades with a paler one between them; marginal line black, waved, interrupted at the veins; fringe dark grey, with darker median line; cell-spot small.

*Hindwings* : similar, without basal lines.

Underside dark grey, dusted with white scales, with the edges of the central fascia showing as dark lines. Head, thorax, and abdomen concolorous.

Expanse of wings : 22—24 mm.

Two ♀ ♀ from Australia, without more precise locality.

The hindmargin of hindwings is slightly excised between veins 4 and 6. In the second example all the wings are nearly unicolorous and the markings very indistinct.

75. *Glaucopteryx indecora* sp. nov.

*Forewings* : pale grey, with a rufous tinge; the markings fuscous-brown; the basal patch and central fascia darkest; basal patch containing three curved dark fuscous lines, the central fascia four or five waved lines; edge of basal patch and inner edge of fascia curved, outer edge of fascia prominent at vein 6, and with two teeth at veins 4 and 3, incurved beyond cell, darkest towards costa; submarginal line indistinct, pale and waved, with a double darker patch preceding it beyond cell; marginal line crenulate, blackish; fringe reddish grey; the paler spaces on each side of the central fascia with a few pale scales in places and traversed by obscure reddish grey lines.

*Hindwings* : dull cinereous, darker towards inner margin, where there are traces of waved grey transverse lines; marginal line blackish, crenulate; fringe dark grey.

Underside dull cinereous, slightly rufous-tinged, with faint indications of some of the lines; both wings with dark cell-spots; head and thorax reddish brown; abdomen wanting.

Expanse of wings : 32 mm.

One ♂ from Amurland, without further locality.

*Phoenissa* gen. nov.

*Forewings* : triangular, broad; costa strongly arched near base and convex before apex, incurved between; hindmargin obliquely curved; anal angle distinct.

*Hindwings* : broad, the hindmargin fully rounded; anal angle square.

Abdomen of ♂ with the anal claspers exerted. Antennae of ♂ lamellate, faintly pubescent; of ♀ simple; palpi short, porrect, second joint roughly haired beneath.

terminal joint pointed, small; tongue and frenulum present; hind-tibiae with four spurs.

*Neuration*: forewings, cell nearly half as long as wing; discocellular angulated, the lower arm oblique; first median at four-fifths, second close before end of cell; radials normal; 7, 8, 9, stalked from upper angle; 10 and 11 stalked from four-fifths, 10 anastomosing with 8, 9; 7 and 11 from close before apex of areole. Hindwings with discocellular oblique, radial from the centre; the two subcostals stalked; medians as in forewings.

Type: *Phoenissa brephos* Oberth. (*Odezia*).

Related to *Eulype* Hüb., having the areole single; superficially like the New Zealand *Dasyaris* and *Notoreas*, from which it is, however, structurally distinct.

#### SUBFAMILY DEILINIINAE.

##### **Laophila** nom. nov.

*Lomographa* Meyr. (non Hübner), *Proc. Linn. Soc. N. S. Wales* (2), VI. p. 633 (1891).

Meyrick places the two Australian species *spodina* and *isocyma* under *Lomographa* Hüb. But Hübner in the *Verzeichniss*, p. 311, gives four species of *Lomographa*, viz:—

- 3002. *L. taminaria* Schiff.
- 3003. *L. permutataria* Hüb.
- 3004. *L. renolaria* Hüb.
- 3005. *L. laevigaria* Schiff.

Of these the first, the proper type of *Lomographa* = *Bapta bimaculata*, has simple antennae in the ♂: the second is a *Stegania*, with short pectinations; the third, which is identical with the fourth, is a *Ptychopoda*, a genus of *Sterrhinæ*. With no one of these is either *spodina* or *isocyma* congeneric.

##### 76. **Leucetaera subfuscata** sp. nov.

*Forewings*: shining silky cream-colour, dusted with fine dark atoms; costa and fringe yellowish; cell-spot dark brown, edged with yellowish; a pale yellowish submarginal line from below costa shortly before apex to three-fourths of inner margin, outwardly marked by a few dark scales on each vein.

*Hindwings*: with the line curved, parallel to hindmargin throughout.

Underside shining, suffused throughout with pale greyish fawn-colour. Face and palpi black-brown; vertex, thorax, and abdomen like wings.

Expanse of wings: 34 mm.

One ♂ from Mt. Mada, Buru (3000 ft.), September 1898 (Dumas).

The hindwings have a distinct fovea at base of cell.

##### 77. **Parasynegia parumnotata** sp. nov.

*Forewings*: straw-colour, thickly speckled with rusty brown; an indistinct curved brownish line at one-fourth, starting from a short costal streak near base; a large roundish brown cell-spot; outer line from costa at three-fourths, fine and dentate, vertical to vein 4, then oblique and thicker to inner margin before middle, closely preceded throughout by a thick shade, the two forming a double line; a slight brownish streak from the angle at vein 4 to hindmargin intersecting a



thin brown nearly straight subterminal line ; a marginal row of dark spots between the veins ; fringe paler.

*Hindwings* : with a thick brown line near base, the continuation of the double outer line of forewings ; a brown central line, dentate externally, with the small black cell-spot on its inner edge ; a fine dentate postmedian line ; and a thin brown submarginal line, curved at vein 6 ; marginal spots and fringe as in forewings.

Underside paler, all the markings greyer. Head, thorax, and abdomen straw-colour ; tips of palpi and top of face brown ; and a brown bar on basal segment of abdomen.

Expanse of wings : 40 mm.

One ♀ from Iawas, N. Borneo, April 1892 (Everett). Allied to *pluristriaria* Wlk.

#### SUBFAMILY BRACCHINAE.

##### 78. *Bursada flavannulata* sp. nov.

♀ *Forewings* : black, with a yellow blotch of variable shape in the apical third, reaching from subcostal vein to below vein 3, directed towards hindmargin above anal angle.

*Hindwings* : yellow, with broad black costal and hindmarginal border, which runs up half-way along inner margin, ending bluntly and diffusely.

Underside the same, but the black border of hindwings runs from middle of costa to just above anal angle. Head, thorax, and abdomen black ; the abdomen with the basal segment yellow.

In the ♂ the costa of forewings is straighter and the wing narrower than in ♀ ; the yellow blotch shorter and broader ; in the hindwings the black border is narrower, and ends in a point on veins 2 and 1.

Expanse of wings : ♂ 26—30 mm. ; ♀ 32—34 mm.

Three ♂♂, four ♀♀, from Milne Bay, British New Guinea, November 1898—February 1899 (Meek).

##### 79. *Bursada obnubilata* ab. *inversa* nov.

*Forewings* : dull yellow, with the markings brownish fuscous ; the costa brown to one-fourth from base, and an irregular brown blotch on inner margin ; a brown fascia bent at middle from beyond one-third of costa to before middle of inner margin ; a much broader fascia from two-thirds of costa to anal angle, the inner margin between the fasciae brown ; the hindmargin irregularly brown ; fringe brown.

*Hindwings* : with a blotch at apex, two at anal angle, a double blotch on middle of inner margin, some small spots at base, a small round cell-spot, and the fringe brown.

Underside with the markings reddish. Head and thorax brown ; collar and abdomen yellow, the latter with brown segmental rings.

Expanse of wings : 44 mm.

One ♂ from Mt. Mada, Buru (3000 ft.), September 1898 (Dumas).

Although at first sight so different in appearance, I consider this specimen to be a pale local form of *obnubilata* Warr., also from Buru, to which it stands in much the same relation as *B. albovittata* Pag., from South Celebes, does to *B. jidonioides* Wlk., from North Celebes.

**Bursadopsis** gen. nov.

Agreeing in all points with *Barsada* except in the structure of the antennae. In the ♂ the pectinations, though ciliated themselves, are very much finer than in *Barsada*; in the ♀ the antennae are *not* pectinated at all, but merely sharply serrate beneath.

Type: *Bursadopsis praeflavata* sp. nov.

80. **Bursadopsis basalis** sp. nov.

*Forewings*: deep velvety brown, with a small orange spot in base of cell, and a large orange blotch beyond middle, not touching costa, much larger in ♀ than ♂, in the ♂ not reaching below vein 2, in the ♀ with a short tail below that vein; fringe concolorous.

*Hindwings*: with the base and hindmargin broadly, the central third of costa narrowly brown; the rest of wing orange; middle third of inner margin with the fringe orange.

Underside like upper.

Head, thorax, and abdomen brown; palpi, two spots on prothorax, some lateral spots on abdomen, and terminal sixth of antennae yellow; hind-tarsi wholly yellow; fore- and mid-tarsi yellow spotted with brown.

Expanse of wings: ♂ 34 mm.; ♀ 38 mm.

Two ♂♂, two ♀♀ from Laiwui, Obi, September 1897 (Doherty).

81. **Bursadopsis praeflavata** sp. nov.

♀ *Forewings*: velvety brown-black, crossed by an orange band of uniform breadth extending from just before middle to two-thirds of costa, rounded off before reaching the anal angle, and joining inner margin at three-fourths as a narrow projection; a minute yellow costal spot before apex; some yellow scales at hindmargin beyond cell and on submedian fold, produced as yellow spots in the otherwise concolorous fringe.

*Hindwings*: orange, with broad black marginal border with internally irregular crenulate edge from about middle of costa to above anal angle, the orange forming a somewhat rectangular projection in middle.

♂ with the orange band of forewings much reduced, not more than half as wide as in ♀, from costa just beyond middle, and not reaching below vein 2; the costal edge of the orange patch more thickly dotted with black than in the ♀; no yellow scales before hindmargin nor spots in the fringe, but the yellow dot before apex is present; in the hindwings the internal edge of the marginal border is less irregular, more uniformly curved.

Underside like upper, but the base of cell of forewings with some yellow scales. Head, thorax, and abdomen, above and below, and legs all black; sides of abdomen and inside of fore coxae yellow.

Expanse of wings: ♂ 26 mm.; ♀ 28—30 mm.

Four ♂♂, five ♀♀, from Sudest Island, Louisiade Archipelago, April 1898 (Meek).

In one ♀ the orange band of forewings above is narrower than in the rest, and rounded off as in the ♂♂, but below vein 2; on the underside, however, it agrees with normal ♀♀.

82. *Cosmethis basiflava* sp. nov.

*Forewings* : smoky slate-colour, the lines and markings purplish black ; two diffuse curved lines near base, followed by a pale slate-coloured fascia, which is whitish in the cell before the black cell-spot, which stands on a slightly curved darker slate-coloured line ; a purplish black curved line beyond this, nearly in middle, thickened on the veins, incurved at vein 2 ; a broad similarly curved blackish postmedian band ; a submarginal series of long black wedge-shaped blotches between the veins, interrupted between veins 3 and 4 by a white blotch extending from vein 8 to 3, the inner edge of which is vertical and straight, the outer diffuse, the blotch widening between veins 3 and 4 and passing into slate-colour ; hindmargin diffusely purplish black ; fringe dark slate ; a large dull yellowish patch at base between median and submedian veins, extending slightly beyond each.

*Hindwings* : without basal lines ; two thick straight purplish black bands, antemedian and median, enclosing the black cell-spot, the white blotch extending only from vein 6 to 3 ; two slight dull-yellow streaks on submedian fold, one before the antemedian, the other beyond the median band.

Underside dull smoky purple, the cell-spots large and darker ; the white blotches similar in both wings ; both wings with paler spaces before the cell-spots. Head, thorax, and basal segment of abdomen dull purplish slate-colour ; abdomen yellow ; pectus and legs all slate-colour.

Expanse of wings : 78 mm.

One ♀ from Great Kei, April 1898 (H. Kühn).

Distinguished from both *barbara* Cram., and *rosenbergi* Pag., by the absence of buff or yellow markings, except at base of forewings.

83. *Craspedosis flavimedia* sp. nov.

*Forewings* : black ; the middle third occupied by a broad orange fascia from costa that does not quite touch the anal angle : fringe black.

*Hindwings* : wholly black.

Underside like upper, but duller. Head, thorax, and abdomen all black.

Expanse of wings : ♂ 40 mm. ; ♀ 52 mm.

Four ♂♂, four ♀♀, from Milne Bay, British New Guinea, November 1898—February 1899 (Meek).

The orange blotch in the ♀ is paler and broader.

84. *Craspedosis sibilla* sp. nov.

*Forewings* : black, with a central curved white fascia from vein 6 to inner margin, before which it is narrower, and below the submedian vein with only the outer half white.

*Hindwings* : with the fascia broader and nearly reaching costa, its inner edge straight ; fringes black in both wings.

Underside duller black, with the white fascia not reaching below vein 2 and with slight dark striations. Head and thorax black ; abdomen black with yellow segmental rings ; face and pectus yellowish.

Expanse of wings : 48 mm.

One ♀ from Patani, Halmahera, November 1896 (Doherty).

Allied to *C. manda* Wlk.

85. *Craspedosis xanthosoma* sp. nov.

*Forewings* : unicolorous dark olive-brown, without any markings.

*Hindwings* : similar, with indications of blackish wedge-shaped blotches before hindmargin between the veins.

Underside grey-black, without any brown tinge. Head, thorax, and basal segment of abdomen like forewings, but less brown; abdomen yellow; legs blackish.

Expanse of wings : 70 mm.

One ♂ from Mt. Mada, Buru, 3000 ft., September 1898 (Dumas); another from Laiwui, Obi, September 1897 (Doherty).

86. *Xanthomima biquadrata* sp. nov.

*Forewings* : with the basal third orange, the costa and outer two-thirds black; the orange portion rectangular, its outer margin running straight from below one-third of costa to two-thirds of inner margin.

*Hindwings* : with the line separating the two colours nearly straight and just beyond the centre.

Underside the same; the black *not* running up along the costa. Head and collar black; thorax and abdomen orange.

Expanse of wings : 44 mm.

One ♂ from Little Kei (H. Kühn).

Differs from *X. seminigra* Warr., from Kei Toeal = Little Kei, in having the edges of the orange areas straight instead of curved; and the costa of hindwings beneath wholly orange as far as the black outer half.

## SUBFAMILY ABRAVINAE.

87. *Abraxas comminuta* sp. nov.

*Forewings* : white; the markings dark leaden grey tinged with fulvous; a large dark fulvous-tinged basal blotch, its outer edge twice curved; a blotch on middle of costa connected with an oval one on discocellular, touching three smaller and contiguous ones on veins 2, 3, 4; another in a line with the last three on vein 1, preceded by two more on the submedian fold and inner margin; a submarginal sinuous series of spots starting from a larger costal blotch, and ending in two short streaks before anal angle, which represent the usual blotch; apex, hindmargin, and fringe wholly dark, with a prominence basewards in the middle.

*Hindwings* : with the hindmargin and fringe dark; a submarginal series of spots on the veins, preceded by grey spots on inner margin and costa, which in one case are connected by spots on veins. All the spots and blotches contain a fulvous nucleus; that on the cell of forewings a fulvous pale centred annulus.

Underside like upper. Face and palpi yellow; head, thorax, and abdomen yellow spotted with black.

Expanse of wings : 39 mm.

Four ♂♂ from S. Flores, October 1896, dry season (Everett).

88. *Abraxas extralineata* sp. nov.

*Forewings* : semi-transparent dull whitish; costal edge and subcostal vein blackish throughout, the costal blackish only beyond first line, which is near base,

angled at its upper two-thirds, then oblique; the basal area within it yellow, with one or two small black spots; cell-spot blackish; second line close to hindmargin, curved near costa, then parallel to hindmargin as far as vein 1, thence to inner margin at middle; a marginal blackish line; fringe (probably) whitish.

*Hindwings*: with only the outer and marginal lines.

Underside the same as upper, but duller; the base hardly yellow. Head, thorax, and abdomen pale yellow; thorax and abdomen spotted with black; palpi blackish.

Expanse of wings: 48 mm.

One ♂ from Mt. Mada, Burn, 3000 ft., September 1898 (Dumas).

The costa of hindwing is strongly shouldered near base.

### 89. *Abraxas sesquilineata* sp. nov.

*Forewings*: pale cream-colour; the costa distinctly black; the subcostal vein slightly marked with black near base; first line black, at one-fourth, nearly vertical; second line from two-thirds of costa to three-fourths of inner margin, strongly out-curved to submedian fold, then vertical, black; followed by a third black line, curved regularly from costa to submedian fold and there stopping short; marginal line black; fringe blackish, with the tips pale; cell-spot black.

*Hindwings*: with a faint line near base; outer line from four-fifths of inner margin, separating almost immediately into two parallel curved lines of which the inner one is semi-obsolete beyond vein 6, and the outer stops short at vein 4; marginal line slightly lunulate.

Underside similar; a black spot near base of costa in each wing. Head, face, thorax, and abdomen yellow; the abdomen with rows of black spots; legs marked with smoky grey.

Expanse of wings: 54 mm.

One ♂ from Mount Mada, Buru, 3000 ft., September 1898 (Dumas).

## SUBFAMILY SCOTOPTERYGINAE.

### 90. *Scotopterix immundata* sp. nov.

*Forewings*: dingy grey, thickly covered with darker specks; all the markings indistinct; an obscure line at one-fourth, from a brown costal spot, followed by a diffuse cloudly waved shade a little before the middle preceding the dark cell-spot; exterior line from two-thirds of costa, below which it is bent, then quite straight to three-fifths of inner margin, marked by dark spots on the veins; marginal area rather darker, through which an indistinct pale submarginal line of spots can be traced, that between veins 3 and 4 larger and paler, and preceded by a darker cloud; fringe concolorous.

*Hindwings*: similar, without first line and with the second line curved.

Underside paler, less dusted; cell-spots black, distinct; outer line and submarginal shade expressed, most clear on costa; the pale spot between veins 3 and 4 of forewings plain, and the apex paler. Face and palpi black; thorax and abdomen like wings.

Expanse of wings: ♂ 40 mm.; ♀ 52 mm.

Two ♂♂, one ♀, from Beirut.

## SUBFAMILY BISTONINAE.

91. *Amraica recursaria* Wlk. ab. *semifusca*, nov.

*Forewings*: grey, peppered with black scales and tinged in places with ochraceous; the lines black; the whole of the central area between first and outer line suffused with brownish fuscous, the outer edge of the suffusion extended from angle of outer line to the apex.

*Hindwings*: with the same suffusion, the inner edge of submarginal line below costa also black-brown.

Face velvety black above, brown below.

Expanse of wings: 60 mm.

One ♀ from Dammer Island, November 1898 (H. Kühn).

I have referred this as an aberration to *A. recursaria*; but it may prove a constant local form. At first sight it appears very distinct.

## SUBFAMILY ASCOTINAE.

92. *Alcis* (?) *paucisignata* sp. nov.

*Forewings*: dull brownish ochreous, speckled and striated with blackish; first line at one-fourth, curved and indistinct; outer line fine, blackish, irregularly crenulate, at two-thirds. A small dark cell-spot, followed by an obscure median shade; marginal area beyond outer line filled up with brownish and finely striated with black, the apical area paler; fringe concolorous beyond a fine dark marginal line.

*Hindwings*: wholly suffused with brownish and speckled with black, except the narrow basal area, which remains paler.

Underside similar, but the ground-colour yellower, and the brown tints brighter; traces of a dark interrupted submarginal shade. Head, thorax, and abdomen like wings; face and palpi browner.

Expanse of wings: 35 mm.

One ♀ from the Gunung Ijan, Perak, March 1898 (2000—3000 ft.) (Butler).

Probably near *Alcis tenera* Warr., from India, but its exact position must remain doubtful in the absence of the ♂: veins 10 and 11 of forewings free.

93. *Calicha rufiplaga* sp. nov.

*Forewings*: almost black, with a slight rufous tinge; the lines black; first curved and double from about one-fourth of costa to near base of inner margin; second from three-fourths of costa to just beyond middle of inner margin, indented below costa and thickened to vein 6, followed on costa by a small ochreous mark; submarginal line only shown by the darker internal border, black at costa; it is preceded above vein 6 by a dull rufous blotch; an indistinct median shade; marginal line and fringe blackish.

*Hindwings*: with antemedian, postmedian, and submarginal black lines; cell-spot black.

Underside smoky black-brown; the cell-spots and exterior line black, and the rufous blotch showing through. Head, thorax, and abdomen all black.

Expanse of wings: 40 mm.

One ♂ from Stratfield, N. S. Wales (Kerslake).

Veins 10 and 11 of forewings short-stalked.

94. *Chogada vittata* sp. nov.

*Forewings* : white, sparsely dusted with black scales : first line at one-fourth, black and curved, preceded by two smoky shades, making the basal area as a whole dark ; second line from costa at three-fourths to two-thirds of inner margin, irregularly dentate lunulate, bent outwards beyond cell, then incurved, followed by a smoky dark shade ; submarginal line uniformly lunulate, preceded and followed by dark shades, the inner one blacker and regular, the outer interrupted below middle : fringe dark grey, with black marginal lunules at base ; cell-spot sometimes wholly black, sometimes with a pale centre ; generally a faint thin median line through it ; sometimes this line is thickened with a shade which fills up more or less the whole of the central space ; in these specimens all the other shades are thicker.

*Hindwings* : like forewings, without first line, the base itself smoky.

Underside smoky black, the discal spots large and velvety black, each preceded and followed by a whitish space. A small white spot at apex and below middle of hindmargin in each wing. Head, thorax, and abdomen whitish, speckled with grey ; abdomen generally with black basal ring.

Expanse of wings : 39 mm.

Four ♀♀ from Rossel Island, Louisiade Archipelago, February—March 1898 (Meek).

The species is nearest to *C. fuliginosa* Warr., from Engano.

95. *Darisa* (?) *marmorata* sp. nov.

*Forewings* : stone-grey, dusted slightly with black scales and mottled with numerous transverse grey strigae ; the costa with black spots at the origin of lines : first line from about one-fourth of costa to one-third of inner margin, angled outwards above and below the median vein and marked with black dots on the veins, the portion below submedian vein oblique outwards : second line (median) from a large black costal spot before middle to about middle of inner margin, interrupted, and marked by dark scales on the veins ; outer line from a similar costal blotch just beyond middle to two-thirds of inner margin, marked by blackish vein-spots, slightly excurved from vein 6 to 2, the portions of this and the median line below submedian vein oblique inwards ; this line is followed by a broad rufous-grey shade with denticulate edges on the veins, also starting from a dark costal spot ; submarginal line pale, obscure, but preceded by a curved series of short wedge-shaped black blotches between veins except between 4 and 5 : a marginal series of black spots ; fringe grey ; no cell-spot visible above.

*Hindwings* : with thick black curved antemedian and strongly denticulate black postmedian line ; a black linear cell-mark : the rest as in forewings, but the hindmargin very strongly denticulate.

Underside dull smoky grey, darker towards hindmargins where there is an obscure submarginal shade ; cell-spots in both wings black, linear, distinct. Head, thorax, and abdomen grey like wings ; abdomen with a short black lateral streak on basal segments ; face brownish grey.

Expanse of wings : 56 mm.

One ♀ from Brown River, British New Guinea, 1898 (Weiske).

Forewings with vein 11 out of 12 ; 10 anastomosing with 11 and again at a point with 9.

96. *Ectropis hypochromaria*.

*Forewings*: greenish ochreous, dusted with fine blackish atoms: the costa marked with very fine striae and black spots at the origin of the lines: first obscure, from costa at one-fourth to inner margin near base; outer line from two-thirds of costa to middle of inner margin, somewhat irregularly waved, incurved below median vein and forming an inward sinus on submedian fold, closely approaching a dark sinuous median shade which touches the ocelloid cell-spot; all three lines partially doubled by a dark shade, especially the outer line, the outer shade of which has a strongly marked dentate edge containing a dark blotch below vein 7, and running to costa at four-fifths; submarginal pale, waved, interrupted, with dark clouds before and beyond it, and a blackish blotch from it to hindmargin below vein 7; marginal spots black; fringe concolorous.

*Hindwings*: without first line: the median double line broader and diffuse, the shade beyond outer line forming a dark blotch on inner margin.

Underside dingy ochreous, with the markings and round cell-spots obscurely darker; a diffuse submarginal dark cloud. Head, thorax, and abdomen like wings; the abdomen with a black band at base.

Expanse of wings: 52 mm.

Two ♂♂ from Milne Bay, British New Guinea, February 1899 (A. S. Meek).

The pectus, femora, base of abdomen and anal segments are all thickly clothed with hair: the hind-tibiae much swollen, with a pencil of hairs, and four short spurs, the tarsi short.

97. *Ectropis rufibrunnea* sp. nov.

*Forewings*: reddish brown, varied with paler, and thickly black-speckled, especially along the veins; costa dotted with black: the lines marked mainly by black dots on the veins, and starting from larger blackish costal spots; first from one-fourth of costa to one-fifth of inner margin, followed by a slightly paler fascia; median line outcurved below costa, then oblique to one-third of inner margin; outer line from two-thirds of costa, outcurved at veins 6 and 5, then oblique and closely approaching median line on submedian fold, to middle of inner margin; submarginal line wavy, whitish, followed by a dark patch between veins 6 and 7, above which the apex is paler; fringe red-brown, a diffuse red-brown cloud on discocellular.

*Hindwings*: the same, but without first line, and with the basal area paler.

Underside dull cinereous, mottled with darker; both wings with large dark cell-spot and smoky dark submarginal fascia; costa of forewings ochreous strigulated with fuscous; the apex paler. Head, thorax, and abdomen like wings; palpi dark, with the tips pale; face dark brown, paler below; legs blackish with the joints ochreous.

Expanse of wings: 45 mm.

One ♂ from Mackay, Queensland.

Distinguished from the other species of the genus by its red-brown coloration and somewhat stouter build.



98. *Gasterocome subfasciata* sp. nov.

*Forewings*: pale brownish ochreous, varied with darker brown: the three lines indistinct, being lost in the brown fasciae accompanying them, but all three starting from concise black-brown costal spots at one-fourth, two-fifths, and two-thirds respectively; the lines are denticulate and run parallel to hindmargin: the shade preceding the submarginal line externally denticulate, and starting from a large brown costal blotch, which is followed on costa by two small blotches; a row of triangular dark marginal spots between the veins: fringe concolorous.

*Hindwings*: with pale ochreous base: a dark brown line at one-fifth: a distinct dentated dark postmedian line, approaching first line on inner margin, the included space darker brown containing a black cell-spot: the postmedian line is finely edged with pale and then a brown cloud: submarginal line and marginal area as in forewings.

Underside pale ochreous with grey striations; a brown-grey submarginal fascia, joining margin opposite cell: cell-spots and costal spots of forewing brown. Head, thorax, and abdomen brown and ochreous.

Expanse of wings: 36 mm.

One ♂ from Penang, April 1898 (Curtis).

The double tuft of hair beneath on the basal segment of abdomen is blackish and submetallic.

99. *Maidana pallidiplaga* sp. nov.

*Forewings*: pale greyish ochreous, thickly dusted with minute black atoms: the costa with dense blackish striae: first line at one-fourth, marked generally by black vein-spots; second line from three-fourths of costa to three-fifths of inner margin, slightly curved, marked also by black vein-dots: a straight oblique median shade from two-thirds of costa to middle of inner margin, sometimes hardly visible, at others strongly marked in blackish: cell-spot linear, blackish: submarginal line pale, indistinct, except when preceded by a dark dentate shade, but always forming a pale oval blotch between veins 3 and 4, and sometimes followed by a black spot below apex: a marginal row of black spots: fringe concolorous: the narrow space between median and outer lines is generally paler than the rest of the wing.

*Hindwings*: without first line: the postmedian denticulate.

Underside paler and greyer: with black cell-spots and denticulate postmedian line. Head, thorax, and abdomen concolorous with wings.

Expanse of wings: ♂ 40 mm.; ♀ 44 mm.

Two ♂♂ from Rossel Island, February—March 1898 (Meek); eight ♂♂, 2 ♀♀, from Sudest Island, April 1898 (Meek). The single typical ♀ is darker marked than the ♂♂, and in particular has the dark edging of the submarginal line more distinct both above and below. The other ♀ is so strongly marked as to require a distinct aberrational name.

ab. *fumipicta* nov.

Ground-colour yellow-ochreous, with the basal line and patch, the oblique median line, and marginal third beyond and including the outer line dark smoky fuscous: the costal area and a small oval patch between veins 3 and 4, as well as the extreme hindmargin ochreous: hindwings with the central band and marginal third smoky fuscous, the hindmarginal area, especially towards anal angle, slightly varied with ochreous.

**Microtome** gen. nov.

*Forewings*: narrow, the costa nearly straight, curved close to apex: apex bluntly rounded: hindmargin faintly excised between veins 6 and 8, below obliquely curved.

*Hindwings*: narrow: apex rounded off: hindmargin well rounded and subcrenulate: anal angle excised from vein 1.

Abdomen of ♂ long and slender: antennae bipectinated: forehead produced below: palpi thick and stout, oblique in front of face, terminal joint minute: tongue and frenulum present: hind-tibiae thickened, with four short spurs: forewing with distinct fovea.

*Neuration*: forewings, cell half as long as wing: discocellular bluntly angled: first median at three-fifths, second close before end of cell: radials normal: 7, 8, 9, stalked: 10 and 11 stalked. Hindwings with costal shortly approximated to subcostal: first subcostal nervule and second median close before ends of cell.

Type *M. trigonata* sp. nov.

100. **Microtome trigonata** sp. nov.

*Forewings*: pale ochreous, more or less dusted with fuscous and in parts suffused with ochraceous: the lines ochraceous, indistinct, and often obsolete, all starting from brown-grey spots on costa: first from one-fifth of costa to nearly one-third of inner margin, oblique outwards to subcostal vein, then vertical: median diffuse, slightly before middle, angled, like the first, then slightly oblique to near middle of inner margin: outer line fine, at two-thirds, sinuous and marked by dark vein-dots, closely followed by a darker line or shade which starts from costa just before apex: the space between this line and the median forms a pale costal triangle, suffusedly edged with ochraceous: marginal area ochraceous, through which the submarginal line is marked above the median by pale black-edged spots or lunules: fringe ochraceous.

*Hindwings*: paler, without any ochraceous suffusion: an obscure and diffuse antemedian shade, a curved slightly waved postmedian line, and a macular submarginal line: cell-spot brown, in one example large and round: the two lines are brown on inner margin.

Underside ochreous, speckled with ochraceous: the lines ochraceous and more distinct, the second on the hindwing double: the dark submarginal spots of forewings and cell-spot of hindwings larger and blacker. Head, thorax, and abdomen ochreous.

Expanse of wings: 34 mm.

Two ♂♂ from Rossel Island, February—March 1898 (Meek).

101. **Poecilalcis indigna** sp. nov.

*Forewings*: ochreous-whitish, speckled and suffused with pale fuscous and brown: the lines dark brown: first from one-fourth of costa to two-fifths of inner margin, bent above the median vein: second from two-thirds of costa to three-fifths of inner margin, outcurved above incurved below, denticulate and lunulate: the included space filled up with pale brown and containing a comparatively large dark cell-spot: submarginal line pale, indistinct, preceded by brownish clouds and followed beyond cell and at costa by brown shades: a row of elongated dark marginal spots: fringe ochreous.

*Hindwings* : worn : apparently with postmedian and submarginal lines.

Underside similar, with the markings obscure. Head, thorax, and abdomen ochreous ; face and palpi dark brown.

Expanse of wings : 26 mm.

One ♂ from Penang, March 1898 (Curtis).

Quite the smallest species of the genus.

#### 102. *Systema farinosa* sp. nov.

*Forewings* : whitish, powdered with grey ; the lines olive-fuscous, rather indistinct, darker on the costa : first near base ; second median, outcurved round the large dark cell-spot ; postmedian slightly angled on veins 6 and 4, submarginal formed of brownish lunules : an interrupted dark marginal line ; fringe concolorous.

*Hindwings* : with sinuous antemedian, postmedian and incomplete submarginal lines.

Underside dull grey. Head, thorax, and abdomen whitish, like wings.

Expanse of wings : 24 mm.

One ♂, one ♀, from Ron Island, July 1897 (Doherty).

Forewings without fovea ; veins 7, 8, 9, stalked : 10 and 11 coincident.

### SUBFAMILY SELIDOSEMINAE.

#### 103. *Casbia anomalata* sp. nov.

♀. *Forewings* : reddish fuscous, speckled with darker : the lines blackish fuscous, indistinct towards costa ; first from one-fifth of costa to one-fourth of inner margin, curved, preceded on inner margin by an orange-red blotch ; second (median) from middle of inner margin, parallel to first as far as median vein, then curved outwards towards middle of costa ; third from three-fourths of inner margin, sinuous, approaching second at costa ; fourth (submarginal) black and wavy, preceded by orange-red patches almost touching third line : a row of black marginal spots ; fringe concolorous : cell-spot ocelloid, dark with pale centre.

*Hindwings* : like forewings, but with a single dark antemedian line, and the other markings more indistinct.

Underside rufous-ochreous with a broad blackish marginal fascia. Head, thorax, and abdomen concolorous ; palpi dark fuscous.

Expanse of wings : 24 mm.

One ♀ from Woodlark Island, April 1897 (Meek).

Along with this ♀ is a ♂ captured at the same time and place, but not in such good condition, which probably belongs to the same species ; inasmuch, however, as it differs structurally from the ♀, I describe it separately. The forewings are longer and narrower ; the cell is quite half the length of the wing, whereas in the ♀ it is scarcely half as long ; in the ♂ therefore the ocelloid cell-spot is near to the third line, while in the ♀ it is just beyond the second : vein 2 rises at one-third from the base, instead of as in the ♀ at one-half, and there is no fovea. The markings, as far as they can be made out, are similar to those of the ♀. The hind-tibiae are not thickened, and have two pairs of slender spurs, much farther apart from each other than in the ♀ ; in both the palpi are perfect and longer than usual in the genus ; but while in the ♀ they are dark fuscous and closely scaled, in the ♂ they are pale reddish ochreous, and much longer, the second joint being

hairy, the third smooth and slender and bent at an angle with the second; the shaft of the ♂ antennae is white with the pectinations fuscous.

Expanse: 26 mm.

104. **Parametrodes aurantiacata** sp. nov.

♂. *Forewings*: deep yellow with orange-red strigae and suffusion; the costa with dark fuscous striae and ochreous intervals; first line diffuse, at one-fourth, orange-red; second at two-thirds, thicker, angled outwards at vein 4, and inwards on the submedian fold; followed by a white blotch beyond cell and on submedian fold; marginal area beyond suffused and thickly striated with orange-red; fringe concolorous; cell-spot red.

*Hindwings*: like forewings, but without first line.

♀ with the lines more defined; the red striae mixed with fuscous; the outer line followed by pale yellow instead of white blotches.

Underside duller; the outer line red and narrower; a diffuse fuscous marginal fascia. Head, thorax, and abdomen yellow, speckled with orange-red; the shoulders wholly red.

Expanse of wings: ♂ 26 mm.; ♀ 30 mm.

A pair from Sudest Island, April 1898 (Meek).

The hindwings of the ♂ are not so disproportionately large as in the type species, *dispar*.

SUBFAMILY SEMIOTHISINAE.

105. **Azata funebris** sp. nov.

*Forewings*: dark purplish grey, with very much less pale scaling than in *A. variegata* Warr.; the pale scales being restricted to the space between middle and outer lines; the costa dotted with yellow and fuscous purple; three dark brown transverse lines, finer and less wavy than in *variegata*, the outer preceded by yellowish scales; submarginal line hardly shown, except by a prominent pale subapical spot above vein 6; an interrupted dark purplish marginal line; fringe white at base, broadly mottled with fuscous beyond the veins.

*Hindwings*: with only two lines; the submarginal faintly paler.

Underside white, thickly peppered with purplish, the lines and a broad submarginal fascia purplish; the subapical spot of forewings white. Head, thorax, and abdomen like wings.

Expanse of wings: 26 mm.

Three ♂♂, two ♀♀, from Milne Bay, British New Guinea, November 1898—February 1899 (Meek).

The hindmargin of hindwings is rounded, without an elbow in the middle; the antennae of ♂ have longer ciliations, and the forewings are without the conspicuous hyaline fovea of *A. variegata*.

Genus **Bithiodes** Warr., Nov. Zool. I. p. 439.

When I made this genus for the species—up to that time referred to *Lusiarina* Wlk.—in which the angle of the hindwings is at the end of vein 6 instead of vein 4, I named *Acidalia incunctata* Wlk., as the type, being under the impression that it was the oldest name for *obliquata* Moore. To my surprise, when lately

examining Walker's types in the Oxford Museum, I at once recognised the type of *incinctata*, a ♀, as being the insect described by me as *Nadagurodes straminea* (cf. Nov. Zool. III. pp. 303 and 411), and by Meyrick as *Luciaria ditrota* (cf. Tr. E. S. 1897 p. 76). Both these names must therefore sink to *incinctata*, and *obliquata* Moore (= *incinctata*, Warren **not** Walker) stand as type of *Bithiodes*.

#### 106. *Evarzia tripunctata* sp. nov.

*Forewings*: whitish, dappled with ochreous and fuscous; the costa olive-ochreous with fine black dots; the lines ochreous-olive, browner on the costa; first close to base, bent below costa; second a little before middle, oblique, and slightly sinuous; the outer fine and brown, forming a strong angle outwards towards the excision, then sinuous to two-thirds of inner margin; a dark brown costal streak beyond it; a darker shade beyond the outer line running on to apex and embracing the excision; black marginal dots between the veins and a fine black line along the excision; fringe black-brown along the excision, concolorous with wings below.

*Hindwings*: with a dark spot at base, a diffuse double sinuous antemedial line before the black cell-spot; a nearly straight brown postmedian line with three black lunules contiguous to it and each other, the middle one between veins 3 and 4; marginal third darker, olive-ochreous with a wavy submarginal line through it, preceded by a single black blotch between veins 3 and 4; fringe pale, with small marginal dots at base.

Underside white, mottled with dark fuscous; a partially double wavy dark brown median line and treble outer line lying in a fulvous shade, which in forewings is forked to costa and excision, leaving the apex pure white with black speckles; head, thorax, and abdomen greyish.

Expanse of wings: 36 mm.

One ♂ from S. Flores, October 1896, dry season (Everetti).

#### 107. *Gonodela effusata* ab. *uniformis* nov.

*Forewings*: uniform dark grey, mixed with ochreous scales; the inner and median lines very indistinct, marked at the costa with darker; outer line fine, dark brown, edged with ochreous scales, altogether ochreous at the angle; a white semi-hyaline blotch between veins 2 and 3 near their rise, a smaller one between 3 and 4, and another beyond the angle of outer line; cell-spot small, inconspicuous; fringe unicolorous, with an interrupted black line at the base; a faintly darker submarginal shade.

*Hindwings*: with distinct black cell-spot beyond a wavy dull central line; a fine black slightly undulating line just beyond the middle; a dull submarginal cloud; pale patches, as in forewings, at base of the median veins.

Underside yellowish with thick brown speckling; white patches of forewing very distinct; a curved brown exterior line as well as traces of the brown angulated line of the upper side; submarginal shade blackish; fringe glossy grey with paler base; hindwings with black cell-spot, but the pale blotches very obscure. Head, thorax, and abdomen concolorous with wings.

Expanse of wings: 37 mm.

One ♂ from Solan, near Simla, August 1896.

108. *Nadagara irretracta* sp. nov.

*Forewings* : pale greyish fawn-colour, faintly dappled with darker ; first line from one-third of costa to before one-third of inner margin, strongly outcurved in cell close to the dark brown cell-spot, but indistinct except on costa and inner margin ; second line from inner margin a little beyond middle to costa shortly before apex, irregularly crenulate and slightly curved ; unlike the other species this line is not retracted at costa ; the inner line is edged outwardly and the outer internally with brown, while the inner is edged internally and the outer externally with whitish ; a faint dentate submarginal line preceded by a faint brownish shade and edged outwardly with whitish ; a row of chocolate-brown marginal lunules ; fringe (?) concolorous.

*Hindwings* : similar ; no inner line, the outer line straight ; marginal line chocolate-brown, crenulate.

Underside greyish white, thickly striated with fawn-brown ; cell-spots and outer line brown. Palpi, top of face, and edges of vertex fulvous ; face brown ; thorax and abdomen like wings ; shoulders darker.

Expanse of wings : 35 mm.

One ♂ from Tngela, Solomon Islands (Woodford).

Nearest to *N. pulchritineata* Wlk.

109. *Nadagarodes duplicipuncta* sp. nov.

Very closely allied to *N. mysolata* Wlk. (= *ceramata* Wlk. = *nunctata* Feld.) ; but whereas in that species the lines are all oblique, and straight, parallel to hind-margin, in the present one they are curved and crenulate. This will distinguish both sexes. The ♀♀ moreover may be easily separated by the white apical blotch of the underside of forewings, which in *mysolata* is single, and contained between veins 7 and 8, and in *duplicipuncta* double, extending to vein 6. The species occurs, along with *mysolata*, in St. Aignan ; Ron Island ; Ausns, Jobi ; Sudest Island and Rossel Island ; but at present I have not seen it from New Hanover or Goodenough Island, from both of which localities *mysolata* has lately been received, nor from the original localities of that species, Mysol and Ceram. Felder's *Psamatodes nunctata* is identical with *mysolata*.

Expanse of wings : 40—44 mm.

The St. Aignan specimens are all smaller than the average size.

110. *Tephrinopsis lineata* sp. nov.

*Forewings* : dingy whitish, covered with short fine transverse brown striae ; a dark brown inner line at one-fourth, angled in cell, then oblique inwards ; a diffuse cloudy oblique median shade touching first line and containing a small dark cell-spot ; exterior and submarginal lines oblique and close together, thick, slightly crenulate and diffuse ; a short dark line at anal angle ; an interrupted dark marginal line ; fringe concolorous.

*Hindwings* : with thick diffuse antemedian shade, and three postmedian lines, the last bent at middle ; cell-spot black.

Underside yellower, with the lines and striae reproduced. Head, thorax, and abdomen like wings.

Expanse of wings : 26 mm.

One ♂ from Penang, April 1898 (Curtis).

## SUBFAMILY ENNOMINAE.

111. *Gonophaga albipuncta* sp. nov.

*Forewings*: pale fawn-colour, speckled with fuscous, and towards hindmargin tinged with brown; the lines marked by fuscous dots on veins; first from one-fourth of costa to one-third of inner margin, oblique to subcostal, then vertical; second from three-fourths of costa, oblique outwards to vein 6, then oblique inwards to inner margin just beyond middle, and therefore approximated to first line; cell-spot annular, with white centre and dark edge; a cloudy curved postmedian shade; submarginal line indistinct, dark brownish, marked by black white-centred dashes on veins beyond it; marginal line lanulate and dark above the angle, brown below it; fringe brown, like the marginal tint.

*Hindwings*: with cell-spot as on forewings; a curved postmedian line of black dots; submarginal line nearly straight from just before apex to anal angle, dark brown, edged externally with pale, which between veins 4 and 6, and 6 and 7, is developed into a whitish spot; marginal half of wing tinged with deep brown except beyond submarginal line from anal angle to middle.

Underside yellow, strigulated with brown; outer half of wings deep brown, becoming lilac-grey beyond submarginal line; inner edge of the brown fascia sinuous, preceded by a row of black spots on the veins; cell-spot white with brown edge, the lower half of median shade brown; hindwings the same. Head, thorax, and abdomen ochreous, speckled with fuscous.

Expanse of wings: ♂ 39 mm.; ♀ 44 mm.

One ♂ from Ron Island, July 1897 (Doherty); two ♀♀, one ♂, from Sudest Island, April; two ♂♂, one ♀, from Rossel Island, February—March 1898 (Meek).

In forewings veins 10 and 11 are coincident, anastomosing with 12, 10 not afterwards anastomosing with 8, 9, as in *Anisographe* Warr.; but in shape of hindwings the species agrees with *Gonophaga* rather than with *Anisographe*. In one ♀ from Sudest Island vein 10 does anastomose at a point with 8, 9.

112. *Hyposidra incomptaria*.

*Lagyr incomptaria* Wlk., xxxv. p. 1539, ♂ (Arn).

*Lagyr corticaria* Wlk., xxxv. p. 1540, ♂ (Tondano).

*Hyposidra variabilis* Warr., Nov. Zool. III. p. 306 (Ferganasson Island).

" " " " " III. p. 416 (Humboldt Bay, New Guinea).

" " " " " IV. p. 119 (Queensland).

Having seen many more examples of this variable species, I am satisfied that my *variabilis* is identical with Walker's *incomptaria*. Among five specimens (one ♀, four ♂♂), lately received from Sudest Island, collected by A. S. Meek, one ♂ in particular is so strikingly marked that I here record it as aberr. *pallidiplaga*. The ground-colour is a mixture of deep brown and purplish grey; the lines, the upper half of central fascia, the apical blotch and submarginal shade are brown; but the inner margin from near base to beyond middle bears an irregular yellowish ochreous patch extending to the median vein, and transversed by the inner, median, and exterior brown lines. Hindwings dark purplish fuscous, the patch at anal angle brown with a yellow spot on it on inner margin.

113. *Mimomiza annulata* sp. nov.

*Forewings* : yellow, suffused in places with bright fulvons and speckled with fuscous ; the lines lead-coloured ; first from one-fourth of costa, oblique outwards from costa, angled in cell, to one-third of inner margin ; outer line with white outer edge, oblique from three-fourths of inner margin towards apex close before which it is acutely angulated and retracted to costa : an oblique dark costal streak at two-thirds ; cell-spot annular ; fringe apparently yellow.

*Hindwings* : paler, not suffused with fulvons ; the outer line at three-fourths curved parallel to hindmargin ; no first line ; cell-spot annular.

Underside yellowish, with coarse fuscous speckles ; the cell-spots dark ; outer line indicated on both wings, and beyond it a curved series of dark dots on veins, which are faintly marked also on the upperside. Head, thorax, and abdomen yellow, suffused with fulvons.

Expanse of wings : 35 mm.

One ♀ from S. Flores, October 1896, dry season (Everett).

In forewings veins 7, 8, 9, 10, 11 are stalked, and 11 anastomoses with 12, their apex is produced, and the hindmargin bent at vein 4.

NOTE.—*Abraxas compositata* Guen. : not an Indian insect. In the *Brit. Mus. Cat.* xxiv. p. 1120 (1862), Walker referred four specimens of an Indian insect to *Abr. compositata* Guen., the types of which came from N. China and Japan. In the *Proc. Zool. Soc. Lond.* p. 653 (1867), Mr. Moore, accepting Walker's identification, erected, not without reason, a new genus, *Indusara*, for the Indian species, which he figured (Pl. XXXII. fig. 6) ; and it is recorded as Guenée's species in Cotes & Swinhoe's *Catalogue* of 1888, and subsequently by Sir G. Hampson in the *Fauna of Brit. India, Moths*, iii. p. 296 ; nor did it occur to me, when rearranging the Geometridae in the British Museum Collection, to suspect the correctness of Walker's assumption, accepted, as it apparently had been, by general consent. I have lately had occasion to refer to Mr. Leech's paper on the "Lepidoptera Heterocera of China, Japan, and Corea," published in *Ann. Mag. N. H.* 1897, and was surprised to find no record of the occurrence of a species which, in India, seems to be no rarity. On referring to Guenée's original description, it was at once apparent that this Indian species, for whose identification Walker was responsible, has nothing whatever to do with Guenée's so-called *Abraxas* from China. The expanse of the Indian insect, as given by Hampson, is 74—80 mm. ; Guenée gives 46 mm. for his Chinese species. Secondly, Guenée makes no mention of any excision in the hindmargin of the hindwings, a peculiarity not occurring in any *Abraxas*, and which could not have escaped his observation ; but, lastly and positively, he speaks of "a bundle of yellow hairs at the base of the forewings in the ♂ on the underside." Thus the omission of the species *A. compositata* Guen., under that name, in Mr. Leech's paper became intelligible. In fact, *Abr. compositata* Guen. is nothing else than *Lygris junctilineata* Wlk., a species with which Guenée's description agrees entirely, but which does not occur in India, as neither does Walker's *compositata* in China. The Indian insect must therefore be quoted for the future as *compositata* Walker, non Guenée. The superficial resemblance in colour and markings between the two insects may possibly have misled Walker ; though how he could have overlooked the mention of the tuft of hairs below it is difficult to understand. To modern devotees of nervation will be interesting to observe, as a result of the



comparative inattention to structural differences which characterised the earlier entomologists, that both Guenée described as an *Abraeus* an insect which belonged to another subfamily, the *Larentinæ*, and Walker referred to the same genus *Abraeus*, the identical Larentid with which he had previously misidentified a *Boarmia*.

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### NOTE ON *TESTUDO SUMEIREI*.

By WALTER ROTHSCHILD, Ph.D.

IN May 1898, Mr. Leopold Antelme sent me a giant land tortoise purporting to be an abnormally large female of *Testudo elephantina*. On its arrival at the London Zoological Gardens, the first discovery I made was that, instead of being a gigantic female, it was a male of (for *elephantina*) moderate size, the carapace measuring about thirty-eight inches in a straight line. I immediately examined the animal more closely, and found that it was quite distinct from *T. elephantina* in many characters. It was nearly as wide as long, while *T. elephantina* is half as long again as wide; it was quite flat on the top of carapace, while *T. elephantina* is strongly arched; it was sharply declivous in front, while *T. elephantina* is much more gradually deflexed; its head was narrower, and lastly, its neck was half as long again, as in *T. elephantina*. On comparison with the figures and descriptions in Dr. Günther's monograph, I came to the conclusion that it was an exceedingly large example of the supposed extinct Mauritius species, *Testudo inepta*, and as such it was registered. Some months afterwards, being struck by the animal's attitudes and action, I had it photographed in a variety of positions, and became at once aware on seeing the prints that I had seen such pictures before. On going through my various pictures of tortoises, I discovered that my tortoise agreed exactly with the specimen still living in the Artillery Barracks at Mauritius. I then proceeded to look up Mr. Sauzier's description of the Mauritius specimen which he named *Testudo sumeirei*, and I found that my animal agreed in all points with the Mauritius specimen. I therefore have the great pleasure of recording a second living specimen of *Testudo sumeirei*.

Now, as to the history of these *Testudo sumeirei*, it is known that in the year 1766 five large tortoises were brought to Mauritius from the Seychelles by the French Chevalier Marion de Fresne, and were known as the Marion tortoises. In the year 1833 one of these was sent by Sir Charles Colville to the London Zoological Gardens, but soon died. A second arrived a few years later. Both these were recorded as *Testudo indica*, as were all giant land tortoises up to 1871; since then these two have been supposed to have been *Testudo cosmaeri* of the Isle of Rodriguez, but evidently were two *T. sumeirei*.

*Testudo sumeirei* is a little-known species whose characters have not been well diagnosed, for being only known from living specimens, the essential and osteological features have not been available for examination. It was thought by Mr. Sauzier

that this was the species, or one of the species, which formerly inhabited the Island of Bourbon or Réunion. This I always doubted, as the species had nothing in common with the other six or seven extinct Mascarene tortoises, while it had great affinity to the four races of Aldabra. At the time of the publication of Dr. Günther's monograph, a very large number of references to the Giant Tortoises by various ancient voyagers had been overlooked or not made public, and also the discovery of tortoise eggs in a semi-fossilised state had not been made on an outlying island of the Seychelles. Now, however, we know that in addition to the imported Aldabra tortoises the Seychelles were originally inhabited by a special race or races of giant land tortoises. The *Testudo sumeirei*, as we have seen, were taken from the Seychelles to Mauritius as curiosities: up to 1850 Aldabra was overrun with thousands of tortoises, so that the Aldabra races were well known: what would be more likely, on the other hand, that the last, or nearly the last, indigenous Seychelles tortoises should have been carefully preserved and taken to Mauritius as wonders? I therefore think there is little doubt that *Testudo sumeirei* was the original Seychelles tortoise, and of these three only are left alive—two in Mauritius, and one in London.

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THE GENUS *APTERYX*.

BY THE HON. WALTER ROTHSCHILD, PH.D.

WITH A CHAPTER ON THE ANATOMY OF THE KIWIS BY FRANK BEDDARD.

(Plates IX. to XVI.)

THE genus *Apteryx*, forming the family *Apterygidae*, is now generally admitted to represent an order or suborder (*Apterygtes* or *Apterygiformes*) of the *Ratitae*. The position among the latter has been generally recognised from the time of the earliest knowledge of the *Apteryx*. In 1813 Shaw said that these birds seemed "to approach more nearly to the struthious and gallinaceous tribes than to any other." Lesson finally placed *Apteryx* among his "Oiseaux Anomaux," which correspond with our *Ratitae*, declaring that it would doubtless have a sternum without a keel. Latham (*Gen. Hist. B.* v. X. p. 394) called it an "Apteron Penguin," and this grave error of judgment was endorsed by Stephens (in Shaw's *Gen. Zool.* v. XIII. p. 70), while Temminck placed it along with the Dodo in his order *Inertes*. The peculiar features of the *Apteryx* have been very differently valued, but not many serious doubts have ever been raised as to the fact that the *Apterygtes* belong to the *Ratitae*. Nevertheless Fürbringer (*Unters. zur Morphologie u. Syst. d. Vog.* v. II. p. 1567, 1888) places the Kiwis, together with the *Crypturiformes* and *Galliformes*, in his order *Alectorornithes*, dividing his *Genus Apterygtes* into the families *Apterygidae* and *Dinornithidae*. Many important anatomical details (see among others Parker's observations) show a striking similarity with the *Carinatae* rather than with the *Ratitae*, especially the structure of the foot. If the structure of the eggshell is admitted as of any taxonomic value, then the Kiwis have nothing to do with any of the other *Ratitae*, but approach the *Grallae* or *Gralliformes*. This is easily seen when examining an *Apteryx*-egg macroscopically, and admitted by everybody (*cf.* Hutton 1871, Des Murs, Schalow 1894); and also Nathusius' microscopical studies on the eggs of *Apteryx* led to the same conclusion.

Notwithstanding these facts, most recent authorities (*cf.* Gadow, Newton, Sharpe, Salvadori and others) have placed the Kiwis in the system as an order or suborder of the *Ratitae*, and this may therefore for the present be accepted, though not without reserve. In view of the important peculiarities of these birds—chiefly the extraordinary position of the nostrils, almost on the tip of the beak, the absence of an aftershaft to the feathers, the presence of four well-developed toes, and the prodigiously large, thin-shelled egg—it is certainly impossible to place them merely as a genus along with the Ostriches, Nandus and Cassowaries, especially since it is now universally admitted that the above-named three groups are very distinct families and even orders—*Struthiones* with the genus *Struthio*, *Rheae* with the genus *Rhea*, *Casuarii* with the genera *Dromaeus* and *Casuaris* (*cf.* *Cat. B. Brit. Mus.* v. XXVII. pp. 571-90).

PRINCIPAL FEATURES OF *APTERYX*.

The Kiwis are large birds, as large as and larger than a domestic fowl. They have extremely aborted wings, without flight-feathers, no rectrices, a long, slender, slightly curved beak, with nostrils near the tip. The legs are strong, covered with variously-sized scutes, the metatarsus about as long as the middle toe. The bill has long and numerous bristles at the base. The feathers are long, narrow, and without an aftershaft. The hind toe is well developed, and has, like the other three toes, a long claw. The maxillopalatines resemble those of the Cassowaries, but the vomer is fused with the palatines and pterygoids. The sternum has no keel; the caeca are very large. Habits nocturnal. Food consisting of worms taken out of the soil with the long bill, and occasionally various seeds and fruits. Egg enormous, white, shell very thin. In captivity they can be kept without difficulty, and are not susceptible to cold. The genus was created in 1813.

1813. *Apteryx*, Shaw in *Nat. Misc.* v. XXIV., Pls. 1057, 1058, and text.

In 1837 (Swainson, *Class. B.* v. II. p. 436) the name was spelt *Apteryx*, but other synonyms there do not seem to be. In English, German, and French, the Maori word "Kiwi," or "Kiwi-Kiwi," is adopted for these birds. It was apparently first introduced by Lesson in 1828. Other native names are "Kiwi-parure" on the North Island, "Tokoeka" for *Apteryx australis*, "Kiwi-pukupuku" for *Apteryx acronotus*, "Roaroa," "Ro," or "Kiwi karurai" for *Apteryx haastii*. The more rufous variety of *Apteryx australis mantelli* is called "Kiwi-kura." In Germany the name "Schnepfenstrauss" is sometimes used for the Kiwi.

For accounts of the genus the following articles may be consulted :

1876. Rowley in *Orn. Misc.* v. I. pp. 1—26, Pls. I.—VI. (4 species); 1888, Buller, *B. New Zealand*, 2nd Edition, v. II. pp. 308—332, Pls. XLVII. XLVIII (4 species).  
 1882. Reichenow, *Vog. Zool. Gart.* v. I. p. 6.  
 1893. A. Newton, *Dict. B.* pt. 2, pp. 493-7 (3 species and a "supposed fourth species *A. haastii*").  
 1893. W. Rothschild in *Bull. B. O. Club*, v. I. (No. X.), pp. XLIX—LXII. (5 species, one sub-species); 1895, Salvadori, *Cat. B. Brit. Mus.* v. XXVII. pp. 603-12 (6 species).

For anatomy, see, in addition to the places indicated under the head of the various places :

- 1838, 1842, 1846, 1870. Owen in *P. Zool. Soc. Lond.* : id. in *Trans. Zool. Soc. Lond.*, vols. II. III. VII. ; 1888, T. J. Parker in *Proc. R. Soc.* v. XLIII. pp. 391-97 (6 cuts); id. *ibid.* pp. 482-7 (7 cuts); id. 1890 in *Nature*, XLII. p. 16, and in *Proc. R. Soc.* v. XLVII. pp. 454-9; 1882, Huxley in *Proc. Zool. Soc. Lond.*; 1885, Beddard in *Proc. Zool. Soc. Lond.* p. 188; 1891, T. J. Parker in *New Zeal. Journ. Science* (2), I. pp. 2-9, 66-8; 1888, Fürbringer, *Unters. z. Morph. d. Vögel*, v. II. pp. 1436, 1467, 1567; 1893, Gadow, *Brown's Klassen u. Ordn.* VI. 4, Vögel II. (*System Theil*), p. 104.

Oological characters :

1860. Des Murs, *Traité génér. Oologie oen.* p. 364; 1872, Hutton in *Trans. and Proc. New Zeal. Inst.* v. IV. p. 166, Pl. IX. ; 1871, Nathusius in *Zeitschr. wiss. Zool.* pp. 330-55, ff.; id. in *Journ. f. Orn.* 1871, p. 251; 1894, Schalow in *Journ. f. Orn.* pp. 2, 27.

1. *Apteryx australis* Shaw.*The Striated South-Island Kiwi.*

1813. *Apteryx australis*, Shaw in *Shaw & Nodder's Nat. Misc.* v. XXIV. Pls. 1057, 1058, and text; 1820 (Oct.), Temminck, *Man. d'Orn.* 2nd. ed. v. I. p. CXIV.  
 1826. J. F. Stephens in Shaw's *Gen. Zool.* v. XIII. 1, p. 71; 1826, Ranzani, *Elem. di Zool.* v. III. 9, p. 295; 1828, Lesson, *Man. d'Orn.* v. II. p. 211; 1828, Lesson in *Voy. Coquille, Zool.* I. 2, p. 418 ("Apteryx") (also footnote); 1829, Cuvier, *Règne An.* 2nd. ed. I. p. 498 (note); 1831,

- Lesson, *Traité d'Orn.* p. 12; 1833, Yarrell in *Proc. Zool. Soc.* pp. 24, 80; 1833, id. in *Trans. Zool. Soc. Lond.* v. I. pp. 71-76, pl. X. (figure of type); 1835, MacLeay in *Proc. Zool. Soc.* p. 61 (second specimen); 1836 (Translated extract from Yarrell) in *Ibis*, v. 29, pp. 386-9, Pl. X.; 1837, Short in *P. Zool. Soc. Lond.* (living specs. seen); 1836, 1839, Lesson, *Compl. Buff.* v. 6, p. 524, v. 7, p. 4, Atlas Pl. 37 (after Shaw);
- 1845 (?). Reicheubach, *Handb. Orn. Gallinacae*, Pl. 386, f. 2191, 2192;
1850. Bartlett in *P. Zool. Soc. Lond.* p. 275, Pl. XXX. (head and wing), Pl. XXXI. (foot); 1856, Bonaparte in *Compt. Rend.* v. 43, p. 841, No. 21; 1861, Selater & Hochstetter in *Rep. Brit. Ass. Adv. Sci.* p. 116 (reprinted in *Nat. Hist. Rev.*), 1861, v. 8, p. 504; 1862, G. R. Gray in *Ibis*, ser. 1. v. 4, p. 233; 1867, Huxley in *P. Zool. Soc. Lond.* p. 424 (under aspect of skull); 1870 (Apr.), Potts in *Trans. & Proc. N. Zealand Inst.* v. 2, p. 66 (egg); 1870, Finsch in *J. f. O.* v. 18, p. 337; 1872, Potts in *Ibis*, 3rd ser. v. 2, p. 36 (variety); 1872, Selater in *P. Zool. Soc. Lond.* p. 861; 1872, Finsch in *J. f. O.* v. 20, p. 263;
1873. Schlegel, *Mus. P. B.* v. 4, *Struthionae*, p. 7;
1873. Butler, *B. New Zeal.* ed. 1, p. 365; 1873, Potts in *Trans. & Proc. N. Zealand Inst.* v. 5, pp. 186-193 (biology);
1874. Finsch in *J. f. O.* v. 22, p. 220;
1875. Rowley in *Orn. Misc.* v. I. p. 18, 19, pl. 4 (juv.);
1881. W. A. Forbes in *P. Zool. Soc. Lond.* pp. 781, 782 (trachea);
1882. Buller, *Man. N. Zeal. B.* p. 45, Pl. XXII.;
1883. Beddard in *P. Zool. Soc. Lond.* pp. 188, 189 (heart); Lankester *l.c.* p. 239 (heart—Owen's heart of Apteryx was that of an Ornithorhynchus); Owen *l.c.* p. 328 (Lankester's surmise not correct); Lankester, *l.c.* pp. 477-82 (reasserts and proves his former contention);
1884. Reischek in *Trans. N. Zealand Inst.* v. XVII. p. 191 (biolog.); 1888, Parker in *Ibis*, p. 127, f. 4 (manns);
1888. Buller, *B. New Zealand*, 2nd ed. v. 2, p. 322 (synonymy part.); 1888, Smith, *Trans. N. Zeal. Inst.* v. 21, p. 223 (plentiful near Lake Brunner);
1893. Buller in *Trans. N. Z. Inst.* v. 25, p. 85;
1893. Rothschild in *Bull. Orn. Club.*, No. X. v. 1, pp. 40-42 (id. *Ibis*, pp. 574-6).
1895. Salvadori, *Cat. B. Brit. Mus.* v. XXVII. p. 604.
1828. *Dromicicus notaczealandiae* (from hearsay and a piece of skin, very imperfectly described); Lesson, *Manuel d'Orn.* v. 2, p. 210 (Kivi-kivi of natives).
1891. *Apteryx maxima* (non Bonaparte 1856? nom. nud.), Buller in *Trans. New Zeal. Inst.* v. 23, pp. 602, 603, v. 24, pp. 91, 92;
1893. *Apteryx hurreyi*, Rothschild in *Bull. B. O. Club.* v. 10, pp. 61, 62 (reprint in *Ibis*, 1893, pp. 572, 575); 1896, Buller in *Trans. New Zeal. Inst.* v. 29, p. 204; 1898, Buller *op. cit.* v. 31, p. 36.
- ? 1873. *Apteryx fusca*, Potts in *Trans. & Proc. New Zeal. Inst.* v. 5, p. 196 (from native report about a black Kiwi, which was said to be "all the same as the Kiwi, only black." !!)

DESCRIPTION OF *A. AUSTRALIS* SHAW.

♂ ad. Head and neck rufous brownish-grey. Rest of upperside reddish brown, each feather margined with black, giving the plumage a longitudinally striped appearance. Undersurface grey, with a rufous tinge here and there. Bill pale horn-colour, legs and feet reddish brown, iris brown. Total length about 520 mm.

♀ ad. Larger than the *male*. Head and neck rather dark smoky grey, generally without the rufous tinge. Rest of plumage as in the *male*, but the centres of the feathers in most specimens paler rufous. Total length about 700 mm.

*Juv.* Similar to the adult birds in plumage.

*Chick.* Much darker than the adult of either sex. This is caused by the pale central area of each feather being more restricted in width and the black borders consequently wider; forehead markedly more greyish than the rest of the head and neck. Chicks in this stage strongly resemble adult individuals of *Apteryx australis muntelli*.

Thirty-one specimens in my collection examined. Twelve of these are from Stewart's Island.

I have one *female* from the South Island, collected by Mr. Jewell, in which the black edges to the feathers are more restricted and partially mixed with rufous, so that the whole bird has a much redder appearance than usual. A similar aberration will be discussed further under *Apteryx australis mantelli*.

MEASUREMENTS OF SKINS OF *APTERYX AUSTRALIS*, IN MILLIMÈTRES.

	Culmen from base.	Bill from gape.	Metatarsus.	Toe without claw.
♀ ad. Stewart I. (Pl. IX.)	206	223	100	68
♀ ad. Stewart I. (Described as <i>A. macrura</i> by Buller).	195	199	88	59
♀ ad. no locality.	186	193	83	64
♀ ad. Stewart I. (Buller)	184	190	83	56
♀ ad. Stewart I. (Buller).	171	179	89	62
♀ ad. South I. (Jewell coll. very much rufous).	168	172	70	61
♀ no locality.	165	172	80	61
♀ ad. South I.	162	170	76	70
♀ ad. Stewart I.	162	170	75	59
♀ West Coast Sound.	160	170	80	62
" ♀ " Secretary I. 1899 (Travers) (? ♂).	148	156	71	63
(" ♀ " teste Buller's label, but perhaps ♂) Stewart I.	150	157	71	54
(" ♀ " teste Buller's label, but perhaps ♂) Stewart I.	150	160	79	59
♂ Stewart I. (Buller).	144	154	82	63
♂ Stewart I. (Buller).	139	154	83	62
♂ Stewart I. (Buller).	133	142	74	57
♂ Stewart I. (Buller).	130	140	80	58
♂ Stewart I. (Buller).	154	161	72	58
♂ no locality.	125	134	68	50
♂ no locality.	124	132	73	58
♂ ad. South I.	123	132	65	55.5
♂ South I. (Jewell coll.)	120	126	68	—
♂ South I.	120	129	79	66
♂ South I.	115	121	60	—
♂ no locality.	115	123	78	58
♂ Doubtful Sound, 11 5.88.	112	117	60	—

The discovery of *Apteryx australis* in 1813 (*loc.*) must have created considerable excitement, and its first describer must have felt justly proud in enriching ornithological knowledge with such a remarkable addition. The original description reads as follows :—

"THE SOUTHERN APTERYX.

"GENERIC CHARACTER.

" **Bill** long, slender, nearly straight, covered at the base by a cere, marked on each side by a tubular furrow, slightly swelled and bent at the tip.

" **Nostrils** (?) linear, inconspicuous, near the tip of the bill, at the end of the tubular furrow.

“ **Wings** rudiments only, consisting of a single joint or finger, about an inch in length, and terminated by a small claw or spur.

“ **Feet** comped, short, strong, gallinaceous and tetradactyle: the hinder or subinterior toe very short.

“ **Tail** none.

“ SPECIFIC CHARACTER.

“ Ferruginous, grey Apteryx, with yellowish brown bill and legs.

“ The bird represented on the present plate constitutes a perfectly new genus, which it is not easy to refer to any of the established ornithological orders. It seems however to approach more nearly to the Struthions and the Gallinaceous tribes than to any other, though the very different form of the beak implies a different manner of life. The size of the bird is nearly that of a goose, and its length, from the tip of the bill to the extremity of the body, about two feet and a half. The bill, if measured from the corners of the mouth to the tip of the upper mandible, is about six inches and three quarters in length: but if measured from the beginning of the forehead to the tip, about five inches and three quarters. The general habit or appearance of the bird approaches to that of the Penguins; while the plumage bears a strong alliance to that of the brown or New Holland Cassowary. The head is rather small, and the neck of moderate length: the legs, which are situated as in the Penguins, are short and strong, measuring about six inches from the knee to the extremity of the middle claw. The feet have three toes in front, and a very short hind or subinterior toe; and all are furnished with very strong and sharp claws; that of the middle toe measuring nearly an inch in length. The whole structure of the feet is gallinaceous. There is no appearance of a tail, and in place of wings (unless any art of deception has been practised, of which I cannot discover the least appearance) can only be perceived a small single joint on each side, measuring about an inch in length, slightly fringed on its lower edge by a few straggling plumes, and terminated by a small and sharpish claw or spur, scarcely a quarter of an inch in length. The colour of the whole bird is ferruginous, the edges of the feathers, which on all parts are of a lengthened and pointed shape, being of a more dusky cast, and thus giving the appearance of a mixture of brown in the plumage. The bill and legs are of a yellowish brown colour, the bill paler than the legs.

“ This curious bird is a native of New Zealand, from the south coast of which it was brought by Captain Barclay of the *Providence*, by whom, through the kind interposition of my friend, W. Evans, Esq., it was presented to myself. The second plate represents, in their natural size, the bill, wing, leg, and a feather of this bird.”

This description is preceded by a Latin translation, headed “*Apteryx australis*,” and accompanied by two plates, one representing the whole bird, the other the bill, foot, wing, and a feather. The type specimen from which this description was made passed into the hands of the then Lord Stanley, afterwards thirteenth Lord Derby, and is now preserved in the Liverpool Museum. Many naturalists, however, for a long time doubted the actual existence of such an extraordinary creature. Lesson, who afterwards was well acquainted with this bird, wrote in 1828: on p. 210 of his *Manuel d'Ornithologie*: “L'Aptéryx de M. Temminck ne serait-il pas fondé sur les pièces de dronte (Dodo) conservées au Museum de Londres?” In this same article Lesson also suggests that the Dronte might have been the

Cassowary of India ("le *casoar* des Indes orientales") with the beak of a specimen of the Albatross! On the previous page, however, Lesson describes from hearsay and a piece of a skin a bird about half the size of the Emen, which is common in the forests of New Zealand and which is hunted with dogs by the natives and called "kivi-kivi." This most imperfectly described bird he names "*Dromiceius novaezelandiae*." Shortly afterwards, in the same year, it dawned on Lesson, that these latter birds might have been Shaw's "*Apteryx*," as Lesson spells it, for he says: "Nous ne doutons point aujourd'hui que ce ne soit l'*Apteryx australis* de Shaw, figuré pl. MLVII et MLVIII, du 24<sup>e</sup> volume de ces Mélanges." No second example was known in 1833, when the late Lord Derby sent the original specimen to be exhibited at a meeting of the Zoological Society of London, and when it was excellently described and very well figured by Yarrell. A second specimen reached England in 1835; and between that year and 1850 several other specimens of *Apteryx* including the types of *A. oweni* and *A. mantelli*, were received in Europe.

*Apteryx australis*, although the first known form of the genus, is much rarer in collections than *A. oweni* and *A. australis mantelli*, and until quite recently it was by no means easy to procure a series of this bird. In 1888 Sir Walter Buller wrote as follows: "Comparatively few specimens of this species are now brought in by collectors in the South Island, whereas the supply of *Apteryx oweni* is undiminished; and the conclusion is irresistible that *Apteryx australis*, perhaps the most interesting bird in the Southern Hemisphere, is fast becoming extinct." Sir Walter Buller's fear about their "becoming fast extinct" may soon be justified, for it is evident that these defenceless birds, if allowed to be hunted indiscriminately in a country where civilisation and cultivation of the ground is fast spreading, and where polecats, stoats and weasels are introduced and abound, must before very long become rare if not extinct: but at present they are evidently still common in certain places, and it is strange that this fact was overlooked by the collectors, who have apparently never yet systematically explored the avifauna of all parts of their country. On Stewart Island the Kiwi is now protected by law. I have received specimens from Secretary Island (from Mr. Henry Travers), from Doubtful Sound and West-Coast Sound; but recently a good number have been captured on Stewart Island, and I saw, not long ago, a whole bundle of them put up for sale in an auction room in London. Sir Walter Buller does not describe the exact distribution on South Island. It would seem, however, that *Apteryx australis* is less fond of mountainous parts than most of the other Kiwis, and that it is only known from the southern parts of the South Island. It will be seen from my synonymy that I cannot separate the Stewart Island birds from typical *A. australis*. The only difference ever supposed to exist between them is the alleged larger size of the Stewart Island form. Sir Walter Buller, having received a large female from Stewart Island, considered it to be different from *A. australis*, and applied to it the name *A. maxima*. This name not being applicable, I named it *A. lawryi*, in honour of Sir Walter Lawry Buller. Having now before me a good series of *A. australis* from the South (or Middle) Island as well as from Stewart Island, I find that, although the largest females happen to be from Stewart Island, they cannot be separated, the majority of specimens being equally large from both localities. In addition to this we find similar variations in size among *A. australis mantelli* from the North Island.

One egg from the collection of Count Roederu, now in my museum, measures 11.45 x 7.65 mm., one from the South Island (received from Mr. Dannefaerd)



131 × 80 mm., one from Stewart Island 133 × 81 mm. A specimen in Mr. Crowley's collection measures 4.75 × 3.95 inches (*see* Buller, *B. New Zealand*, 2nd Ed. v. 2. p. 326). The eggs are similar to those of *A. australis mantelli* which will be described in greater detail.

In habits this Kiwi does not differ from the other species. Sir Walter Buller publishes some interesting observations made on Stewart Island Kiwis by Mr. Marklund, who collected a good series before they became "protected" by law.

The following facts are of special interest.

Mr. Marklund says that these birds are very scarce, and have to be hunted for over a large extent of country. "Their favourite feeding ground is the summit of Table Hill, rising to an elevation of 2,300 feet, which is covered with grass and stunted vegetation, and in the daytime they have to descend some 500 feet, in order to camp in the bush, the summit not affording sufficient covert." Mr. Marklund has never found any on the western slope of Table Hill below a level of 1,000 feet: "but on the eastern side the Kiwis go right down to the plain, or practically to the level of the sea." He has found them to inhabit holes among the roots of the "mutton-bird woods." "He generally found a pair of birds together in one hole, sometimes accompanied by a single young one. On one occasion he found five birds inhabiting an extensive chamber. Being without provisions, he had to cook and eat them, rare as he knew the bird to be. From the retreat of this party of five to the summit of Manuka Flat (a distance of half a mile) there was a broad beaten track, as if sheep had been accustomed to travel over it. The roots crossing this track were so worn and abraded that he came to the conclusion the Kiwis had been using the path continuously for several years. He says that this species has three distinct calls: one is a loud shrill whistle, especially in fine evenings when the atmosphere is clear; the second is a deep rasping note, seldom heard; and the third is a low clucking sound, rarely uttered. In hunting these birds his plan was to start about 3 a.m., before daybreak, while the scent was strong upon the ground, and then to intercept them on their way from their open feeding-grounds to the shelter of the 'mutton-bird woods,' or track them by means of the dog to their holes. The old birds often make a stubborn resistance, and the first time his dog tackled one of them he got his foreleg ripped up about six inches by the bird's claws."

There is a chance of this bird being preserved in Stewart Island, which has happily escaped the introduction of stoats and weasels, but on the mainland the protection, on account of these pests, comes probably too late, both for the Kiwi and the Kakapo. Sir Walter Buller continues:

"Towards the end of November Mr. Marklund obtained two eggs of this species of Kiwi, after nearly a month's continuous search; but it was so late in the season that, in both cases, the chick was fully formed within the shell, and had to be removed by incision. This somewhat damaged the specimens, but I am nevertheless able to give a full description of them. They differ conspicuously both in size and in contour. The larger one measures 5.4 in. in length by 3.25 in. in breadth, and is perfectly elliptical in shape, there not being the least indication of a smaller end. The other egg is smaller, measuring 5.1 in. by 3.1 in., and is narrower at one end. Both of them are of a very pale green colour, or perhaps, more properly speaking, greenish white, and the shell, especially in the smaller egg, exhibited minute, widely-scattered punctae on the surface, distinctly visible under a magnifying glass, and similar to the markings on the eggshell of the Moa. In forwarding the

specimens, my collector says : I had a very hard job in procuring these eggs, as the birds do not go far away from their nests while hatching, and of course the dog got a very poor chance of picking up the scent. One of the eggs was somewhat damaged, through the bird defending it from the dog, before I could reach the place ; nevertheless it has a good show side. The larger of the two I procured in a locality where I had never been before, and, owing to the dog being muzzled, the bird that was sitting on the egg managed to escape ; and, inclement weather coming on, it was impossible to get another specimen before I had to leave. In the breeding season the birds never come out on the open ground—in fact, they seem to be starving themselves in their fear of leaving the nest or its close vicinity.

“ My Stewart Island collector, Mr. O. Marklund, who is a very observant man, sends me the following notes : At the end of July I came down from the hills ; and on this trip I found that the Kiwis were moving down to the lower country—probably for nesting purposes. I should also mention—although it may be already known to you—that I have determined which of the cries are used by either sex. After some practice with a leaf of wild flax held in a certain position between my two thumbs, I can fairly well imitate their cry. I have discovered that the best time for these birds is a moonlight night, with the sky somewhat overcast. If it is too light the birds will not leave the scrub. They also object to rainy weather. Though apparently insensible to pain when attacked by a dog, they are naturally very timid. If the moon is bright their own shadow will sometimes cause them uneasiness ; indeed, I have seen one make a kick at its own shadow on the ground, accompanied by that peculiar hissing sound they make when confined in a pen. I have noticed also that a smaller bird will always run as hard as his legs will carry him at the least show of anger from a larger and stronger one. By imitating their cry—the deep, rasping one being the more successful—I have always had the clear, shrill one in response. If in the close neighbourhood, I would then send the dog in, and it would always turn out to be a male. The male is generally ready to answer, especially if it does not happen to know where its mate is ; but the female is more independent, and often takes no notice whatever of the call. With this bird the ordinary relationship between the sexes appears to be reversed : for instance, it is the female that undertakes the defence of the house and home, for the male gives in after a very slight struggle ; but the male is the faster runner of the two. After the young is big enough to follow its parents the male (not the female) seems to take special charge of it. The male has a high shrill cry ; the female utters a low, hoarse note—between a cry and a hiss. In one case I heard the male uttering the cackling noise—like a hen with chicks—but that may be common to both sexes. Although a nocturnal bird, its sight is weak even at night, for I have seen them running against objects that could easily be avoided ; but their hearing and sense of smell are very acute. By going against the wind I have got to within 10 feet of them and seen them feeding. They do not confine themselves to worms, but will also take any kind of vegetable matter available—for example, the young shoots of a very common alpine orchid. I have found three different kinds of seed and a small white berry (of which I have not yet seen the plant) in the stomachs of those I have opened. Enclosed you will find some of the seeds on which the Kiwis subsist. I do not understand how they can find any nourishment without cracking the seeds, but the fact remains that they do, for I have found these seeds in the stomachs of several that I have opened. The grass producing this seed grows in great abundance up to a level of 2,000 feet above the

sea. The seeds sent are those of *Gahnia procera*; they are red-coloured and of the size of small wheat."

I have had several *A. australis* alive, first under Mr. Doggett's care in Cambridge, afterwards here in Tring; and they seemed to be quite happy. They frequently uttered their very loud and strong cries in the evening, and it seemed that the shrill note was that of the *male*. The cry of this form seems to be a little louder than that of *A. australis mantelli*; but otherwise the same.

## 2. *Apteryx australis mantelli* Bartl.

### *The Striated North-Island Kiwi.*

1830. Kiwi, D'Urville in *Voy. Astrolabe, Histoire*, v. 2, p. 481 (North Island); 1830, *Apteryx australis*, Quoy et Gaimard in *Voy. Astrolabe Zool.* v. I. p. 158; 1839, Cunningham in *P. Zool. Soc. Lond.* p. 63; 1841, J. Gould, *B. Austr.* v. 6, Pl. 2 (text partim); 1841, Gould in *P. Zool. Soc. Lond.* p. 70; 1845, Hombron & Jacq. *Voy. Pôle Sud, Atlas Pls.* 24, 25; 1845, Reichenbach, *Grallatores*, Pl. 143 f., 1015, 1016 (from Gould), Gallinaceae, Pl. 386, f. 2193 (from Gray & Mitchell); 1846, Gray, *Gen. B.* v. III. Pl. 139, text; 1853, Jacq. et Puch. in *Voy. Pôle Sud, Ois.* III. p. 127; 1854, Hartlaub in *J. f. O.* p. 166; 1865, Dareste in *Compt. Rend.* v. 42, p. 861 (brain), *Ann. Sc. Nat.* 4 sér. *Zool.* v. 5, p. 48; 1865, Gould, *Handb. B. Aust.* v. 2, p. 568; 1871, Buller in *Trans. N. Zeal. Inst.* p. 52, Pl. XII. b. (*A. australis* and *mantelli* considered the same); 1882, Finsch in *Ibis*, p. 399 (N. Island).
1850. *Apteryx mantelli*, Bartlett in *P. Zool. Soc. Lond.* p. 275, Pl. XXX. f. 3, 4, Pl. XXXI. f. 2 (North Island); 1852, Alfr. Newman in *Fror. Taysber.* No. 664 (*Zool. Bd.* 3, p. 210); 1852, Wolley, *Zoologist*, p. 3409 (habits in captivity), A. Newton p. 3605 (ditto); 1859, Selater in *P. Zool. Soc. Lond.* p. 539 (egg laid in captivity); 1861, Selater & Hochstetter in *Rep. Brit. Ass. Afr. Sc.* p. 177, and *Nat. Hist. Rev.* 1861, p. 505; 1863, Layard in *Ibis*, p. 242 (habits); 1863, Selater in *P. Zool. Soc. Lond.* p. 235 (accounts about breeding); 1864, Selater in *P. Zool. Soc. Lond.* p. 374 (Anckland); 1865, Gould, *B. Australia*, v. 2, p. 569; Finsch in *J. f. O.* p. 329; A. Newton in *Ibis*, pp. 251, 504 ( $\sigma$  incubating); 1870, Potts in *Trans. N. Z. Inst.* v. 2, p. 67; 1870, Buller in *Trans. N. Z. Inst.* v. 2, p. 52 (" *mantelli* = *australis* "), Hector, p. 73; 1871, Hector, *op. cit.* v. 4, p. 363; 1872, Potts in *Ibis*, p. 36 (scutellation of tarsus not a specific character); 1873, Potts in *Trans. N. Zealand Inst.* v. 5, p. 194; 1873, Garrod in *P. Zool. Soc. Lond.* p. 470 (anatomy), p. 644 (muscles); 1873, Buller, *B. New Zealand*, 1st ed. p. 357, pl. 33; 1874, Hutton in *Ibis*, p. 43 (localities on N. Island); 1874, Buller in *Ibis*, p. 122; 1875, Garrod in *P. Zool. Soc. Lond.* p. 341, fig. (anatomy); 1875, Sharpe in *Zool. Voy. Erebus & Terror*, App. p. 36; 1877, Forbes in *P. Zool. Soc. Lond.* p. 308 (bursa Fabricii), 1881, pp. 780, 781, figs. (trachea); 1879, Nathusius in *J. f. O.* v. 27, p. 255 (egg); 1882, Buller, *Manual N. Zealand B.* p. 44, Pl. XXI.; 1893, A. Newton, *Dict. of B.* p. 495; 1893, Rothschild in *Bull. B. O. Club*, No. 10, pp. LX.—LXII., and *Ibis*, pp. 573-5; 1895, Salvadori, *Cat. B. Brit. Mus.* v. XXVII. p. 607;
1885. *Apteryx bulleri*, Sharpe in *Proc. Wellington Phil. Soc.* p. 6, *Trans. N. Zealand Inst.* v. XXI. p. 224; 1888, Buller, *B. New Zealand*, 2nd ed. v. 2, p. 308, Pl. XLVII.; 1892, Schaff in *J. f. O.* p. 230; 1893, Buller in *Trans. N. Zeal. Inst.* v. XXV. p. 85; 1893, Wright in *Ibis*, p. 283 (Hauturu Island, N. Island).

### DESCRIPTION OF *A. AUSTRALIS MANTELLI*.

$\sigma$  ad. Much blacker than *A. australis*, this being caused by the great reduction in width of the rufous area in the centre of the feathers, and the greater extension of the black edges. Forehead and head dark smoky grey, occiput and hindneck blackish grey. Breast and flanks dark smoky grey, each feather in the middle with a pale buff stripe, abdomen in the middle uniform whitish grey. The tips to the feathers, especially on the hindneck, harder and more bristly.

$\text{♀}$  ad. Similar to the *male*, but larger, and the centres of the feathers

generally more rufous, hindneck darker and the forehead often more whitish grey.

A **Chick**, just hatched, in my collection is rufous brown, feathers irregularly margined with black; bill white.

An older **Chick** in my collection has the black colour much more extended, so that only a few feathers on each side on the flanks have rufous centres.

106 specimens of *A. a. mantelli* in my collection examined.

In this subspecies there often occurs the curious red variety already referred to under the typical form. In several of my specimens the black margins of the feathers are so restricted that the whole bird appears a dull rufous red. This variety is known to the Maoris as the *Kivi Kara* or *Red Kivi*.

MEASUREMENTS OF SKINS OF *A. AUSTRALIS MANTELLI*.

	Culmen.	Bill from gape.	Metatarsus.	Middle toe without claw.
♀ (coll. sexed).	147	159	—	—
♀ "	181	190	85	59
♀ "	150	169	75	58
♀ "	161	166	72	54
♀ "	174	185	73	—
♀ "	166	175	75	56
♀ (Minall sexed).	155	163	69	56
♀ (Doggett sexed).	136	145	67	50
♀ (coll. sexed).	168	175	69	58
♀ (?) (Minall sexed).	135	141	65	48
♀ (coll. sexed).	167	173	64	51
♀ (?) (Doggett sexed).	129	134	67	49
♀ (coll. sexed).	167	171	79	56
♀ "	180	188	78	59
♀ "	177	182	78	60
♀ (not sexed).	180	189	80	—
♂ (s. Buller's Kiwikura).	129	135	69	52
♂ (not sexed).	127	140	58	48
♂ (coll. sexed).	140	145	70	52
♂ "	104	114	59	—
♂ "	131	139	69	56
♂ "	136	140	65	39
♂ "	130	138	68	52
♂ (?) (Minall sexed).	157	163	75	56
♂ (coll. sexed).	133	137	62	55
♂ "	126	137	69	54
♂ "	125	133	67	53
♂ (not sexed).	132	140	69	54
♂ (coll. sexed).	126	137	70	50

It is quite evident that the "Kivi-Kura" is merely an individual aberration, for the following reasons:—

The various specimens are not all alike, and some are coloured intermediately between the ordinary darker brown and the rufous varieties. They are not found in any particular places, but occur here and there among the darker ones. A similar aberration is found among *A. australis australis*.

Ever since the discovery of the North Island Apteryx there has been some



*APTERYX AUSTRALIS* Shaw



AD STEWART ISLAND





APTERYX AUSTRALIS MANTELLI Hard







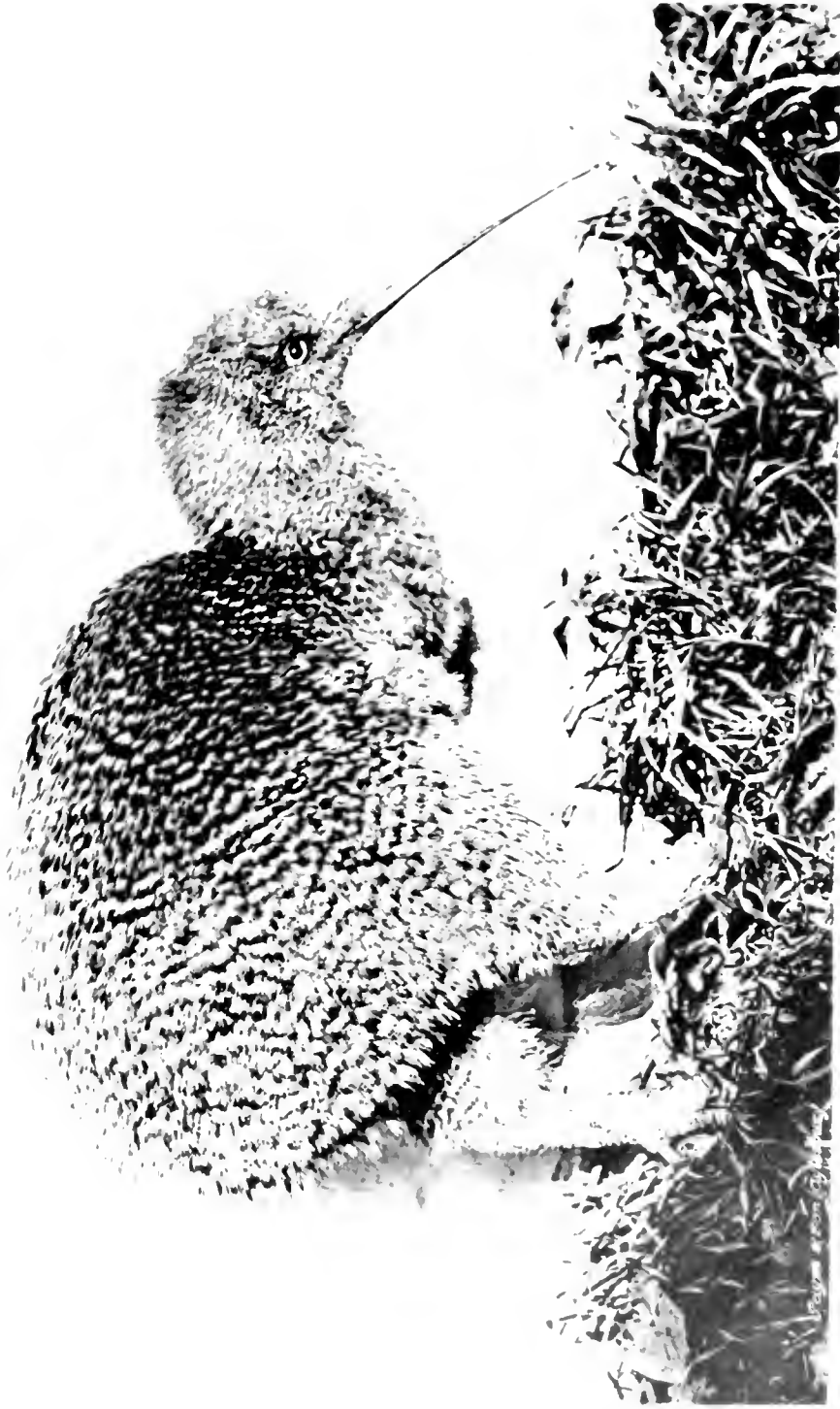
APTERYX OWENI Gould. (TYPICAL FORM)





APTERIX OWENI OCCIDENTALIS Rothsch. ♂ ad.





APTERYX HAASTI Potts. ♂ AD





J. Keulemans del et sculp.

APTERYX A'JIRAI. (See Plate III. fig. 1.)





discussion about its validity as a species, but the majority of those writers who formerly denied its validity now admit that it is specifically distinct from *A. australis australis*. It is true that the North Island specimens can always be distinguished from the true *A. australis* by their harder, more bristly tips to the feathers of the upperside, or at least of the neck. Thus the mere touching of the neck-feathers, stroking the neck upwards, is generally sufficient for discriminating between the two forms. In addition to this peculiarity the southern birds are lighter and often larger. It is therefore wrong to unite the two forms; but the differences being so slight that they are not always very apparent, and the two being representative forms on two not very distant islands, it is more natural to regard them as subspecies than as species. Their anatomy and habits are also quite similar.

The original description of the North Island Kiwi is as follows :—

“ON THE GENUS *APTERYX*. BY A. D. BARTLETT.

(“Aves, Pl. XXX, XXXI.)

“In calling the attention of the Meeting this evening to the large collection of specimens of the genus *Apteryx* on the table, I beg to state that I have been led to make a careful examination of all the individuals I could find in the Collections of the British Museum, the Museum of the Zoological Society, the Royal College of Surgeons, and elsewhere, in consequence of an *Apteryx* belonging to Dr. Mantell having been placed in my hands by that gentleman a few days since, which appeared to me to differ from all that I had before seen. As a careful comparison of this bird with the specimens in the collections before mentioned fully justified me in considering it as a distinct species, I was about to describe it as a new one; but, most fortunately, I heard that the original specimen figured and described by Dr. Shaw (to which he applied the name *Apteryx Australis*) was in the collection of the Earl of Derby at Knowsley. It is with much pleasure I have to acknowledge the kindness of his lordship in honouring me with the loan of this bird, which has enabled me to identify the large *Apteryx* placed in my hands by Dr. Mantell as belonging to this species, and also to determine most satisfactorily the distinctive characters of the common species, which is considerably smaller, and to which the name of *Apteryx Australis* has long been erroneously applied. This bird differs from the original *Apteryx Australis* of Dr. Shaw in its smaller size, its darker and more rufous colour, its longer tarsus which is scutulated in front, its shorter toes and claws, which are dark horn-coloured, its smaller wings, which have much stronger and thicker quills, and also in having long straggling hairs on the face. I may, however, remark, that although individuals of this species differ much in size, depending probably on age, sex, etc., I have found no exception to the distinctive characters above given. I therefore propose the name of *Apteryx Mantelli* for this smaller and more common species,—a humble effort to commemorate the exertions of Walter Mantell, Esq., to whom we are indebted for so many valuable discoveries in the natural history of New Zealand.

“I subjoin a short description of the two species, together with figures of their legs and wings, in order that they may be more readily distinguished.

<i>Apteryx Australis.</i>	<i>Apteryx Mantelli.</i>
Colour, pale greyish-brown, darkest on the back.	Colour, dark rufous brown, darkest on the back.
Entire length, 30 inches.	Entire length, 23 inches.
Bill from forehead, 6 in.	Bill from forehead, 4 in.
Tarsus (reticulated), 2½ in.	Tarsus (scutulated), 2¾ in.
Middle toe and claw, 3¾ in.	Middle toe and claw, 2½ in.
Claws nearly equal in length, and white.	Middle claw longest, all the claws dark horn-colour.
Wings with soft slender quills ; face with short hairs.	Wings with strong thick quills ; face with long straggling hairs.

“In conclusion, I would remark that the specimen of *Apteryx Australis* belonging to Dr. Mantell was collected by his son in **Dusky Bay** ; and I have been informed by J. E. Gray, Esq., that the original bird described by Dr. Shaw was brought from the same locality. As far as I am able to ascertain, all the specimens of *Apteryx Mantelli* are from the North Island.”

This description is so accurate, that, even without the indication of the locality, which is clearly added, it would have been sufficient to admit the name *Mantelli*. It must have been a curious misunderstanding which caused Dr. Sharpe to rename the North Island Kiwi and call it *A. bulleri*, a name which was unfortunately also accepted by Buller in his works.

Specimens of this form are recorded from the Pirongia Ranges, Upper Wanganni River, mountainous part of the Hokianga district, small islands of the Gulf of Hauraki, Kaimanawa Range, Kawhia district, Waitakeri Ranges, Raglan, Waikato coal-mines (1866), Taupiri, Piako Ranges, Howick. Buller says in 1888 : “To the present day they linger on some of the small islands in the Gulf of Hauraki : for although so singular a fact has often been called in question, resting as it apparently did on the mere assertion of the natives, the matter was placed beyond all dispute by Mr. T. Kirk, who obtained several himself on the Little Barrier.”

The Kiwis are very swift runners, and can make very good use of their extremely powerful legs. They are always ready to kick at any object approaching them closely. In kicking they strike forward like an Emu or an Ostrich, but I have seen an *Apteryx australis* from Stewart Island frequently kick backwards as well as forwards. The blow from a Kiwi's foot is strong enough to rip open a dog's leg, and will cut a man's hand to the bone. As is well known, they are nocturnal in habits, but at Tring several North Island *Apteryx* frequently came out of their shed and basked in the sun. The cries of this Kiwi could be heard nearly all over the little town of Tring, when I had dozens of them alive in a paddock near the Museum ; and even now they can be heard all the year round from a pair I still keep near the Museum. They seem to cry when it pleases them, but by no means more than usual on dark and wet nights : on the contrary, I think, most on clear, moonlight nights. They cry chiefly between eight and twelve, and are apparently silent for the rest of the night, but in winter they can be heard from about six to ten o'clock and later. The cry of the *male* is a somewhat hoarse, shrill whistle, often distinctly like Ki-i-wi, often shorter, more in one syllable. The *female* answers in a less loud, harsher and shorter more screaming note. The young and half-grown birds also, according to Sir Walter Buller, call to each other, the *male* in a thinner whistle and the *female* in a thick husky way. Sometimes, but rarely, a low cackling or grunting note is heard, probably of

both *male* and *female*. When angry they hiss audibly, and when feeding make a sniffling noise with their nostrils, evidently to clear them from extraneous matter.

Their natural food is entirely worms, but occasionally they are said to swallow seeds and fruits. I have had many alive, some now in the ninth or tenth year. They delight in earthworms, but live excellently on raw meat, chopped up in small pieces, boiled potatoes and soaked bread. In this climate it is best to allow them a free run in the open, on soft ground, where they can probe for worms, and they must, of course, have a low, dark, but dry, little room under ground, or made of a box. This hiding-place must be well covered, to keep warm in winter and cool in summer, while artificial heat is quite unnecessary, except in—for England—exceptionally cold winters.

They are nearly all, but more so the larger species, of a very pugnacious disposition. As they kick vehemently, and are able to cut the hand to the bone, one must be careful in handling them, and if it is necessary to catch them, grasp both their legs quickly in one's hand.

In the *Birds of New Zealand* (ed. 2, v. 2, p. 315) Sir Walter Buller describes his Kiwi hunts in the Pirongia Ranges as follows :

“At noon on Tuesday, Nov. 1st, we had completed all our arrangements for a week's sojourn in the bush, and started, fully equipped, for a small kainga, about a mile from Alexandra, where we found our men and dogs awaiting us. The former consisted of an experienced Kiwi-hunter, Wiremu Ribia by name, and two young natives who were to carry our provisions and make themselves generally useful. The dogs were small black mongrels, one of them having something of the colley in him. My companion was Mr. G. Lindauer, the well known Austrian artist, who fully shared my enthusiasm about a Kiwi-hunt. Some little time was lost in arranging terms with the men and a tariff for the use of the dogs. It was 3 p.m. before we got fairly started on our expedition. The central cone of Pirongia, which encloses an ancient volcanic crater, towers up to a height of 2800 feet above the level of the sea, and is clothed with dense vegetation to its very summit. The ascent commenced at once, and in less than an hour we had reached the site of the ancient Pirongia pa, the earthworks of which were still distinctly traceable, indicating fortifications of a very formidable kind in the olden time. From this point we obtained a grand panoramic view of the Waikato lands—the theatre of the late war between the British troops and the Maoris, lasting over several years and costing much ‘blood and treasure.’ Away to the right, standing up in bold relief against the sky, was Kakrapuku, in the form of a natural pyramid, and, in the distance beyond, the long central range of Maungatautari, marking the ancestral home of the Ngatirankawa. Far down below us, winding through the plains and showing itself at intervals like a broad streak of molten silver, was the picturesque Waipa river, bounding the ‘King's territory’ and spanned, in the direct line of our view, by the new bridge leading to Whatiwhatihoe, recently opened by the Native Minister, and named by the king, in a symbolic way, Tawhara-kaiatna. Away to the extreme right, looking hazy blue in the afternoon light, were the heights of Rangitoto, where, according to our native guides, there exists another Kiwi preserve; and far beyond again could be seen the snowclad tops of Tongariro and Ruapehu, the giants of the north. In the deep gullies around and in front of us clumps of native bush in all its endless variety filled in the view, the ever-present tree-fern with its lofty crown of spreading fronds being the predominant feature. Groves of these

beautiful objects, and thousands of single ones scattered through the bush, render the landscape characteristic and picturesque. After a brief halt, our natives resumed their swags and we continued the ascent, arriving at Pukehona, at the edge of the mountain-forest, in time to fix our little camp and cook the evening meal before the shades of night had closed in upon us. At daybreak one of the native attendants called me up to hear the rich flute notes of the Kokako (*Graucopis wilsoni*) in the low timber at the edge of the forest. I went after him with my gun, but owing to the thickness of the underwood I failed to find the bird. Leaving our camp at 6 a.m., we entered the dense bush and resumed our ascent of the range. Before we had gone far the dogs (each of whom carried a sheep bell around his neck) took up the Kiwi scent and disappeared down a ravine, one of the natives dashing after them. He presently reappeared with a fine female Kiwi, which was immediately secured in a Maori ket. I returned with him to the spot, and saw at once how utterly hopeless it would be to attempt Kiwi-catching without dogs. Near the bottom of a deep gully, completely choked up with the ground-kiekie (*Freyinetia banksii*), so thick and luxuriant indeed that it was a matter of difficulty to push through it at all, down among the gnarled roots of a tawhero, and quite hidden by a growth of *Asplenium bulbiferum* and other ferns, was the entrance to the Kiwi's retreat—a rounded and perfectly artificial entrance, just large enough to admit the hand. I inserted my arm to its full length and could just reach the extremity of the chamber, which spread laterally and widened at a little distance from the mouth. On getting back to the track on the ridge, the natives showed me another "ma-kiwi" from which they had, not long before, taken an adult kiwi and an egg. This hole was in brown vegetable mould alongside a fallen tree, and the entrance was so perfectly round that I at once felt persuaded that the Kiwis, if they do not actually dig or burrow their holes with their well-armed feet, at any rate scrape and adapt them. Natural holes and cavities are so numerous, owing to the gnarled character of the roots, that the birds would have no difficulty in finding a cavity suitable for nesting purposes, with the smallest possible labour in preparing it. But more about this anon. After a couple of hours' tramp through the bush we came to the place previously decided on for our camp and daily rendezvous.

"Our natives were not long in putting up a double shelter, in the form of an inverted V with the apex open. A log fire occupied the space between, the opening in the roof permitting the smoke to escape. My friend and myself occupied one side, and the natives the other. These bush huts, which are quite impervious to the rain, are very simply and rapidly constructed. First a slanting framework of slender sticks cut from the adjoining woods is erected, and this is thatched on top and sides with the pliant leaves of the nikau plant (*Arca sapida*), the long fronds being skilfully interlaced together, and covered on the outside with a thick layer of tree-fern branches placed with the lower surface reversed, so as to prevent annoyance from the dusty seed-spores.

"Our camping place was conveniently chosen, with ready access to firewood and water, besides being a very picturesque spot; and as it may give some faint idea of the richness and surpassing loveliness of the New Zealand 'Bush,' I shall endeavour to describe it. Behind and overshadowing us was a grove of fine tawa trees, their tops meeting so as to admit only a glimmering of the sunlight; and immediately beyond them, in striking contrast with the clear, upright boles of the former, a group of tawhero, their trunks covered from the ground upwards with a

dense growth of climbing kieke, spreading out its tufted arms in all directions. Right in front of us was a thick and almost impenetrable tangle of undergrowth, laced together with the kareao-vine, which hangs its wiry cables from the tree tops above and twists and coils about among the underwood in every conceivable form. Then a little to the right, and open to the light of heaven through a gap in the forest, could be seen a lovely group of *Cyathea medullaris*, the stems of the largest being some forty feet in height; and in their very midst, touched by their waving fronds and leaning against a sturdy hinan, stood a withered, crownless trunk, covered with a thick profusion of epiphytic plants in every shade of green, and forming with the tree-ferns a study that I was never tired of gazing upon from our open shelter. When broad daylight poured in upon us through the opening in the forest, or the slanting rays of the setting sun lighted up the feathery crowns of these majestic tree-ferns, casting the vegetation below into deeper shade, the effect was simply enchanting. Then out of the tangle in front there rose a beautiful specimen of *Cyathea dealbata*, its starlike crown a perfect model of graceful symmetry, and its lofty stem draped with creeping kohia of brilliant green; while, to heighten the general effect, there hung from a neighbouring tree festoons of the beautiful white elematis, just bursting into full bloom. Examined more in detail, the surroundings of our little camp were full of interest. The whole ground was carpeted with mosses and ferns of all the commoner species, whilst a fallen log at our very feet presented on its damp surface a perfect garden of the curious kidney fern (*Trichomanes reniforme*), tens of thousands of beautiful ferns of vivid satiny-green crowding one upon another in endless profusion, intermingled with the delicate fronds of *Hymenophyllum*. Whilst we were engaged in camp preparations the native lad who had taken charge of the dogs came in with three fine Kiwis, caught in our vicinity, but unfortunately crushed to death, as the dogs were left unmuzzled.

“ After having refreshed ourselves in the morning, we started on our first real Kiwi-hunt. We took a course down the side of the gully, and were soon in a perfect labyrinth of supplejack (*Rhipogonum scandens*). These vines hung from the trees, ran along the ground, twisted around each other and crossed and recrossed, forming the most complete Chinese puzzle one could imagine, and so interlacing the underwood together that it was a matter of extreme difficulty to get through it even at a slow pace. Then when the little dogs took up the scent and disappeared down the gully it became necessary to follow quickly in the direction their bells indicated, so as to be ‘in at the death’; and then the hunt became as exciting as it was difficult—the kareao catching the feet and tripping one up, or striking painfully across the shins—and so up and down, now swinging by a vine, now pushing on all fours through the tangle: forcing one’s way through clumps of kieke and dense beds of *Tomaria* down into the bottom of the ravine; then, as the scent led upwards, following the tinkling bells (the dogs being out of sight) up the tangled slope again, the course sometimes forming a complete circuit of the ‘field,’ and representing the erratic wanderings of the Kiwi upon the feeding ground the night before. Heated, out of breath, scratched in the face and hands, and with our shins aching from repeated contact with the kareao-vines, every now and then we halted to ascertain by the sound of the bells the position of the dogs, and then, full of excitement, resumed our novel chase again. At length, just beside a rough track on the hill-side, our dogs ran their quarry to earth, and began to tear with their paws at the opening to the ‘rua-kiwi.’ Calling the dogs off and closing in upon the spot, we drew from the cavity a fine male Kiwi, and then two vigorous

young birds, all unharmed, but evidently much scared, and striking boldly with their claws. Our captives were soon secured in a Maori ket and we sat down to rest for a short time before taking up the scent again. I put my arm far down into the cavity, and found that, although the rounded entrance was just large enough to admit the bird, the chamber opened out inside, extending diagonally to a depth of about two feet, and wide enough at the bottom for the accommodation of two full-grown birds. I drew out the nest materials, consisting of shreds of kiekie-leaves and other dry litter, mixed with Kiwi feathers.

“ We had not to hunt long before we came upon another bird, a fine adult female, and presumably the mate of the one we had just caught. She had taken refuge in a cavity under a rata-root, and one of the dogs, having unfortunately slipped his muzzle, killed the bird by breaking her neck. Other captures followed, and the aggregate result of the first day’s hunt was ten Kiwis of all ages, and one splendid egg. The ground traversed by us during this hunt and extending over many miles gave evidence everywhere of the presence of Kiwis by their borings in quest of food. These were very numerous in all suitable localities, and were of all sizes, assuming in soft ground the appearance of deep funnels with a circular opening four inches or more in diameter, being thus formed by the rotatory action of the bill in its search for the hidden food. The ground seems admirably adapted for this purpose, consisting of a brown vegetable mould. It is easily worked, and, as I ascertained by digging, this earth teems with annelids and insect life of various kinds.

“ Not far from our camp there was an ancient rara-tree—its age extending to many hundreds of years, its hollow trunk bound round with huge cables of aka, and holding in its hoary arms tons of *Astelia* and other parasitic plants. One of our natives set fire to this tree near the base. The accumulation of dry vegetable substances soon ignited, and the flames ascended the hollow trunk with a roar like that from a steamer’s boiler. All day long this monarch of the forest burned fiercely, sending up a column of smoke visible many miles away on the Waikato plains. During the night we were all startled from our sleep by the fall of this burning tree, which came down with a terrific crash carrying everything before it. We had just time to turn out of our blankets and witness a ‘display of fireworks’ compared with which the Crystal Palace Exhibition is mere child’s play!

“ In the early part of the night we heard the shrill cry of a Kiwi—a prolonged whistle slightly ascending and descending (whence the native name)—and when it was sufficiently light our natives went out with the dogs and brought in an adult female and two young ones. These were found together in one hole. The mate was no doubt one of those obtained in the same locality on the previous day.

“ Early next morning, accompanied by a native, I climbed to the summit of Pirongia proper, and had a magnificent view of the Upper Waikato, the day being beautifully clear and cloudless. The ascent is somewhat laborious, owing to its steepness and the absence in many places of anything like a bush-track. Almost to the very summit of the peak we met with traces of the Kiwi in earth-borings of the kind already described: but although we had one of the dogs with us, we did not find any birds in our track. My native companion was no doubt right in his statement that the Kiwi at night roams over the feeding grounds, and returns on the approach of day to the shade of the gullies where the light penetrates more feebly. All along this mountain track and on the summit I found in great abundance the katoutou shrub with its bright green foliage and pretty tassels of crimson flower. This afternoon yielded two more adult males and two young ones, besides an egg

just ready to be hatched. The succeeding morning was showery, and although the men made an early start they brought in about noon only two more adult birds (male and female), taken at different places, and two more young ones, the effect of the rain being to obliterate the scent and spoil the hunt. The weather having now set in very wet and tempestuous, we had to discontinue Kiwi-hunting and see to making our temporary shelter more secure, by an extra layer of kiekie thatch. The rain came down in torrents towards evening, but on the whole we found ourselves very comfortably housed.

“Our expedition lasted a week, with varying success each day according to the weather; the total result being forty Kiwis of all ages and nine eggs.

“We partook of the flesh of one of the Kiwis which the natives had boiled. It had the dark appearance of, and tasted very much like, tender beef.

“The first two birds (both females) killed by the dogs I dissected with the following result:—The stomach of one contained three wetas (*Deinacrida thoracica*), ten luhn grubs, mostly of large size, several earthworms, and a small brown beetle which my son Percy afterwards identified as *Coptomma acutipenne*; also some berries of the mairi and taiko (well-known forest trees) and a round object, nearly as large as an ordinary marble, which proved to be the egg of the great earthworm toke-tipa. Before we had made out the last-named thing I handed it for examination to my companion, who pressed it between his finger and thumb, when it burst, sending a jet of milky fluid into my eye, causing much smarting and subsequent irritation. The stomach of the other bird contained, besides insect-remains, a large number of the hard kernels of the taiko berry; and it seems to me that these are swallowed by the Kiwi (in lieu of quartz pebbles, which are not found in every locality) to assist the process of digestion. I have found similar kernels in the stomachs of Kiwis received from the Upper Wanganui. Among the comminuted matter I was able to detect some very minute landshells. In the stomach of another, which I opened afterwards, I found a number of angular pieces of pebble; and others contained the hard kernels of pokaka, miro, mairi, and hinau berries.

“The adult birds when taken from their holes were perfectly mute, but endeavoured to wound with their sharply-armed feet, and made a snapping noise with their bills. I soon found that the safest mode of holding them was suspended by the bill. They then only struggle vainly and strike the air with their feet; but if their rumps are allowed to touch the ground, so as to give them leverage, then they strike with effect, as I was not long in discovering. A strong adult bird is capable of inflicting a nasty scratch with its sharp claws by a downward stroke; and one of our natives showed me some skin wounds, long ugly scratches on his arms and legs, inflicted on the previous day by a large Kiwi which he had followed into a sort of cavern at the edge of a stream and captured with his hands.

“Judging by analogy and the form of the bird, I felt persuaded that the Kiwi was a burrower, but our native attendants all denied it. We had undoubted proof of it, however, before we had finished. For the safe custody of our captive birds we had constructed a commodious cage, consisting of kareao-vines well arched over, with both ends driven firmly into the ground, then laced together with native flax and covered over with fern-fronds to keep out the daylight. The birds seemed perfectly at home at once, and commenced to eat the minced-up fresh meat supplied to them. The old birds continued silent, but the young ones emitted now and then, and especially at night, a low sound not unlike the whimpering of a new-born kitten. The cage contained seven fine adult birds, four females and three

males. To our dismay in the morning we discovered that all the former had made their escape during the night through a burrow which undermined the kareao-vines and passed right under an adjacent log, a distance of some eighteen inches. The three male birds were still in the cage. It is evident that the females alone perform the work of digging and preparing the 'rua,' although, as will presently appear, they take no part whatever in the incubation of the eggs. All the specimens of this sex collected by us at this season had the plumage of the back and rump so abraded and worn as to be quite valueless as skins, and were accordingly reserved for skeletons. The males, on the other hand, while having in every instance the abdomen denuded of feathers by constant sitting, generally presented a smooth and undamaged plumage. In further proof of this, the adult females invariably had their claws blunted, as the result of their scraping or digging operations, whereas the other sex (except very old birds) had these weapons perfectly sharp.

"I have already described how some of our captives effected their escape on the mountain by tunnelling under their cage. We had further evidence, after our return to Cambridge, of their engineering skill. One of my birds—not a *Pirongia* captive, but one caught by the natives in the Kawhia district and the largest specimen of *Apteryx bulleri* I had ever seen—was placed with the rest in a vacant stable, which had previously been secured all around the sides to prevent burrowing. To my astonishment, however, in the morning, I found that 'Madam Jumbo' (as we had christened this large Kiwi) had, during the night, forced aside a heavy packing-case, removed a loose scantling stud, deliberately tunnelled a passage through the hard foundation, and escaped from her place of confinement, taking one of her companions with her. They had disappeared in a deep fern gully, and we naturally thought we had seen the last of them. But the birds had been liberally fed during their imprisonment, and this taste of civilisation was sufficient, after a day's absence, to bring them back again into the township. The following morning the male bird was found in the backyard of a chemist's shop, where he was causing consternation among the fowls, whilst 'Madam Jumbo' deliberately marched up the hill into the Constabulary Barracks and made for the officers' quarters, where she was overheard, at daybreak, patrolling the Captain's verandah (tapping the boards gently with her bill), and was immediately put under arrest."

In October 1866 Sir Walter Buller writes: "One of the inmates of my aviary at present is an adult female Kiwi, only recently captured. During the day it retires into a small dark chamber, where it remains coiled up in the form of a ball—and if disturbed or dislodged, moves drowsily about, and seeks the darkest corner of its prison, when it immediately rolls itself again into an attitude of repose. It appears to be blinded by the strong glare of sunlight; and although it recovers itself in the shade, it can then only detect objects that are near. Night is the time of its activity; and the whole nature of the bird then undergoes a change: coming forth from its diurnal retreat full of animation, it moves about the aviary incessantly, tapping the walls with its long slender bill, and probing the ground in search of earthworms. The feeding of this bird at night with the large glow-worm ('toke-tipa' of the natives) is a very interesting sight. This annelid, which often attains a length of 12 and sometimes 20 inches, with a proportionate thickness, emits at night a bright phosphoric light. The mucous matter which adheres to its body appears to be charged with the phosphorus; and on its being disturbed or irritated the whole surface of the worm is illuminated by a bright green light, sufficiently strong to render adjacent objects distinctly visible. Seizing one of these



large worms in its long mandibles, the Kiwi proceeds to kill it by striking it rapidly on the ground or against some hard object. During this operation the bird may be clearly seen under the phosphoric light, and the slime which attaches itself to the bill and head renders these parts highly phosphorescent : so that, even after the luminous body itself has been swallowed, the actions of the bird are still visible. There is no longer the slow and half-stupid movement of the head and neck : but the bill is darted forward with a restless activity, and travels over the surface of the ground with a continued sniffling sound, as if the bird were guided more by scent than by sight in its search for food."

About the propagation we find the following notes in the *Birds of New Zealand* :—

" My investigations on the spot enabled me to determine one important fact with certainty—namely, that, as with the Mooruk, the Cassowary, the Emu, and the Rhea, the male bird alone performs the labour of incubation and takes upon himself the entire charge of the young till they are old enough to shift for themselves.—The female, without any assistance from her mate, digs or scoops out a nesting-place, usually adapting to her requirements an existing hole or cavity in the ground, forms a rude nest and deposits her two eggs. Having done this, she walks off and disclaims all further responsibility, abandoning her mate to his share of the parental duty, and (so the natives allege) immediately pairing with another male and forming a new nest elsewhere."

The last sentence of these observations had probably better be disregarded. The " walking off and disclaiming all further responsibility " (*sic*!) is hardly based on observation, and the native statement that they pair again immediately cannot be fully credited, as it would mean a constant breeding throughout the year. It is also opposed to observations in captivity, for we have found that the pairs keep, as a rule, well together, even out of the breeding season. One of the Kiwis in my possession destroyed her own egg, on which the male would not sit. Although Kiwis have laid eggs in England, in the Zoological Gardens, in my own, and in the late Lord Lilford's aviaries, they have never yet hatched.

" The breeding season evidently extends over a considerable period. Of the ten eggs collected by our party during the first week of November, nine contained well-developed chicks, some of them just ready for extrusion, and the tenth was perfectly fresh. The very young bird figured on page 326, and the egg purchased from the natives, were taken from one hole, and the male bird was still sitting. From the condition of the chick, I judged that if undisturbed it would have been hatched out in another day or two : it was alive and active when the shell was opened, although the egg had been out of the nest for several days. Some of the young birds taken by us were apparently about two months old. I think it probable that there are two broods in the season, inasmuch as one of our adult birds contained in its ovary a large bunch of undeveloped eggs, up to the size of buck shot, whilst, as stated on page 314, a recently captured bird which I had, many years ago, at Wanganni, produced a fully matured egg on the 22nd of March.

" One of the nests found by us contained a young bird and an egg (an unusually large one, and from its white appearance evidently newly laid) ; another contained a single young bird, and two others contained each two young ones. All of them, with a solitary exception, were active and strong, snapping angrily with their little bills and attempting to strike with their feet. The exception referred to could not have been hatched out very long, because it was too weak to run, and, after the

manner of young nestlings, had an abnormally large stomach. It is evident that the bird usually lays two eggs; occasionally, however, there is only one, and Mr. Cheeseman informs me of two well-authenticated instances of three eggs in the nest—one in the Waitakerei Ranges and the other at Raglan. In both cases the eggs were brought to the Auckland Museum, and the fact vouched for to his satisfaction.

“The natives state that the Kiwi begins to lay in August, which is quite likely to be true, as the eggs must take a long period to incubate. It will be remembered that Mr. Bartlett’s bird (mentioned on page 314) sat on perseveringly from the beginning of January to the 25th of April. In further support of this view I may mention the following circumstance. Among the live birds brought from Pirongia was a female which appeared to be carrying a well-developed egg in the oviduct, inasmuch as it moved about with awkwardness and habitually rested on the tarsus horizontally as described at page 314. She was more untractable than the other birds, attacking the hand when approached, striking savagely forward with her feet, and uttering at the same time a low growl. This bird was killed by an accident about the middle of February following; and on dissection I found a membranous egg, about two-thirds the full size, the shell not having yet formed. In the ordinary course a fortnight would probably have elapsed before the exclusion of the egg for incubation. Again, among the birds captured by my party there were three young birds of the year: that is to say, of such a size as to make it probable they had been hatched out about April or May. If the conclusion thus pointed to is the true one, the nesting operations of the Kiwi must extend over a great portion of the year: in which case its reproduction is not the least interesting feature in the natural history of this anomalous bird. In all the eggs I opened (save one freshly laid) there was enclosed with the well-developed feathered chick, a tough membranous sac, connected with the embryo and containing several ounces of yellow fatty substance (Vitellus). When all this adipose matter has been absorbed into its system, the chick, having in the meantime expanded to its full size, cracks its tabernacle and comes out into the world ready for active service. It is very soon able to forage for itself, and increases rapidly in size, inasmuch as the young which I attempted to rear had more than doubled their size in six months.

“The eggs, which are broadly elliptical in form, vary somewhat in size. The largest of those collected by us measured 5.30 inches in length by 3.30 in breadth; and the smallest 4.5 by 2.7. The latter weighed exactly 11½ ounces, being just 4 ounces less than the weight of our largest. Two other eggs of full size weighed respectively 14 oz. and 15½ oz. They vary likewise in form, some being more elliptical than others, whilst one in my possession is perfectly oval. Some are pure white when laid, others have a greenish-grey tint; but owing to the long period of incubation they get much soiled by contact with the bird,\* the shell becoming a dirty yellowish-brown colour. This is easily washed off, by the application of a brush, in soap and cold water; but I think it is necessary to do this whilst the egg is fresh, for there is a greasy matter on the surface which would no doubt make the discoloration permanent if allowed to become perfectly dry. The fresh egg on being emptied of its contents exhibited a delicate pink tint on the inner surface of the shell; but this was absent in those containing chicks.”

I have very little to add to Sir Walter Buller’s notes. To me it seems almost

\* It is in my opinion not so much the contact with the bird—or its feet, as elsewhere stated—but with the soil and nesting material, that discolours the egg of the Kiwis, like those of other birds (*Podiceps* for example).

incredible that an *Apteryx* should lay more than one egg at the time, and the fact that two and even three have been found in one hole is not quite conclusive to show that they were laid by one female. However, the Kiwi female in the Zoological Gardens has several times laid two eggs in one year, but between the first and second a period of four or five weeks elapsed, and it was noticed that the male could not entirely cover the two eggs with its body. These facts do not seem natural, and do not support the theory that several eggs are hatched at one time. The shell being rather thin, and the temperature in the nests naturally high, there is no reason to believe that the time of incubation is an unusually long time; and the native report mentioned by Gould, that the period of incubation is six weeks, may perhaps be quite correct, but it is a pity that nothing definite is known about it.

The eggs of Mantell's Kiwi in my collection measure as follows:—

134	by 73	mm.	121	by 77·6	mm.
131	„ 79	„	121	„ 78·5	„
131	„ 80	„	120·5	„ 79	„
130	„ 85·5	„	119·6	„ 80·5	„
127	„ 77·2	„	119	„ 74·5	„
124	„ 80·6	„	118·3	„ 75	„
124	„ 76·5	„	109	„ 72	„ (abnormally
124	„ 85	„			small. From Sir Walter
123	„ 80	„			Buller).
121	„ 77	„			

The weight of one in my aviary was 18 ounces. The shell is very thin, the grain rather fine and totally different from that of all other Struthion Birds, more resembling that of the eggs of *Rallidae* or of *Otis*, than that of the eggs of *Struthio*, *Rhea*, *Dromaeus*, and *Casuaris*. The empty eggshell is very light in weight, being on an average about 1 ounce or little more, while that of the smaller egg of the swan is about 1½ oz., and that of the still much smaller egg of *Aptendodytes longirostris* is also about 1½ oz.

### 3. *Apteryx haasti* Potts.

#### *Haast's Kiwi.*

1861. *Apteryx australis* (non Shaw), Haast, *Topogr. & Geol. Expl.* p. 139 (Nel-on Prov.); id. in *Ibis*, 1862, p. 104;
1872. *Apteryx haasti*, Potts in *Trans. N. Zeal. Inst.* v. IV. p. 204; id. in *Ibis*, p. 35 (Okarito country); 1872, Finsch in *J. f. O.* p. 271 (after Potts); 1873, Potts in *Trans. N. Zealand Inst.* v. V. p. 195; Finsch *t.c.* p. 212; 1874, Potts in *Zoologist*, v. 32, p. 4014; 1874, Finsch in *J. f. O.* p. 220; 1874, Rowley in *P. Zool. Soc. Lond.* p. 497; 1875, Rowley in *Orn. Misc.* v. I. p. 3, Pls. I., III.; 1881, Forbes in *P. Zool. Soc. Lond.* p. 781 (trachea); 1882, Buller, *Man. New Zeal. B.* p. 46, No. 57, Pl. XXII.; 1889, Smith in *Trans. New Zeal. Inst.* v. XXI. p. 224; 1893, Buller in *Trans. New Zeal. Inst.* v. XXV. p. 87; 1893, Kingley, *t.c.* p. 198 (young); 1895, Buller in *Trans. N. Zeal. Inst.* v. XXVII. p. 126, 1896, v. XXVIII. p. 358; 1893, A. Newton, *Diet. of B.* p. 496; 1893, Rothschild in *Ann. Mag. Nat. Hist.* (6) v. XI. p. 43 (error); 1893, Forbes *t.c.* p. 159 (correction); 1893, Rothschild, *t.c.* p. 299; 1893, id. in *Bull. B. O. Club*, No. X. pp. LX, LXII. and reprint in *Ibis*, pp. 573—575; 1894 in *Bull. B. O. Club*, No. XVII. p. XXXVI., and reprint in *Ibis*, p. 429.
- ?1841. *Fremant*, J. Gould in letterpress to *A. oveni* in v. VI. of *Birds Austral.*; 1847, Strange in *P. Zool. Soc. Lond.* p. 51 (from native reports. Deser. nulla); ?1861, *Apteryx natjar*, Ellman in *Zoologist* p. 7468, *Ibis*, p. 416 (deser. nulla); ?*Apteryx navarina*, Bonaparte (ex Verreaux MS.) in *Compt. Rend.* v. 43, pp. 841, 1026 (deser. nulla! Native reports about a very large

Kiwi and inspection of an egg, the enormous size of which evidently induced Mons. Verreaux to believe that its parent was a much larger bird than the common Kiwi): 1873. Potts in *Trans. and Proc. New Zeal. Instit.* v. V. p. 195.

DESCRIPTION OF *A. HAUSTI*.

♂ ad. Head brownish grey, this colour being produced by the bases of the feathers being ashy grey, and the tips darker, almost blackish. Neck similar but with more or less indistinct brownish buff bars before the tips of the feathers, giving the neck a somewhat undulated appearance. Rest of upper surface clay-brown with darker and lighter cross-bars, each feather being brownish grey for about its basal half, the interior half brownish black with two well-defined whitish buff bars and the tip light brown. Under surface much paler and greyer, the transverse bars being indistinct. Bill pale yellowish horn-colour. Iris dark brown, Tarsi and toes dark brown, claws dark horn-brown. Total length about 560 mm. culmen from base 100, 108, 112, 115, 115, 115, 120, 121 mm. from gape to tip 117, 125, 125, 128, 130, 130, 134, 135 mm. Metatarsus 72, 75, 76, 76, 78, 79, 80, 80, 82 mm. Middle toe without claw 55, 56, 57, 59, 60, 61, 61, 62, 65 mm. (Nine evidently adult sexed *males* in my collection measured.)

♀ ad. Similar to the *male* but considerably larger, and the colour generally somewhat richer and darker brown above. Total length about 660 mm., culmen from base 134, 138, 139, 143, 144, 146, 152, 152, 156, 157, 160, 161 mm., from gape to tip 144, 150, 150, 155, 158, 160, 160, 163, 164, 166, 168, 172 mm. Metatarsus 80, 80, 80, 83, 87, 87, 88, 88, 89, 91, 91, 92 mm. Middle toe without claw 58, 61, 62, 63, 63, 63, 65, 65, 68, 68, 70, 77 mm. (Twelve evidently adult sexed *females* measured.) One adult specimen measuring as above 112, 123, 82, 70 mm., is marked as a *female* by Sir Walter Buller, but I have no doubt is a *male*.

Soon after moult the plumage is darker, but when much worn it appears much paler.

Chick in first plumage very similar to the old bird, but somewhat more yellowish, the lower bar on the feathers nowhere well-developed, but only faintly indicated. All the feathers, chiefly at their bases, softer and more downy.

Aberrations: I have one adult *male* with the head and chin nearly quite white, a narrow line of white running down the foreneck and chest, and a few white feathers scattered here and there on the hindneck and back.

For the above descriptions I have examined 43 specimens at present in my collection, of which 17 are from the Heaphy Ranges, the rest without indication of exact locality.

The adult *Apteryx hausti* is easily distinguished from any *A. oweni* by its very much larger size, especially the very robust and long bill and large feet. The plumage differs in its brown coloration. The pale bars are much wider and more distinct. Young *A. hausti* as a rule are easily distinguished from *A. oweni* by the characters of the plumage, occasionally, however, we find a young *A. hausti* which is difficult to separate from large West-coast specimens of *A. oweni* with very distinct barring to the feathers. It is said that *A. hausti* has always dark claws, but this is not constant. As a rule the claws are blackish, but I have one with white and several with light brown claws, while those of *A. oweni* are also sometimes dark brown.

The eggs are like those of *A. australis* and its subspecies. I have only three, received from Sir Walter Buller. Two are evidently normal eggs of a greenish white colour and measure 130 by 77, and 125 by 92 mm. The third one,

from the Heaphy Ranges, is clearly abnormally small, and has an exceptionally thick shell and is elliptical oval in shape, while usually the eggs of *Apteryx* have a more or less distinctly pointed smaller end. It measures 115 by 71.5 mm.

This fine Kiwi is only known to inhabit the mountain-range running parallel to the west coast of the South Island. In my controversy with Dr. Forbes in the *Annals and Magazine of Natural History*, and in the *Bulletin* of the B.O. Club, I have made erroneous statements about this species also being found on the North Island, where only *Apteryx australis mantelli* and *A. oweni occidentalis* are known to occur. My mistake arose from a specimen of *A. oweni occidentalis* having been sent to me from the North Island as a young of *A. haasti*, and from the fact that specimens of *A. haasti* were liberated on a small islet near Papaitonga.

Very little is on record about the life-history of Haast's Kiwi, but from what we know its habits are similar to those of the other species of *Apteryx*.

#### 4. *Apteryx oweni* Gould.

##### *Owen's Kiwi.*

1847. *Apteryx oweni* (spelt *Owenii*) J. Gould in *P. Zool. Soc. Lond.* p. 94; 1848, Gould, *B. Australia*, v. VI. Pl. 3; 1849, Gould in *Trans. Zool. Soc.* v. III. p. 379, Pl. 57; 1851, Reichenbach, *Syn. Av. Gallinaeae, Novitiae*, t. 387, ff. 2692, 2693; 1861, Selater & Hochstetter in *Rep. Brit. Ass. Adv. Sc.* p. 176, and *Nat. Hist. Review*, p. 505; 1862, Selater in *Trans. Zool. Soc. Lond.* v. IV. p. 362; 1867, Finsch in *J. f. O.* pp. 329, 346, 1872, p. 268, 1874, pp. 174, 220; 1869, Potts in *Trans. N. Zealand Inst.* v. 2, p. 67 (egg); 1873, Schlegel, *Mus. P. B. v. 1V. Struthionae*, p. 8; 1873, Buller, *B. New Zealand*, 1st ed. p. 368, Pl. 34; 1873, Garrod in *P. Zool. Soc. Lond.* pp. 470, 641 (anatomy); 1874, Haast in *Ibis*, p. 215; 1875, Rowley in *Orn. Misc.* v. I. p. 29 Pl. II. (*♂* ad.) Pl. V. (*juv.*); 1876, Buller in *Trans. New Zealand Inst.* v. VIII. p. 193; Forbes in *P. Zool. Soc. Lond.* p. 781 (trachea); 1882, Buller, *Manual N. Zeal. B.* p. 46, Pl. XXI. a; 1884, A. B. Meyer, *Abbild. Vogelskelette*, p. 42, Pl. LIV.; 1884, Reischek in *Trans. N. Zeal. Inst.* v. XVII. p. 192 (biological observations); Beddard in *P. Zool. Soc.* p. 189 (anatomy of heart); Parker in *Ibis*, p. 127 (manus); Buller, *B. New Zealand*, 2nd ed. v. II. p. 327; 1891, Buller in *Trans. N. Zeal. Inst.* v. XXIV. p. 90 (Preservation Inlet), 1893, v. XXV. p. 86; 1893, A. Newton, *Dict. B.* p. 495; 1893, Rothschild in *Bull. B. O. Club*, No. X. pp. LX—LXII, and *Ibis*, pp. 573-6; 1895, Buller in *Trans. N. Zeal. Inst.* v. XXVII. pp. 82, 137, 142; 1896, Buller, in *Trans. N. Zeal. Inst.* v. XXVIII. p. 357.
- 1869, 1871, 1872, *Apteryx oweni*, Selater in *P. Zool. Soc. Lond.* pp. 468, 479, 861.
- 1873, *Apteryx mollis*, Potts in *Trans. & Proc. N. Zeal. Inst.* v. 5, p. 196 (Martin's Bay, W. Coast, albino).
- 1875, *Apteryx fuscus* (non Potts, 1873), Rowley in *Orn. Misc.* v. 2, p. 8.

##### DESCRIPTION OF *A. OWENI*.

*♂* ad. Head and throat brownish grey, darker on the occiput and hindneck, feathers of the neck slightly marked with indistinct greyish-whitish bars, which increase in distinctness towards the back and flanks. Upper surface of body deep brownish grey, each feather with one or two bars of a greyish white colour. These bars are less wide and generally less distinct than in *A. haasti*, being more or less of a horseshoe shape and irregular in outline. Undersurface of body much paler, of a whitish grey colour with a number of darker grey bands on each feather. Total length about 415 mm. Measurements of ten sexed adult *males* in my collection: Culmen 84, 76, 90, 80, 83, 80, 96, 77, 87, 76. Bill from gape to tip 95, 85, 99, 90, 90, 87, 110, 84, 92, 83. Tarsus 56, 54, 55, 61, 55, 57, 59, 52, 54, 55. Middle toe without claw 43, 47, 42, 50, 45.5, 46, 48, 44, 42, 40 mm.

♀ ad. Similar to the adult *male*, but larger and sometimes slightly darker. Total length about 480 mm. Measurements of nine sexed and one doubtful *female* in my collection: Culmen 102, 107, 95, 100, 96, 90, 93, 98, 102, 110.\* Bill from gape to tip 111, 115, 110, 105, 109, 100, 101, 109, 111, 115.\* Tarsus 61, 66, 60, 60, 61, 62, 58, 60, 60, 62.\* Middle toe without claw 45, 50, 44, 46, 48, 44, 43, 48, 48\* mm.

Chick. Head pale grey, rest of body dark ashy vermiculated with paler grey, underside much paler, as in the adult birds.

Two specimens, *male* and *female*, from Collingwood, are very dark. The *male* has the pale crossbars much less apparent than usual owing to the long blackish tips to the feathers; the *female* shows the pale bars very distinctly, but yet the general tone of colour is much darker than in typical *A. oweni*. Head and hindneck rather grey. Behind the base of the mandible, below the eyes, is a patch of white feathers. This peculiar feature, however, is present in several other typical *A. oweni* in my collection.

Owen's Kiwi, or, as it is generally called, the Grey Kiwi, or, as it might be termed, the Small Kiwi, is found over a great portion of the South Island, and is still fairly common in its western and eastern parts.

According to Buller it frequents the woods and must be sought for in prostrate hollow trunks, natural holes or caverns among the roots of the large forest-trees and clefts or fissures in the rocks. In such places it breeds, and the eggs are sometimes taken from under a clump of tussock or from the shelter afforded by an overhanging stone on the slope of a hill.

In manners and breeding-habits this Kiwi agrees with its congeners, only its notes are much feebler, softer, and its eggs considerably smaller. The two sexes generally cry together. The eggs in my collection measure 112 by 64, 112.5 by 69, 111 by 72, 112 by 71, 99.5 by 65, 108 by 68, 110.5 by 69, 107.5 by 69, 108 by 68.5, 111 by 68, 108.5 by 67.5, 112 by 66, 108 by 68 mm. It is, of course, possible that some of these eggs belong to my *A. oweni occidentalis*, but there is no certainty about it, as New Zealand collectors seldom take the trouble of properly labelling eggs and birds.

### 5. *Apteryx oweni occidentalis* Rothsch.

#### *Larger grey Kiwi.*

*Apteryx oweni*, Buller, *B. New Zeal.* 2nd ed. v. 2, p. 327 (partim) :

*Apteryx occidentalis*, Rothschild in *Bull. B. O. Club*, v. 1, No. X. pp. 59, 61 (reprint in *Ibis*, 1893, pp. 573, 576) ; 1895, Salvadori, *Cat. B. Brit. Mus.* v. XXVII. p. 610 ; 1896, Buller in *Trans. New Zealand Inst.* v. XXVIII. p. 358 ; 1899, Buller, *op. cit.* v. XXXI. p. 35.

*Apteryx oweni occidentalis*, Rothschild in *Bull. B. O. Club*, v. 1, p. 62.

#### DESCRIPTION OF *A. OWENI OCCIDENTALIS*.

♂ ad. Differs from the same sex of *A. oweni oweni* by its larger size, more distinct, more regular and wider pale bars to the feathers and the more developed light tips to the feathers. The wider pale bars to the feathers make the dark bars bolder and stand out more conspicuously than in typical *A. oweni*. The reason for the greater distinctness of the pale bars in this form is their more regular outline

\* This specimen, though sexed *male*, is doubtless a *female*. Its collector is not known.

as well as greater width. In most specimens of *A. oweni oweni* they are not only narrower, but more or less irregularly V-shaped. Total length about 480 mm.

♀ ad. Larger than the *male* and generally darker. Total length about 540 mm.

Measurements of *A. oweni occidentalis* :—

Culmen from base.	Bill from gape.	Metatarsus.	Middle toe without claw.
♂ 115 mm. (died in captivity, caught N. Island).	124 mm.	66 mm.	55 mm.
♂ 96 mm. (Mt. Hector, N. Island).	104 "	60 "	45 "
♀ 125 mm. (Buller distr., S. Island).	130 "	65 "	53 "
♀ 118 mm. (Buller distr., S. Island).	130 "	64 "	50 "
♀ 118 mm. (Buller distr., S. Island).	127 "	60 "	47 "
♂ 85 mm. (Buller distr., S. Island).	96 "	50 "	— —
♂ 97 mm. (Buller distr., S. Island).	108 "	60 "	45 "

I have examined altogether 19 specimens in my collection, of which two are from the North Island, the rest from the mountains of the north-west portion of the South Island.

The specimen of *A. oweni occidentalis* I received alive from the North Island was the cause for my erroneous statements with regard to the occurrence of *Apteryx haasti* in the North Island, as it was sent to me as a young specimen of *Apteryx haasti* by Sir Walter Buller. As a fact, *Apteryx haasti* has never been obtained on the North Island.

It is by no means easy to define the exact range of my *A. oweni occidentalis*. The North Island specimen was obtained by Mr. Morgan Carkeek at the head of the Hutt river on Mount Hector, in the Tararua Range, in December 1875. It was caught by his dog among the snow-grass, at an elevation of about 3,000 feet. At a higher altitude he found the species comparatively abundant, and he met with it occasionally below the snow-line, frequenting mossy places in the bush free from undergrowth. (Buller, *B. N. Zeal.* 2nd ed. v. 2, p. 328.)

In addition to the North-Island bird I have a fine series of specimens from the Upper Buller district, where, according to Mr. Brough, of Nelson, "they inhabit the dense bush, and seem to prefer dark and gloomy gullies, where the sun scarcely ever penetrates, and where the under-scrub is almost always dripping wet." Some specimens which I have are labelled "Nelson," by Sir Walter Buller, but as they bear Mr. Brough's name, I have no doubt that they also come from the "Upper Buller." Others I bought from Sir Walter Buller are labelled "Buller district, W. Coast," and one "Heaphy River." Some skins, however, which are labelled "Collingwood," I consider to be typical *A. oweni*, not *occidentalis*. Therefore, if the localities on our labels are correct, the distribution of my *occidentalis* is not easy to understand, but I believe it is a fairly distinct form, perhaps representing the typical *A. oweni* on the high mountains of the Buller district, where it may occur together with *A. haasti*.

Sir Walter Buller mentions an egg measuring 4·6 by 2·5 inches.

In the *Bull. B. O. Club*, No. XVII. p. 36 (*Ibis*, 1894, p. 429) it is mentioned that I exhibited before the Club some Kiwis I had received alive, and which in addition to the cross-markings, showed longitudinal lines to the feathers. I concluded that they must be hybrids between *A. mantelli* and *A. occidentalis*; but I evidently made a mistake about this, as they lost all the mixed appearance in their plumage, and could afterwards not be distinguished from ordinary *A. oweni*. The mixed markings they showed, when young, were therefore most likely a peculiar aberrational character. The place these Kiwis came from is not known to me.

KEY TO THE FORMS OF THE GENUS *APTERYX* NOW  
RECOGNISED BY ME.

1. { Feathers of upperside striated : 2.  
    { Feathers of upperside barred : 3.
2. { Plumage darker, feathers of neck more bristly : *A. australis mantelli* ;  
    { North Island.  
    { Plumage lighter, feathers of neck softer, less bristly : *A. australis australis* ;  
    { South Island and adjacent smaller islands.
3. { Larger, more brown, and with wider light bars : *A. haasti* ; South Island.  
    { Smaller, more greyish, and with narrower light bars : 4.
4. { Generally larger. More distinct, more regular, wider and straighter pale  
    { bars to the feathers : *A. oweni occidentalis* ; South Island and south-  
    { western portions of North Island.  
    { Generally smaller. Less distinct, more irregular and more or less distinctly  
    { V-shaped bars to the feathers : *A. oweni oweni* ; South Island.

NOTES ON THE ANATOMY OF THE GENUS *APTERYX*.

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(Plates XV. and XVI.)

Through the great kindness of the Hon. Dr. Walter Rothschild, M.P., I have come into temporary possession of the largest collection of the skeletons and alcohol-preserved bodies of the genus *Apteryx* that have ever been amassed in one museum. I have been able to study skeletons of *Apteryx mantelli* (= *A. balleri*), *A. haasti*, *A. oweni*, *A. australis* from Stewart Island; besides these there were two young specimens of *A. australis* removed from the egg, and bodies in spirit of *A. mantelli*, *A. oweni*, *A. haasti*, and *A. australis* from Stewart Island, and a body from which a skin had been prepared, and which was therefore incomplete, of *A. occidentalis*.

In addition to this rich material, for the use of which I am greatly indebted to Mr. Rothschild, I have been able to refer to a single skeleton of each of *A. oweni* and *A. australis* which belong to the collection under my charge at the Zoological Society's Gardens.

I am therefore, I believe, in a position to settle more definitely than has yet



been done the specific characters of the various species of this genus so far as concerns their internal structure.

In dealing with this subject, however, I am by no means breaking new ground. A few osteological marks of difference between *A. australis* and *A. oweni* have been pointed out by Dr. Mivart, F.R.S.,\* in his Memoir upon the axial skeleton of the Struthionidae. More important as a contribution to the *present* question is a memoir by Professor T. J. Parker, F.R.S., chiefly concerned with a description of the development of this genus, but containing incidentally many and valuable notes upon the specific characters of *A. australis*, *A. oweni*, and *A. muntelli*, besides a few remarks upon the wing of *A. haasti*, upon its skeleton (doubtfully referred to this species), and of *A. maxima* (probably "a sub-adult *A. balleri*"). Professor Parker had, however, fewer complete specimens of these birds than I have had the privilege of examining. This, it is hardly necessary to point out, reduces the value of the specific determinations based upon them; and I shall have to point out later the very considerable variations that occur in most parts of the skeletons of all the species of the genus *Apteryx*, a fact which renders the tabulation of reliable specific differences extremely difficult.

The general anatomy of *Apteryx* has been apparently so exhaustively treated of (see the list of memoirs dealing with the genus) that I had hardly hoped to discover any new points. I have, however, been able to ascertain two new facts of some little classificatory importance. The first of these is the existence of an oil gland hitherto overlooked, a feature in which this genus appears to differ from all other Struthious birds; the second matter is the presence of definite intrinsic syringeal muscles, not unique among the Struthiones, but new to *Apteryx* so far as recorded fact enables me to judge. A few minor novel points are only of systematic value.

The memoirs which I have consulted in the preparation of this paper are the following:—

- PARKER, T. J. "Observations on the Anatomy and Development of *Apteryx*." *Phil. Trans.* 1891.
- FORBES, W. A. "On the . . . Trachea in the Ratite Birds." *P.Z.S.*, 1881, p. 778.
- OWEN, SIR R. "On the *Apteryx australis*." *Trans. Z.S.*, ii, p. 57, and iii, p. 277.
- MIVART, ST. G. "On the Axial Skeleton of the Struthionidae." *Trans. Z.S.*, x, p. 1.
- FÜRBRINGER, M. "Untersuchungen zur Morphologie und Systematik der Vögel." Amsterdam, 1888.
- GADOW, H. "Aves" in "Bronn's Klassen und Ordnungen des Thierreichs."
- HUXLEY, T. H. "On the Respiratory Organs of *Apteryx*." *P.Z.S.*, 1882, p. 560.
- MITCHELL, P. CHALMERS. "On the Intestinal Tract of Birds." *P.Z.S.*, 1896, p. 136.
- BEDDARD, F. E. "On the Heart of *Apteryx*." *P.Z.S.*, 1885, p. 188.
- LANKESTER, E. R. "On the Heart described by Professor Owen in 1841 as that of *Apteryx*." *P.Z.S.*, 1885, p. 239.
- LANKESTER, E. R. "On the Right Cardiac Valve of the Specimens of *Apteryx* dissected by Sir Richard Owen in 1841." *P.Z.S.*, 1885, p. 477.
- OWEN, SIR R. "On the Structure of the Heart in *Ornithonychus* and *Apteryx*." *P.Z.S.*, 1885, p. 328.

\* See list of literature above.

- WELDON, W. F. R. "On the Anatomy of *Phoenicopterus*." *P.Z.S.*, 1883, p. 638.  
 PARKER, W. K. "The Shoulder Girdle." *Ray Society Publication*.  
 LINDSAY, B. "On the Avian Sternum." *P.Z.S.*, 1885, p. 684.

## I. CERTAIN EXTERNAL CHARACTERS.

### THE OIL GLAND. (Pl. XV.)

The impression is generally given that *Apteryx* has no oil gland. Gadow, for example, distinctly denies its presence; Fürbringer, in his table of characters of the groups of birds, marks it as absent—but with a query. Garrod, in his MS. notes, declared the oil gland to be absent, as also in a published reference to the matter. It is curious that three such excellent observers should have fallen into an error; for not only has the *Apteryx* an oil gland, but it is a particularly large one. The oil gland is, however, in some ways rather unlike that of other birds, which may account for its having thus far escaped detection. One naturally looks for the oil gland a little way from the extremity of the tail, and expects to find two closely approximated pear-shaped bodies with conspicuous mamillae. The oil gland of *Apteryx* is not at all like this. It might easily be mistaken for a mass of fat surrounding the extremity of the tail. It is a really enormous gland which lies quite normally above the extremity of the vertebral column, though it appears also to extend down the sides of the caudal vertebra. It is not distinctly divided into two glands, though there are two not very prominent nipples—the external orifices. It was the presence of these that directed my attention to the existence of the gland. The two nipples form the very extremity of the body of the bird. In an *A. australis* I found each of these nipples to have two orifices; this was not plain in an *A. haasti* (pl. XV.), nor in an *A. mantelli*. The oil gland was perfectly nude in the former case; it had two minute feathers in the latter bird.

It will be obviously desirable to ascertain how far an oil gland is really represented in the other Struthion birds which are commonly stated to be devoid of that structure. At present *Apteryx* seems to stand rather apart, as indeed it is held to do on other grounds. It is suggestive, too, to note the less specialised condition of the oil gland of *Apteryx*, as shown by the absence of the cordate form and the slight prominence of the mamillae.

### REMIGES.

The arrangement of the feathers upon the wing offers several points of interest for consideration, and has been variously construed. There is, for instance, considerable difference of opinion as to the number of remiges present—a matter which is discussed at some length by T. J. Parker. In an embryo of *Apteryx australis*, practically full grown and corresponding to one of Stages H—K of Parker, I carefully counted the remiges and made out fourteen of them, closely set long feathers. Upon the upper surface of this wing, which measured in total length in its natural (somewhat flexed) condition from the point where it became free from the body, about the middle of the humerus 12 mm., were numerous rather closely set strong feathers. These feathers did not appear to me to have a particularly regular arrangement. The tendency of their distribution seemed to me to be towards the production of transverse rather than longitudinal lines of feathers. It is important to notice that the under surface of the wing of the young is also

1



2.



OIL GLAND OF *APTERYX HAASTI*  
1. VENTRAL VIEW - 2 LATERAL VIEW



feathered, though more sparingly, which rarely persists, and then to a very small extent, in the full-grown bird.

The number of remiges in the wing of the adult *Apteryx* has been variously stated. Parker figures eleven and thirteen remiges in *A. mantelli*; Owen allowed "nine quasi-quill-plumes" in *A. australis*. These feathers, of course, vary in numbers and relative development. In *A. haasti*—in two specimens, at any rate—I observed a curious change in position of the remiges. After the first seven or eight, counting from the claw, the feathers ceased to lie along the edge of the manus; they moved on to its upper surface. Had there been in these birds any lower coverts (of which I have seen three or four in some wings) these feathers would possibly get the credit of being the true remiges. It seems to be therefore difficult and unprofitable to attempt any definite statements as to the exact number of remiges in the various species of *Apteryx*. It is generally the case—and Parker has illustrated the fact—that the distal remiges are the larger, and that they cease abruptly at about the middle of the forearm.

The utmost number of remiges that I have counted, including both large and small, is fourteen, which agrees with the conditions observable in the young. The species *A. australis* appeared to have the feeblest remiges, but of six examples examined by me from this point of view, the largest number of strongly developed remiges was five or six out of a total of thirteen or fourteen. In two others the strongly developed remiges were only two or three. In the remaining two all the remiges were feeble.

On the other hand, in *A. haasti* there were as many as ten or eleven strong remiges in four birds, eight and nine in two others, and seven in a small bird. *A. oweni* in this matter agrees with *A. haasti*; in three individuals there were ten or twelve strongly developed feathers. *A. mantelli* in the characters of its remiges is somewhat intermediate. Seven or eight was the largest number present; in some specimens all were feeble.

#### CLAW OF DIGIT.

Professor Parker has attempted—but does not lay undue emphasis upon the point—to extract specific characters from the form of the claw upon the wing. In *A. oweni* he has found it to be "always soft and weak, gently curved, about 4 mm. long." As far as my experience goes this is accurate, save that the length varies somewhat, though not within wide limits. I do not, however, find myself able to agree with what he has written concerning *A. haasti*. He finds no difference from the claw of *A. oweni*, save that it is sometimes smaller; but he quotes Professor Hutton to the effect that it may reach a length of 9 mm. In *A. haasti* the claw is either straight or curved; its length varies from 6 mm. through 7, 8, and 9, to 14, which was the extreme length observed by myself. In *A. australis* I noted rather less variation in the length of the claws, which were nearly always curved; they were straight in only one individual out of six. The length varied from 5 to 10, but the average was distinctly 7 mm.

In *A. mantelli* the claw was short\* (4 or 5 mm.) in six out of seven individuals examined; 11 mm. long in the seventh. They were curved, and I should state that in no case have I allowed for the curve in measuring. In this species (" *A. bulleri* ") Parker describes and figures a claw 18 mm. long.

\* In one individual on one side of the body the claw was double.

It appears, therefore, that in all the species examined the claws may be longer or shorter, and more or less curved. I do not see sufficient grounds for emphasising any specific distinctions. It may be generally remarked, however, that *A. australis* and *A. haasti* agree in having as a rule longer claws than *A. oweni* (which is, after all, a smaller species); and, *as a rule*, *A. mantelli* is distinguished from its allies by its smaller claws.

## 2. SOME NOTES UPON THE OSTEOLOGY.

The osteology of *Apteryx* has been so fully described in the adult and in the embryo, especially by Owen, Mivart, and T. J. Parker, that it seems to be unnecessary to enter into an elaborate description of the skeleton here.

In certain features, however, the skeleton varies rather more than is perhaps generally thought. A few of these variations coincide with differences in external characters and in other points of structure, and are therefore possibly of specific value. These will be found referred to in the course of the following pages and at the end of this paper where it is attempted to lay down the specific characters of the different species of *Apteryx*. But the bulk of osteological variation has not apparently any such meaning.

### VERTEBRAL COLUMN.

The vertebral column of *Apteryx* has been elaborately described by Mivart for *A. oweni* and *A. australis*.

I find that the centrum of the atlas is very deeply notched in *A. oweni* and *A. mantelli*\*; indeed, in the latter the superior boundaries of the circular notch very nearly meet and convert it into a foramen. The same is the case with *A. haasti*. A peculiarity which *A. mantelli* has, and does not share with the other species mentioned, except occasionally in *A. oweni*, is the incompleteness of the neural arch of the atlas: there is a median division perfectly complete, though the two halves come into actual contact. The hypapophyses of the atlas of *A. oweni* are not quite as figured by Mivart. In one specimen I find no hypapophysis at all; in another, instead of the squarish median process figured by him as extending along the base of the centrum, it was divided into two very strongly marked and more laterally situated processes. As, however, in *A. haasti* there is a median tubercle as well as these two, it seems probable that the former is the real hypapophysis, and that the latter correspond to the lateral hypapophysial processes described by Mivart in the ostrich. In *A. mantelli* the lateral processes alone are present. The hyperapophyses are well developed in all species, in *A. oweni* they are long and rather narrow; in *A. haasti* medium, and in *A. mantelli* very deep.

As to the *axis*, I observed but slight differences in the different species. The spine is massive, particularly in *A. mantelli*: the hyperapophyses are long, and there is no hypapophyses. The rib-like elements exist in all species, being stontest in *A. oweni*.

Dr. Mivart remarks that the tenth and eleventh cervical vertebrae in *A. oweni*,

\* In one of three specimens of *A. mantelli* the "body" of the atlas, instead of being completely perforated by the odontoid process, was only deeply excavated above a narrow vertically oval foramen, even turning the excavation forward through the body. In this individual the arch of the atlas was complete above.

but not in *A. australis*, have a median ventral canal formed by the united catapophysis. In only one species did I find a complete canal to be formed by the catapophysis, that was on C. 17 of *A. australis*: but in all the catapophyses of two or three vertebrae came very nearly into contact. This was more marked in *A. oweni* and *A. australis* than in the other species. On the twelfth cervical vertebrae in all species of *Apteryx* a median hypapophysis appears, save only in *A. haasti* where it is the thirteenth. In *A. mantelli*, *A. australis*, and in *A. haasti* the first hypapophysis is at least occasionally bifid. The hypapophyses in *A. oweni* continue to the first dorsal vertebra in *A. haasti* to the third dorsal. In all species of *Apteryx* there are sixteen cervical vertebrae, the number of free dorsals, and consequently of sacrals, varies somewhat. In an *A. australis* I found 6 free dorsals and 6 sacrals in front of the acetabulum. In three *A. mantelli* these numbers were 7 and 5: in another 8 and 4: in an *A. haasti* 7 and 5: in an *A. oweni* 7 and 5.

In *Apteryx oweni* I find nine perfectly free caudal vertebrae. One in front of this series is overlapped by the ilium, but is not completely ankylosed to the vertebra in front. (Pl. XVI. f. 3.)

In *A. mantelli* there are either seven or eight free caudal vertebrae, not overlapped by the ilia. In front of these either none at all, or two or three vertebrae which are not ankylosed to each other.

In *A. australis* there is a longish pygostyle formed by the partial ankylosis of the last four caudals; in front of this are three free caudals. (Pl. XVI. f. 4.)

*A. haasti* has eight free caudals not overlapped by the ilia. In front of this series is one caudal not completely ankylosed.

#### RIBS.

In *Apteryx oweni* there are two ribs belonging to the cervical series, three ribs which join the sternum below, and four ribs following, of which the first has a sternal division, which does not, however, reach the sternum. Uncinate processes are borne by the last cervical rib, and by the four following ribs; thus there are five in all. Sometimes four ribs articulate with the sternum or even, according to Mivart, five.

In *A. mantelli* there are also nine pairs of ribs; but only one belongs to the cervical vertebrae. The following four reach the sternum; the rest have not a sternal half. The six first ribs have uncinat processes.

In *A. haasti* there are nine pairs of ribs, as in the other species, in addition to a rudiment belonging to the fifteenth cervical. Four ribs reach the sternum, and there are six pairs of uncinat processes.

In *A. australis* from Stewart Island there is a rudimentary rib on the fifteenth vertebra; then follow six pairs with uncinat processes, of which the last five reach the sternum; then two largish free ribs without uncinat processes and finally a minute pair.

#### SHOULDER GIRDLE.

Professor T. J. Parker has dealt with the variations of this part of the skeleton. It is chiefly in the proportions between scapula and coracoid, in the size of the angle between the two, and in the bony or membranous condition of the procoracoid, that variations occur.

This last-named variation, like the others, has no very definite relation to the

species. Professor Parker found two deeply notched coracoids of *A. mantelli* as against one unnotched. Three *A. australis* are figured as notched, but neither of two *A. oweni*. Fürbringer depicts one notched and one unnotched *A. australis*, the latter copied from Owen. Parker (W. K.) figures *A. australis* as unnotched. My specimen is notched.

I have found no notch in any of six specimens of *A. haasti*; neither of two *Oweni* had a notch: but of four *A. mantelli* two were notched and two had completely bony procoracoids. It looks, therefore, as if it was at least rarer for *A. oweni* and *A. haasti*\* to have largely membranous procoracoids than for the other species.

#### THE STERNUM.

The general form of the sternum of *Apteryx* is well known. It is, however, very variable in details, most of the details, if not all, being totally unconnected with specific distinctions. The principal variations shown by the sternum are as follows:—

1. Variations in the proportions of the median and posterior lateral processes. In the majority of cases the posterior lateral processes are the longer: this was so in six *A. mantelli* examined by myself, in one figured by T. J. Parker, and in one figured by Miss Lindsay; in four *A. haasti* examined by myself, and a queried *haasti* figured by Parker; in two *A. oweni* examined by myself, in two figured by Parker, in one figured by Miss Lindsay; in one *A. australis* examined by myself; in one *A. australis* figured by Owen, in one figured by Parker.

Total 21.

In many specimens the two processes are equal: this was so in two *A. mantelli* examined by myself, in two figured by T. J. Parker; in two *A. haasti* examined by myself; in one *A. australis* figured by Fürbringer, in one figured by Parker.

Total 8.

In fewer specimens still the median is longer than either of the two lateral processes; this characterised an *A. australis* figured by W. K. Parker, and an embryo *A. australis* figured by T. J. Parker.

Total 2.

These variations are purely in the amount of ossification, some cartilage being apparently invariably left tipping the processes. This fact still further diminishes the importance of these variations; but it is noteworthy that in the unossified or but slightly ossified sternum the lateral processes (according to T. J. Parker) always exceed the median, save in the striking case of an *A. australis* last referred to, which agrees with an adult figured by W. K. Parker.

2. Variations in the character of the median process.

This is longer or shorter, broader or narrower: it is sometimes but rarely bifid at the extremity. This has been figured in two examples of *A. oweni* (by Miss Lindsay and T. J. Parker), and in a doubtful *A. haasti* (by Parker).

3. The anterior emargination of the sternum varies in depth, but is usually a symmetrical semicircular incision. Professor T. J. Parker distinguishes "*A. bulleri*" (= *A. mantelli*) from *A. australis* by the greater depth of the emargination in the former species. This is certainly usually, but not universally, the case; I have an *A. mantelli* with quite a shallow anterior emargination. *A. haasti* varies in precisely the same way. On the other hand, the specimens at my disposal lead me to support

\* T. J. Parker's doubtful *A. haasti* had a notched coracoid.



Professor Parker's statement that "in *A. Oweni* . . . the emargination of the anterior border . . . is slightly sinuous, each side presenting a sigmoid curvature."

I have not found this characteristic form of the anterior emargination of the sternum in any species but *A. oweni*.

4. There are occasionally but rarely two fenestrae in the sternum. Owen describes this in his specimen of *A. australis*; I have seen the same thing, the right fenestra being rather the larger in an *A. mantelli*. In another *A. mantelli* there were two minute fenestrae of pinhole size.

5. The sternum of *Apteryx* is described as quite flat and keelless. Nevertheless T. J. Parker observed in quite a large proportion of examples of *A. mantelli* studied by himself a distinct keel. I also find it to be commonly present in that species. This vestigial keel is so slight that it is not particularly easy to see: it is however readily felt. I have found similar traces in *A. haasti*.

6. From measurements of the sternum Professor Parker thought himself justified in deducing the following results:—

"In *A. australis* the length of the corpus sterni appears to be constantly more than half its breadth."

"In *A. bulleri* (= *A. mantelli*) the length of the corpus sterni is—often considerably—less than half its breadth."

"In *A. oweni* . . . the length of the body is less than half its breadth." I have tested these conclusions upon other examples measured in precisely the same fashion as that adopted by Parker. These are my figures:—

	Length.	Breadth.		Length.	Breadth.
<i>A. oweni</i> . . . .	11	33	<i>A. haasti</i> . . . .	19	38
" " . . . .	15	35	" " . . . .	21	45
" " . . . .	17	38	" " . . . .	21	44
<i>A. mantelli</i> . . . .	18	40	" " . . . .	18	40
" " . . . .	15	39	" " . . . .	20	45
" " . . . .	11	41	<i>A. australis</i> . . . .	28	55
" " . . . .	18	37	" " . . . .	19	51
" " . . . .	16	41	" " . . . .	20	50
<i>A. haasti</i> . . . .	22	45	" " . . . .	15	35

These measurements on the whole bear out Professor Parker's remarks concerning *A. oweni* and *A. mantelli*. I may perhaps point out in addition that *A. haasti* belongs to the same category as those two species, but that there is a tendency to an increase in the length as compared with the breadth. In *A. australis* it appears from the measurements which I have taken that the length is also less than half the breadth. But not a great deal can be made out of these measurements. In the first place the numbers (actual and proportional) are very close; the differences are not at all salient. In the second place the occasional asymmetry of the lateral notches renders it sometimes difficult to follow out Professor Parker's scheme of measurements. I give my own figures therefore for what they are worth, which does not appear to me to be a great deal.

#### SKULL.

The very slightest differences apart from those of size distinguish the *Apteryges*.

A peculiarity which I noticed in the skull of *A. australis* is possibly of some little interest: that is, the bifid anterior extremity of the vomer, a deep oval notch

separating its two horns. The shape of the vomer in this region is in fact not unlike that of certain Limicolous birds, especially perhaps *Haematopus*. In other skulls of *Apteryx* I did not find this peculiarity nearly so well marked.

The basis cranii is a little different in the various skulls which I have examined. In *A. mantelli* the basi-sphenoid bar widens out in a fusiform fashion, to contract again just before it is hidden beneath the vomers. This does not characterise the other skulls. But *A. oweni* and *A. haasti* agree to differ from *A. mantelli* in that the basi-sphenoidal rostrum is ridged on either side where it widens out into the basi-temporals. In *A. australis* these two lateral ridges exist as well as a median one lying between them, equally marked but not quite so long.

#### PELVIS. (Pl. XVI.)

A comparison of the pelves of the different species of *Apteryx* shows a great uniformity in the characters of this part of the skeleton. The principal point of difference which I could detect concerned the length of the prepubic process. The following measurements show how short this process is in *A. mantelli*, and how long it is in *A. oweni* :—

	Length of pre-antitrochanteric part of ilium.	Length of post-antitrochanteric part of ilium.	Prepubis.
<i>A. mantelli</i> . . . . .	83 mm.	39 mm.	5 mm.
" " . . . . .	75 mm.	35 mm.	3 mm.
<i>A. haasti</i> . . . . .	82 mm.	40 mm.	8 mm.
<i>A. australis</i> . . . . .	90 mm.	41 mm.	8 mm.
<i>A. oweni</i> . . . . .	61 mm.	30 mm.	9 mm.
" " . . . . .	54 mm.	30 mm.	8 mm.

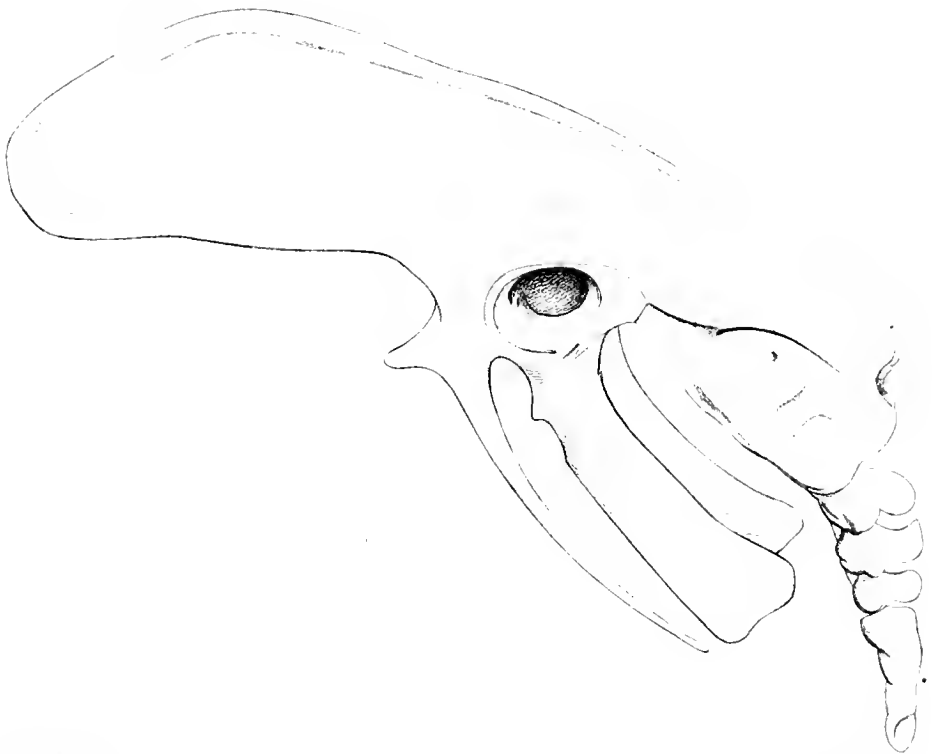
The two ilia diverge from each other anteriorly, and here is the widest part of the pelvis. The two bones, instead of being almost parallel with the vertebral column, as they are posteriorly, are flattened out laterally, which is of course the cause of the greater width of the pelvis here. Posteriorly the pelvis is widest just behind the acetabula, across the antacetabular processes. In rare cases the width of the pelvis at these two points is equal or subequal. These examples are so far nearer to the other genera of struthions birds, in none of which are ilia wider in front than across the antacetabular processes. The following are a few measurements :—

Width of ilia anteriorly.	Width across antac. proc.	Difference.	Species.
40	36	4	<i>A. haasti</i> .
44	36	8	" "
39	35	4	" "
36	36	0	" "
50	36	14	" "
44	37	7	" "
35	34	1	<i>A. mantelli</i> .
41	35	6	" "
41	35	6	" "
46	39	7	" "
36	25	11	<i>A. oweni</i> .
40	29	11	" "
56	36	20	<i>A. australis</i> .

3.



4.



3 PELVIS OF APTERYX OWENI  
4 " " " AUSTRALIS



The pelvis of *Apteryx* also shows variations in the degree in which the ilia meet above the vertebral column. Dr. Mivart remarks that "the ilia do not quite meet together dorsad behind the acetabula, though they are not so open as in *Dromaeus* and *Casuaris*." I should have regarded it as the rule for this open tract through which the spines of the lumbar vertebrae are visible to commence rather in front of, or at least on a level with, the anterior margin of the acetabulum.

### 3. MUSCULAR ANATOMY.

The general muscular anatomy of *Apteryx* has been described by Owen; Garrod dealt subsequently with certain muscles of the thigh, and with the deep flexor tendons; Fürbringer has carefully gone into the shoulder muscles in his great work upon birds; T. J. Parker redescribed the muscles of the wing, correcting Owen in several particulars; finally Gadow's book upon birds contains the bulk of what is known concerning the musculature of *Apteryx*.

#### MUSCLES OF THE HIND LIMB.

*Glutaeus primus*.—This wide sheet of muscle is correctly described by all authors as arising from the entire length of the ilium, post-acetabular as well as pre-acetabular. I observed no variations worthy of remark.

*Glutaeus secundus*.—This is, as usual, the most powerful of the three glutaei which spring from the pre-acetabular ilium. It arises from the whole of the crest of that bone in front of the acetabulum, and also from such parts of the surface of the ilium as are not occupied by the two muscles next to be described. Some of its fibres even spring from the septum between itself and those muscles. The insertion is by a broad strap-shaped tendon.

The *Glutaeus tertius* and *Gl. quartus* really form one muscle, with but indications of division. They are both covered by the last muscle, excepting the anterior part of *Glutaeus tertius*. In *A. huastii* they spring from the ilium and lie side by side, the anterior of the two being slightly the smaller; in *A. australis* I was unable to distinguish the two muscles, except just before their tendons of insertion. In this species the tendons are inserted separately but contiguously; in *A. huastii* they are absolutely fused just before insertion.

*Glutaeus quintus*.—This muscle is continuous at its origin with the *Glutaeus secundus*; it ends in a long strong tendon inserted between the tendons of the femoro-caudal and *Glutaei tertius et quartus*.

*Obturator externus*.—This muscle (called by Owen "pyramidalis") arises from the ischium, and is inserted fleshily beneath the tendon of the obturator internus by a wide insertion considerably wider than that of the femoro-caudal.

*Obturator internus* ends in a long round tendon which is as usual accompanied by *Gemelli*. It overlaps the insertion of the last muscle.

The *Iliacus* is a small muscle with fleshy origin and insertion.

The *Femoro-caudal* immediately underlies the accessory femoro-caudal. It is distinguished by Garrod into two parts, one of which, arising from the caudal vertebrae, he separates as true femoro-caudal. I imagine that the pyramidal muscle does represent both femoro-caudal and its accessory, but I can see no marked line of division between them. The muscle arises chiefly from the ischium, but its area of origin also strays on to the ilium and the caudal vertebrae. It is inserted

by a flat tendinous head on to the neck of the femur, being crossed just at its insertion by the tendon of the *Gluteus V.*

The *Superficial femoro-caudal* muscle is a great mass of flesh immediately underlying the biceps; it springs from the ilium as well as posteriorly from the caudal vertebrae. It is inserted along the edge of the femur external to the femoro-caudal, adductor and accessory semitendinosus. It reaches exactly as far as the distal end of the origin of the last mentioned. The muscle, as has been correctly observed by Owen and Garrod, is divided into two parts, separated by the emergence of the sciatic nerve and artery. The anterior smaller part (called by Owen the "Adductor brevis femoris") is apparently to be distinguished among other struthious birds and in the tinamous.

The large extent of the *Biceps femoris* is not clearly indicated in the figures of either Owen or Garrod. Its origin by a tendinous sheet in common with that of the last-described muscle extends considerably in front of the acetabulum as well as considerably behind it. Before its insertion on to the fibula through the biceps sling it gives off from its upper surface a fibrous band to the outside of the gastrocnemius. This has not been mentioned in *Apteryx*: but Gadow states its existence in *Struthio*. I may remark that I have found a somewhat similar insertion in the rail *Podica senegalensis*—a fact which may conceivably be of some little classificatory import. On the other hand Weldon has figured (p. 648, Fig. 3, B) a closely similar arrangement in the duck, and I have observed the same in a swan.

The *Semimembranosus* of *Apteryx australis* is very much as it has been described by Garrod in *A. oweni*. It has two very distinct heads of origin, between which arises the femoro-caudal and lies a portion of the oil gland. The posterior part arises close to the semitendinosus from some of the coccygeal vertebrae; the rest of the muscle springs partly tendinously, partly muscularly, from the ischium, and even to a small extent from the pubis: the two join almost immediately, arching in a crescent-shaped outline over the femoro-caudal, as already said. In *A. haasti* the two heads of the muscle were present, but the discontinuity at their origin was less marked; the second head, moreover, was limited to the ischium, and was circular or thereabouts in section, instead of strap-shaped. The tendon of insertion of the muscle runs side by side with, and is indistinguishable from, that of the semitendinosus.

*Semitendinosus*.—This muscle shows a slight variation in the relations of its accessory (femoral) head within the genus. In *A. australis* the accessory head of the semitendinosus was distinctly separated from, though parallel to, the middle head of the gastrocnemius. In *A. haasti* no such separation is obvious.

*Adductor*.—There is but one adductor in *Apteryx*. It is a flat thin muscle arising from the front edge of the ischium.

*Rectus femoris* (= *Vastus externus* + *Cruraeus*\*). This is an enormously thick and fleshy muscle arising from the greater part of the shaft of the femur from the neck onwards. The vastus externus portion is much the larger, and on the outer side of the thigh forms a continuous and undivided mass of muscle; on the upper side of the thigh there are indications of its division into two accessory heads of origin. The cruraeus portion from the greater part of the length of the inner side of the femur ends in a strong round tendon, to which many fibres of the vastus externus portion are attached, and which then becomes continuous with the strong

\* *Cruraeus* + *gracilis* of Owen's description of the *Apteryx*.

tendon of the vastus externus. The two together form the ligamentum patella, the smallish ossified patella being enclosed in their substance, and are inserted on to the head of the tibia.

*Vastus internus*.—This muscle arises below the last, but has not so extensive an origin from the femur; its short tendon is inserted on to the head of the tibia below and to the inside of the last.

The *Sartorius* is a powerful muscle with no peculiarities of origin or insertion.

The *Ambiens* (*Pectineus* of Owen's description) is well developed, and arises as usual from the pre-pubic process; it disappears into the soft tissues of the leg between the two divisions of the rectus femoris, and is inserted, as will be described, into the flexor perforatus.

The *Peroneus longus* is a massive muscle covering the front part, and covering the tibialis anticus for nearly the whole of its extent. The tendon, as usual, divides into two—one branch going to the heel, the other becoming continuous with the tendon of the flexor perforans et perforatus.

*Peroneus brevis* appears to be completely absent.

*Tibialis anticus*.—It might be gathered from Sir R. Owen's description of the muscles of this bird that the characteristic long tendinous head arising from the external condyle of the femur was absent. This, however, is not the case. The tendon of insertion is undivided save just at its insertion, where it is perforated by the Extensor dig. III.

*Extensor communis digitorum*.—The tendon of this muscle supplies the second, third and fourth toes; it first divides into two branches, and then each of these again divides into two, the middle of the three toes getting two branches.

The number of the short extensors of the foot has been understated by Owen. There are altogether five of these.

*Extensor digiti III*.—This arises by a long slender tendon from the ligament uniting the tibio tarsus with the tarso metatarsus. It perforates the tendon of insertion of the tibialis anticus, and immediately after swells out into a fleshy belly, which again ends in a long tendon inserted on to the extensor communis tendon just below toes III and IV. The remaining short extensors, except that of digit I, are covered by a densish fascia, which accounts for their having been missed by Owen.

*Extensor brevis dig. II*.—This, like the remaining extensors, arises from the extensor surface of the metatarsus. Its origin, however, extends further forward than any of the rest. Its tendon, moreover, is attached laterally to the fourth digit, and acts rather as an adductor, as well as to the fourth digit.\* The *Abductor dig. II* is attached to the inner side of that digit. The *Extensores hallucis* and *dig. III* are purely extensors in insertion.

*Gastrocnemius*.—This muscle has, as usual, three heads. The outer head springs by a rather narrow head from the femur, which is entirely tendinous. This tendon arises distally to, but nearly in contact with, the long arm of the biceps sling. The short arm of the biceps sling is a broad ligament to which the adjacent flexor muscles are attached on its way to the leg. The inner head of the gastrocnemius is the larger, and arises from the crest of the tibia as well as from adjacent fasciae. The middle femoral head has been already referred to in connection with the accessory semitendinosus. The insertion of the gastrocnemius is in no way peculiar.

\* This presumably represents two short extensors fused.

The *Plantaris* (= *Soleus*) is in no way peculiar: it is a fleshy muscle arising from the head of tibia just beneath the insertion of the semitendinosus: it is inserted by a long tendon on to the cartilage through which the flexor tendons glide.

The three *Flexores perforati* (of digits II., III., IV.) are connected at their origin from the femur with each other and with the flexor profundus. Their tendons, however, separate early, as is usual. The strong ambiens tendon is definitely attached to the fl. perf. II., and to that only: it does not give off slips, as Mitchell has figured and described in various birds to the two other muscles, making up the perforatus complex. Furthermore, three small tendinous bands, accompanied by muscle fibres, and forming a thin flat sheet of tissue, are continuous with the ambiens tendon above, and appear to be in connection at the other end with the short arm of the biceps sling, and to arise from the fibula. I look upon this sheet of muscle and tendon as a second head of the flexor in question, and as corresponding to the fibular head of birds, such as *Nycticorax*. If this be so, Mitchell's contention that the ligamentous head in question is a rudimentary ambiens is not so certain as it seemed to be, for both occur in *Apteryx*. I found the same state of affairs in *A. haasti*.

The *Flexor perforans et perforatus dig. III.* arises partly from the head of the tibia, partly from the patellar ligament, and finally from a broad sheet of glistening tendon which unites it with the adjacent gastrocnemius head, and from the middle of which also arises the next muscle to be described. This broad sheet of tendon ends below to form a turned-up margin continuous with the long head of the biceps sling. The tendon of the muscle is joined by a vinculum to the perforatus tendon of the same digit.

The *Flexor perforans et perforatus dig. II.* is a smaller muscle than the last: it lies between it and the outer head of the gastrocnemius. It arises, as already stated in describing the last muscle, from the femur and the septum between itself and the last.

The *Flexor hallucis longus* arises by a principal head from the intercondylar region in conjunction with some of the other flexor muscles, and by a small slender entirely muscular additional head from the posterior surface of the outer condyle: the two soon unite, and from their tendon is given off, as Garrod has described, a thin tendon to the Hallux before it becomes fused with the tendon of the flexor profundus.

The *Flexor profundus* springs from the upper part of the shaft of the tibia and fibula, both beneath the Popliteus and also from its fibular tendons: there is a second and smaller head of origin from the outer condyle of the femur. Its tendon fuses with that of the last muscle, and the conjoined tendon thus formed splits into three tendons for digits II.—IV.

#### MUSCLES OF THE FORE LIMB.

The muscles of the fore limb have been, as already explained, described in great detail for *Apteryx* by more than one observer. I feel it therefore unnecessary to do more than indicate some few differences that I have observed in several species. Considering that the wing is the most degenerate organ of *Apteryx*, and that the muscles are naturally sharing the fate of the dwindling bones, it does not seem permissible to dwell much upon such variations as their different degrees of degeneracy show.



*Latissimus dorsi*.—As has been pointed out, this muscle consists of only one piece, which may or may not be the equivalent of the two latissimi of other birds. It is a much larger muscle, relatively as well as actually, in *A. haasti* than in *A. oweni*. In the former species it conceals more of the *Rhomboidens*, and leaves less of the scapula bare than it does in *A. oweni*.

*Deltoids*.—In *A. haasti* I found, in addition to the deltoid present in all *Apteryx*, a broadish strap-shaped slip of muscle arising from the scapula superficially to the deltoid, passing over it, and inserted on to the humerus below it by a fleshy insertion. The existence of this muscle seems to me to show that the single deltoid of the majority of species of *Apteryx* is not, as it has been called, a *deltoides major*, perhaps including a representative of the *minor*, but definitely a *deltoides minor* inserted, as it should be, above the insertion of the *major*.\*

*Rhomboidens*.—There is no special remark to be made about this muscle, except to confirm the already known fact that it is a single muscle. I found it relatively largest in *A. australis*.

*Teres*.—There is but one *teres*, which is very much larger in the smaller *A. oweni* than in *A. haasti*, an undoubtedly bigger species. It was also relatively small in *A. australis*.

*Serratus profundus*.—This muscle is stated by Fürbringer to consist of four slips in *Apteryx*. In *A. haasti* I found but three slips, two longer than the third, which was inserted in common with the second. In *A. australis* all four were present. In *A. oweni* the fourth (most posterior) slip, which arose from the rib as the third, was represented by an excessively slender piece.

The *serratus superficialis* consisted of four distinct bundles in *A. australis*, of apparently only three in *A. haasti*, and of only two in *A. oweni*.

#### ABDOMINAL VISCERA.

The arrangement of the septa which subdivide the body cavity offers nothing specially noteworthy. The intestines are contained in a spacious cavity, which is as usual shut off from that which lodges the lobes of the liver by a horizontal septum. This latter is attached to the ventral body wall just behind the liver lobes. The latter are divided from each other by the usual falciform ligament.

The *intestinal tract*, as it lies undisturbed, shows the usual duodenal loop, inclined apically to the left side of the body; to the right of this are the irregular coils of the greater part of the small intestine. Thence emerges the ileum, which runs across the body cavity below the gizzard, and accompanied by the *cæca*; this bends back and passes into the short straight rectum.

The arrangement of the intestines, when compared with Mr. P. Chalmers Mitchell's important series of figures of the avian intestine, is seen to conform closely to the type characteristic of *Casuarinus* and *Dromæus*. But the duodenal loop is narrow across, and not wide like that of *Casuarinus*; the gut, too, is not very much folded. There is no other bird to which *Apteryx* shows a closer likeness in these matters: a further argument for the close association of all the Struthionæ. The large intestine is short. The vitelline *cæcum* is very plain, and in a specimen of *A. australis* was attached to the abdominal wall.

As is usual in birds, the median mesenteric vein runs straight through the

\* This muscle can hardly be a propatagialis which has shifted its insertion?

primary loop of the intestine to the vitelline caecum, which is at its middle. This vein, however, is borne at the summit of a deep fold of mesentery for the greater part of its course. Towards the vitelline caecum this fold becomes obsolete.

As to the length of the intestine, I measured it in three individuals belonging to the species *A. australis*, *A. haasti*, and *A. oweni*, which were about of the relative sizes that is indicated by the order of their placing—*A. australis* being the largest individual. I found the lengths of the entire gut and of the caeca to be as follows :—

	Gut.	Caeca.
<i>A. australis</i> . . .	67 in.	8 in.
<i>A. haasti</i> . . .	41 in.	6 in.
<i>A. oweni</i> . . .	32 in.	4½ in.

The measurements, corresponding so nearly as they do, did not seem to favour the probability of discovering specific differences by the study of a more extensive series.

I do not find myself able to agree in every detail with Sir R. Owen's description of the lining membrane of the intestine. He writes that the duodenum is beset with extremely fine villi about one line in length which are towards the end of the duodenum converted into thin zigzag longitudinal folds. At the very beginning of the duodenum (of *A. oweni*) I find appearances a little different: there are, in fact, no separate villi at all, but closely set zigzags, which give a beautifully sculptured appearance to the interior of the gut. In the lower part of the small intestine, not far from the origin of the caeca, these folds are rather more regular, closer, straighter and finer.

The character of the lining membrane absolutely changes at the origin of the caeca. Moreover, a marked valvular fold separates the small from the large intestine. The latter has a series of conspicuous longitudinal ridges; these, for the most part, cease some little way in front of the end of this portion of the gut. The appearances of the interior of the gut, however, are liable to alteration from the condition of its distension. In the large intestine of *A. occidentalis* I did not find the longitudinal folds referred to except at the very end of that portion of the gut.

The gall bladder is known, from the investigations of Owen, to be subject to individual variation. It was wanting in one of the three individuals dissected by him. Mr. W. A. Forbes (MS. notes) found a gall bladder in a specimen each of *A. australis* and *A. oweni*.

In a specimen of *A. haasti*, dissected by myself, there was a large gall bladder; but the mode of its connection with the liver and with the cystic and hepatic ducts was different from that figured by Owen. The cystic duct leaving the gall bladder was immediately joined by a duct from the right lobe of the liver, and then became continuous by means of a branch with the hepatic duct coming from the left lobe. A second specimen had an equally well developed gall bladder.

I found a gall bladder in the remaining species, including *A. occidentalis*.

#### 4. WINDPIPE.

The syrinx of *Apteryx* has been to some extent described by the late Mr. W. A. Forbes. His observations (illustrated by two cuts) related to the

species *A. australis*, *A. haasti*, *A. oweni*, and *A. mantelli*, between which he noted certain differences which will be referred to presently. Owen observed of the *Apteryx* that there was no lower larynx—by which, of course, he meant syrinx. As Forbes remarked of this question of the alleged absence of a syrinx, it is difficult to answer definitely in the case of many of the Ratite birds, because the nature of a syrinx has not been accurately defined. In any case I am able to add a somewhat important fact to Forbes' description, which removes all doubt as to the truly syringeal nature of the bifurcation of the trachea in *Apteryx*.

As to the form of the syrinx itself, Mr. Forbes, who has figured back and front views of that of *A. mantelli*, has pointed out some slight variations from species to species. In *A. mantelli* and in *A. haasti* the last tracheal ring is incomplete behind, though complete in front; on the other hand, in *A. australis* and *A. oweni* the last three tracheal rings are incomplete posteriorly.

I find that Mr. Forbes is perfectly correct in this statement so far as concerns three of the species which he mentions.

In Mr. Rothschild's species, *A. occidentalis*, only the last tracheal ring was split posteriorly; but then, as I had only a single individual to examine, it would be rash to base or support a specific difference on the fact. In this species both the penultimate and antepenultimate ring are produced posteriorly in a triangular fashion. In front the last three are thus produced.

As Mr. Forbes showed, there is some modification of at least the last two tracheal rings, and, though there is no pessulus, the membrana tympaniformis is well-developed. There is therefore, so far, every essential of a properly developed syrinx, save the pessulus and the intrinsic syringeal muscles. The latter I find to be present and to be especially plainly developed in *Apteryx australis*. There is a thin band of muscle continuous above with the extrinsic muscle; this passes down the side of the trachea and gradually thins out into fibrous tissue, which seems to die away upon the last tracheal ring, hardly reaching the bronchi. Its state, in fact, is clearly one of degeneration, and very much on a par with the state of the corresponding muscle in the Hoatzin (*Opisthocomus*). In *A. mantelli* the same muscle was visible; but it did not seem to me to be anything like so well developed as it is in the species just referred to.

In neither *A. haasti* nor *A. oweni* could I observe the presence of this muscle at all. I looked for it, moreover, in a fresh *A. haasti* which died in the Zoological Society's Gardens early in March. It is perhaps noteworthy, in connection with the better development of the intrinsic syringeal muscles in *A. australis*, that the lower end of the trachea in this species is a more consolidated structure than it is in the other *Apteryx*. In the meantime it is clear that *Apteryx*, like *Rhea* (and these are the only Struthionines which are so characterised), possesses a pair of intrinsic syringeal muscles, but that these are much more on the wane in *Apteryx* than in *Rhea*.

## 5. THE SPECIES OF *APTERYX*.

I shall now attempt to deduce from the foregoing facts the characters of the several species of *Apteryx*.

*Apteryx oweni* perhaps differs more from the rest than they do among themselves: it is to be distinguished by its smaller size, the characters of its plumage, the three open rings of the trachea below, and the great length of the prepubic process, besides possibly a number of minor points.

*Apteryx haasti*, although looking like a larger edition of *A. oweni*, differs in the last two features just mentioned.

*Apteryx mantelli* and *A. australis* are closely allied to each other, and come very much nearer to *A. haasti* than to *A. oweni*. The following tabular statement deals with many of the points raised in the present paper.

	<i>A. oweni.</i>	<i>A. haasti.</i>	<i>A. mantelli.</i>	<i>A. australis.</i>
Neural arch of atlas . . .	Sometimes incomplete.	Complete.	Sometimes incomplete.	Complete.
Catapophysial canal . . .	Sometimes present.	Not formed.	Not formed.	Sometimes present.
First median hypapophysis . . .	On C.V. 12.	On C.V. 13.	On C.V. 12.	On C.V. 12.
Free dorsal vertebrae . . .	7.	7.	7 or 8.	6.
Free caudals . . . . .	9.	8.	7 or 8.	7 (of which 4 form a pygostyle).
Ribs . . . . .	2 cervical; 3, 4 or 5 reach sternum	2 cervical; 4 reach sternum.	1 cervical; 4 reach sternum	2 cervical; 5 reach sternum.
Coracoid . . . . .	Not notched.	Not notched.	Varies (2 and 2).	Notched.
Prepubic process . . . . .	Very long.	Moderate.	Very short.	Moderate.
Syrinx . . . . .	3 tracheal rings open posteriorly.	1 tracheal ring only.	As in <i>haasti</i> .	As in <i>haasti</i> .
Intrinsic muscles . . . . .	0.	0.	Faint.	Fairly developed.

It will be observed that a very large proportion of the structural variations, observed by myself and others among the species of *Apteryx*, concern degenerating, or at least altering, organs: they are mainly indeed massed in the wing and adjacent parts, which is of course precisely where degeneration is most actively progressing. These very numerous variations cannot, therefore, be safely regarded as a basis of classification. In different individuals the processes may be easily supposed to be going on with more accelerated or with less rapidity than in others. The wing of *Apteryx* seems to be too small to be useful in any way, and yet too large to enable us to assume that a position of equilibrium has been reached. The specific characters, therefore, in that region of the body are not yet fixed; we can at most observe tendencies towards particular structural peculiarities. It would seem, for example, that the sternum of *A. haasti* varies round a long and comparatively narrow form, and that a short comparatively wide sternum is equally distinctive of *A. mantelli*; that perhaps *A. haasti* has definitely acquired a solid coracoid without an anterior notch, while *A. mantelli* and *A. australis* have not settled down to a state of rest in this particular. On the other hand, the syrinx and the hind limb would seem to offer more reliable material whereon to base specific distinction.

LIST OF A COLLECTION OF BIRDS MADE AT GAMBAGA,  
IN THE GOLD COAST HINTERLAND,  
BY CAPT. W. GIFFARD.

By ERNST HARTERT.

THIS collection is made near Gambaga, in the Gold Coast Hinterland, north of Cape Coast Castle,  $10\frac{1}{2}$ ° N. lat., and about 1° west of Greenwich. A few skins are from Mossi, or as it is now officially spelt "Moshi." This is the country beginning about fifty miles N.E. of Gambaga, and such few birds as Captain Giffard shot there were procured within twenty miles of Wagadugu or Waghadugu. A few skins were also secured during the return journey on the Volta River, others at Cape Coast Castle, and others at Prabsu or Praso.

The collection, although not a very large one, and most of the species being represented in a few specimens only, contains some interesting novelties, which are already briefly characterised in the bulletin of last October's meeting of the British Ornithologists' Club. Still greater, however, is the zoogeographical interest attached to the ornithology of Gambaga. The close relationship between the fauna of North-eastern Africa and that northern portion of West Africa which has been called the Senegambian division is now a well-known fact, which I had an opportunity to observe myself in Haussaland, as long ago as 1885 and 1886 (see *Journal für Ornithologie*, 1886, p. 576). The exact limits of the great zoogeographical area extending from North-east Africa to Senegambia are, nevertheless, very little known. Reliable facts about the distribution of birds in Senegambia itself are scarce; nothing is known of the exact northern limits of tropical Senegambia towards the Saharan desert-fauna, next to nothing from within the great bend of the Niger north of the tenth degree, next to nothing from the northern portions of Haussaland, nothing from Bornu, Bagirmi, Wadai and Darfur. Every additional fact is therefore welcome to ornithologists and students of African zoogeography. From my own scanty observations, made fourteen years ago, under difficult circumstances, in Haussaland, I am inclined to think that the mountains in Central Haussaland, which separate the waters going to the Benue and to the Niger south of the tenth degree, from those running to the Lake of Tsad, and to the Upper Niger, or their northern slopes, form a kind of line of demarcation between the tropical West African region and the Senegambian and North-eastern division. Future observations and collections, however, must show how much of these differences is merely due to the prevalence of large forests in the West African region, and their greater scarcity in the more northern portions. As it is, the name of the West African region is not too well chosen, as it extends as far eastwards, about, as the thirtieth to thirty-fifth degree east of Greenwich, and as it extends to the north only along the west coast in a narrow belt to about the Gambia, where it seems to be limited by the great area reaching from North-east Africa to Senegambia, which might be called the Sub-Saharan area. For this distribution cf. *Oedinemus affinis*, *Ptilopus fuscus*, *Certhia alpestris*, *Coracias naevius*, *C. abyssinicus*, *Petronia dentata*, *Mirafra erythroptera*, *Heliocorys modesta giffardi*, and many others in the following list.

More remarkable still is the occurrence at Gambaga of some species only known from Angola to Nyassa-land—*i.e.*, *Accipiter urampensis* (No. 26), *Petrochelidon rufigula* (No. 150), and a form closely allied to *Bessonornis modestus* Shelley (No. 129).

The occurrence of such forms within the bend of the Niger is quite unexpected, and it shows how little we know of the details of distribution of African birds.

In addition to thirty-four of the forms collected by Captain Gillard, the following were obtained near Gambaga by Colonel H. P. Northcott :

*Macrodipteryx macrodipterus*, *Lanius gubernator* (previously only known from Eastern Equatorial Africa), *Prionops poliophus*, *Pytelia hypogrammica*, *Crateropus reinwardti*, according to Sharpe in Bull. B. O. Club, vol. x. pp. 6, 7, October 1899.

## LIMICOLAE.

### 1. *Oedicnemus affinis* Rüpp.

♂ Gambaga, 20. 12. 1898. "Iris yellow."

The distribution of this species is generally only known to be North-east African. In the *Catalogue of Birds* (vol. xxiv.), it is given as: "North-eastern Africa, from Kordofan and Bogos, south to Somali-land, and to Lado in Equatorial Africa."

### 2. *Pluvianus aegyptius* (L.).

♀ Gambaga, 27. 10. 1898. "Iris brown, legs grey."

### 3. *Galachrysia cinerea* (Fraser).

♀ Gambaga, 27. 10. 1898. "Legs and base of bill coral red." The base of the bill is not yellow, as stated in *Cat. B. Brit. Mus.* vol. xxiv. p. 65. See also *Journ. f. Orn.* 1886, p. 610. Dr. Sharpe recorded this species from the Rio Volta, Prof. Reichenow from Togoland. I found it far in the interior of Haussaland, to at least 12° north. Gambaga seems to be the most westerly locality known for this bird.

### 4. *Lobivanellus senegalus* (L.).

♂ Gambaga.

### 5. *Lobivanellus albiceps* (Gould).

♂ Gambaga, 14. 3. 1898. "Iris yellow."

### 6. *Oxyechus forbesi* (Shelley).

♀ Upper Volta River, 22. 3. 1899.

### 7. *Helodromas ochropus* (L.).

♀ Gambaga, 24. 12. 1898. "Iris brown."

### 8. *Tringoides hypoleucus* (L.)

♀ Gambaga, 25. 11. 1898.

## PARRIDAE.

9. *Parra africana* (Gm.).

♀ Gambaga, 14. 3. 1898. "Iris brown."

## HELIORNITHIDAE.

10. *Podica senegalensis* (Vieill.).

♂ Gambaga, 20. 12. 1898. "Iris grey."

## RALLIDAE.

11. *Porphyrio alleni* Thomps.

Moshi, 3. 7. 1898. "Iris orange."

## PHASIANIDAE.

12. *Ptilopachus fuscus* (Vieill.).

♂♂ Gambaga, 7. 2. and 13. 3. 1898. "Iris hazel, cere and legs red." It seems to me that eastern specimens (Kordofan) are much lighter, and with the throat more brownish than our Gambaga birds, which agree with such from Senegambia, but I have no fresh material from the east to decide about this question. One of the two Gambaga birds, which are both sexed "♂," the bird shot in March, has the breast much paler.

13. *Francolinus bicalcaratus* (L.).

♂ Gambaga, 20. 2. 1899. "Iris brown."

14. *Francolinus albogularis* Gray.

♂ Gambaga, 5. 2. 1898. "Iris brown." This *male* agrees entirely with the type of the species in the British Museum. Besides this *male* there is a *female*, which differs from the male in the following characters: The feather of the lower hind-neck and upper back have no creamy white shaft stripes, but are grey, with a large black patch, traversed by rufous lines, on the margin of each web, and they are rufous at base; the feathers of the chest, sides and flanks are blurred with blackish brown.

The tarsus has no spur. This *female* was shot at Gambaga, on October 4th, 1898. The iris was hazel.

I have very little doubt, but further proof is required to show, that *Francolinus buckleyi* (Grant ex Shelley's MS., *Cat. B. Brit. Mus.* v. xxii. p. 145) is the *female* of *F. albogularis*. The types from Accra, Gold Coast, differ from the undoubted ♀ of *F. albogularis*, as described above, essentially only in having more numerous and narrower black bars to the feathers of the chest. These birds, which have been named, *F. buckleyi*, cannot, in my opinion, be considered to be the ♀ of *F. schlegelii*, from N.E Africa, which is only known in the *male* sex, and which is not yet represented in any British collection, as far as we are aware. If *F. buckleyi* is not the ♀ of *F. albogularis*, then it must be that of a very closely allied form.

## PTEROCLIDAE.

15. *Pterocles quadricinctus* (Temm.)

♂ ad. and juv., Gambaga 1. 1. 1899 and 3. 3. 1898. "Iris brown."

## COLUMBAE.

16. *Vinago waalia* (Gm.).

♂ ad. Gambaga, 4. 11. 1898. "Iris orange red."

Wing 177 mm. Abyssinian specimens seem to have the wing slightly longer, while a *female* from Niam-Niam (Bohndorff coll.) has the wing very short, only 165 mm. Larger series from the different localities should be studied. The *female* differs from the *male* in being smaller and in having the vicious patch on the wing much smaller.

17. *Columba guinea* (L.).

♂ Gambaga, 28. 8. 1898. "Iris, cere and legs pink."

18. ? *Columba gymnocyclus* (Gray).

♀ Gambaga, 28. 8. 1898. "Iris pink with yellow edge, cere and legs pink."

This interesting pigeon looks very much like some domesticated races of *C. livia*, and agrees perfectly with the types of *C. gymnocyclus*, except that it is of a lighter grey and has a shorter wing, which latter peculiarity may be due to its sex. It has a distinct bare ring round the eye. Captain Giffard kindly tells me about this bird as follows:—"The little blue rock-pigeon is a wild bird. These birds live in a big 800-foot scarp, about six miles from Gambaga, and come down in fair numbers at sowing and harvest time, at other times they are very seldom seen. There is not the least doubt as to their being wild, and they could not have originated from tame birds, as there is only one pair of tame pigeons in Gambaga—large white birds—and very likely no more in the whole of the Hinterland." Our knowledge of *Columba gymnocyclus* is very small, and there is no reliable evidence of its distribution. There are some specimens from "Senagambia" in Berlin, some from "W. Africa" in the British and Paris Museums; and we have one that was formerly in the Rioour collection, without locality, but perfectly agreeing with the types. Probably these dark birds are inhabitants of rocky cliffs somewhere in Senegambia, and possibly the Gambaga birds are a paler sub-species. The wing of our bird measures 209 mm., that of our dark *C. gymnocyclus* 213 mm.

19. *Chalcopelia afra* (L.).

♂ Gambaga, 31. 8. 1898. "Iris brown." Rather pale on the breast!

20. *Turtur senegalensis* (L.).

♂ Gambaga, 20. 2. 1899. "Iris brown."

*Turtur vinaceus* (Gm.).

Gambaga.

21. *Turtur semitorquatus* (Rüpp.).

♀ Gambaga, 17. 9. 1898. "Iris orange, cere red."



ARDEIDAE.

22. *Butorides atricapilla* (Afzel).

♂ Upper Volta River, 10. 2. 1899. "Iris and legs yellow. Upper jaw black, lower part yellowish."

23. *Ardetta payesi* Verr.

Moshi, 20 miles from Wagadugu, 4. 7. 1898. "Iris orange."

(Cf. Neumann in *Journ. f. Orn.* 1898, pp. 283, 284, Hartert in appendix to Anson's "Under the African Sun.")

ACCIPITRES.

24. *Circus macrurus* (Gm.).

♀ Gambaga, 7. 12. 1898. "Iris yellow."

25. *Astur sphenurus* (Rüpp.).

♂♂ ♀ ad. Gambaga, 24. 12. 1898, 12. 4. 1898. "Iris orange."

This species is closely allied to *A. badius*, from which the adult bird can easily be distinguished, although it may hardly be more than a subspecies of it.

26. *Accipiter ovampensis* Gurney.

♂ ad. Gambaga, December 1898. "Iris orange." This rare hawk, which Dr. Sharpe kindly compared with a specimen in the British Museum, is figured and described in the *Ibis* 1875, p. 367, Pl. VI. It is hitherto only known to occur from S.W. Africa to Nyassa-land and the Zambesi, and the occurrence in the Gold Coast Hinterland is a most unexpected one. Our bird, being a *male*, is considerably smaller than the ♀ ad. type. It measures as follows: Wing 215, tail 159, metatarsus 44 mm.

27. *Eutolmaetus spilogaster* (Bp.).

♀ Gambaga, 24. 10. 1898. "Iris orange."

28. *Circaetus cinereus* Vieill.

♀ Gambaga, 14. 1. 1899.

29. *Nauclerus riocouri* (Vieill.).

♂ Gambaga, 22. 1. 1899. "Iris pink." The claws are whitish yellow.

30. *Cerchneis alopec* Hougk.

♀ Gambaga, 4. 12. 1898. "Iris brown."

This specimen is somewhat paler and less reddish than specimens from Shoa and Bogosland. The occurrence so far west as Gambaga is in the highest degree interesting. (Cf. Rothschild in *Bull. B. O. Club*, v. VIII. p. 57 (June 1899).

31. *Dissodectes ardosiacus* (Bonh. et Vieill.).

♂ ♀ Gambaga, 12. 10. 1898, 29. 12. 1898. " Iris brown, cere and legs yellow."

These two specimens, said to be a *male* and a *female*, are alike in size, but the ♀ has the inner webs of the rectrices more distinctly barred on the underside.

## STRIGES.

32. *Huhua poensis* (Tras.).

One young bird, (♀ ?), Cape Coast, 1. 5. 1899.

33. *Bubo cinerascens* Guér.

(♂ ?) Gambaga, 14. 1. 1899. " Iris orange."

34. *Pisorhina capensis* subsp. ? ?

A *male*, shot on the Volta River 10. 2. 1899, with a light yellow iris, differs from a good series of skins of *P. capensis* from Southern Africa in being generally more rufous, in having the wing about 3 or 5 mm. shorter, the under wing-coverts much less spotted and barred, the black shaft-stripes to the feathers of the underside narrower. I suppose our bird will eventually prove to belong to an undescribed form of *P. capensis*, if it cannot be called *P. senegalensis* (Swains.), with which *P. pygmaea* (C. L. Brehm) may be synonymous. *P. ugandae* O. Neum. should also be compared. With only a single skin, and without sufficient material from other parts of Africa for comparison, I cannot at present venture to settle the question of our Gambaga Scops-owl.

35. *Glaucidium perlatum* (Vieill.).

♀ Gambaga, 20. 7. 1898. " Iris yellow."

## PSITTACI.

36. *Palaeornis docilis* Vieill.

♂ Gambaga, 25. 9. 1898. " Iris orange."

37. *Poiocephalus versteri* (Finsch.).

♂ Gambaga, 9. 10. 1898. " Iris yellow."

## CORACIIDÆ.

38. *Coracias cyanogaster* Cuv.

♂ ♀ Gambaga, November and January 1898. " Iris hazel."

39. *Coracias naevius* Daud.

♂ ♀ Gambaga, January and October 1898. " Iris hazel."

The *female* has the wings a little shorter than the *male*. Both these skins are much smaller than our skins from Erithraea and Somaliland. The ♂ from Gambaga has the wing 185, the *female* 175 mm.

40. *Coracias abyssinicus* Bodd.

♂ ♀ Gambaga, January 1899. "Iris brown."

41. *Eurystomus afer* (Lath.).

♂ ad. Gambaga, 16. 4. 1898. ♀ juv. Gambaga, 20. 10. 1888.

ALCEDINIDAE.

42. *Corythornis cyanostigma* (Rüpp.).

♂ Gambaga, 23. 11. 1898. "Iris brown."

43. *Ispidina picta* (Bodd.).

♀ Gambaga, 17. 9. 1898. "Iris brown."

44. *Halcyon chelicuti* (Stanl.).

♀ ♀ Gambaga, June and March.

45. *Halcyon semicaerulea* (Forsk.).

♂ ♀ ad. Gambaga, 4. 11 and 16. 4. 1898. "Iris brown."

♂ juv. Moshi, 1. 7. 1898.

46. *Halcyon torquata forbesi* Sharpe.

♂ ♀ of this interesting subspecies of *H. torquata* were shot at Gambaga in December 1898. Their iris was brown. The brighter and more extended blue colour on the chest and the greyish blue wash on the flanks and under tail-coverts separate this form from *H. torquata torquata*. Our female is a little smaller than our male. Wing of ♂ 124, of ♀ 121 mm. In the *Catalogue of Birds* the distribution of *H. t. forbesi* is given as "West Africa from Sierra Leone to the Cameroons," that of *H. torquata torquata* as "Senegambia" alone; while farther south, from Gaboon to Angola, we meet with *H. torquata malimbica*.

MEROPIIDAE.

47. *Merops nubicus* Gm.

♂ ad. Gambaga, 12. 1. 1898. "Iris red."

48. *Merops bullocki* Vieill.

♂ ♀ Gambaga, February and August 1898. "Iris brown."

49. *Merops albicollis* Vieill.

♀ Gold Coast, near Koranza, 17. 4. 1899. "Iris red."

50. *Merops pusillus* P. L. S. Mull.

♂ ♀ Gambaga, July and August 1898. "Iris red."

51. *Merops gularis* Shaw.

♂ ad. Prahsu, Gold Coast, 28. 4. 1899. "Iris red."

52. *Dicrocercus furcatus* (Stuhl.).

♂ Gambaga, 2. 12. 1898; ♀ 9. 1. 1899. "Iris red."

BUCEROTIDAE.

53. *Lophoceros nasutus* (L.).

Gambaga, February 1898.

54. *Lophoceros erythrorhynchus* (Temm.).

Gambaga, 1898.

UPUPIDAE.

55. *Upupa epops senegalensis* Swains.

♀ in moult, Gambaga, 20. 2. 1899. "Iris brown."

This skin is not at all brighter rusty rufous than European examples. The crest-feathers show but very indistinct whitish bars before the black tips, but some of the feathers are wanting. It is not yet, apparently, quite certain whether the Hoopoe is a resident bird in West Africa, or merely a winter visitor, and the question about its being subspecifically different or not from *Upupa epops epops* is by no means settled. Cf. *Cat. B. Brit. Mus.* v. XVI. p. 7, and *Journ. f. Orn.* 1897, p. 23.

56. *Irrisor viridis senegalensis* Vieill.

♀ ♀ Gambaga, 16. 1. and 20. 8. 1898.

I believe there is no doubt that two sub-species of large *Irrisor* with dark heads inhabit Africa. One of them has the back, head, and neck golden green, and the tail purple in fresh plumage: the other has the back, head, and neck dark green or steel-blue, and the tail, in fresh plumage, steel-blue, with very little or no purple. The former inhabits Southern Africa, north to Mombasa, the other North-east and West Africa. It is perhaps wiser to regard them as only subspecifically distinct, for the present. There can be no doubt that the name *viridis* can only be applied to the southern bird, while that of *erythrorhynchus*, which is used in the Catalogue of Birds, is perhaps doubtful, and *senegalensis* Vieill. might better be used for it. Prof. Reichenow (*Journ. f. Orn.* 1897, p. 24) mentions only the difference in the colour of the tail, but he seems to confound his bird from the White Nile, which must be the western and north-eastern form, with the southern race. The coppery and olive sheen often seen in the tails of *Irrisor* is apparently only seen on old feathers.

CAPRIMULGIDAE.

57. *Scotornis climacurus* (Vieill.).

♂ ♂ Gambaga, 18. 2. and 25. 7. 1898.

58. *Tachornis parva* (Licht.).

♂ Gambaga, 10. 11. 1898. Quills in moult. This specimen belongs to the pale form.

MUSOPHAGIDAE.

59. *Schizorhis africana* (Lath.).

♂ Gambaga, 25. 2. 1898. "Iris brown."

60. *Musophaga violacea* Isert.

♀ ad. Gambaga, 18. 2. 1898. "Iris brown. Shield on forehead yellow, bill in front of nostrils orange-red."

CUCULIDAE.

61. *Cuculus gularis* Steph.

♂ ♀ Gambaga, August and October 1898. "Eyelid and iris yellow." The ♂ has the wing 229, the female 210 mm. long.

62. *Coccytes cafer* (Licht.).

♀ ad. Moshi, 30. 6. 1898; ♂ Gambaga, 29. 8. 1898. "Iris brown."

63. *Coccytes glandarius* (L.).

♂ Gambaga, 20. 12. 1898.

64. *Chrysococcyx klaasi* (Steph.).

Gambaga, July and August 1898.

65. *Chrysococcyx cupreus* (Bodd.).

♀ Gambaga, 18. 7. 1898. "Iris light yellow."

66. *Centropus senegalensis* (L.).

♂ Gambaga, 31. 8. 1898. "Iris red."

PICIDAE.

67. *Dendromus punctatus* (Valenc.).

♂ Gambaga, 16. 8. 1898. "Iris pink."

68. *Jyngipicus obsoletus* (Wagl.).

♂ ♂ Gambaga, February and March 1898. "Iris brown."

CAPITONIDAE.

69. *Pogonorhynchus dubius* (Gm.).

♀ ♀ Gambaga, August and February.

70. **Melanobucco vieilloti** (Leach).

Gambaga, 22. 2. 1899; 4. 8. 1898. Cape Coast, 1. 5. 1899.

71. **Barbatula duchaillii** Cass.

♂ Prahsu, Gold Coast, 28. 4. 1899.

72. **Gymnobucco calvus** (Lafr.).

♂ Prahsu, 28. 4. 1899. "Iris brown."

INDICATORIDAE.

73. **Indicator indicator** (Gm.).

Gambaga, August, November and December 1898. "Iris brown."

CORVIDAE.

74. **Cryptorhina afra** (Gm.).

♂ Gambaga, October 1898.

This bird is doubtless a *male*, but the black bill has some white spots near the base—evidently indicating that the young bird has a pale bill like the *female*.

75. **Pholidauges leucogaster** (Gm.).

Gambaga, rather common in August 1898.

76. **Lamprocolius purpureus** (P. L. S. Müll).

♂ ♀ Gambaga, 5. 2. 1828; 3. 3. 1898. "Iris bright yellow."

77. **Lamprotornis caudatus** (P. L. S. Müll).

♂ Gambaga, 25. 9. 1898. "Iris yellow."

This bird is on the breast, neck, back, and wings purplish blue, and is therefore *L. cytoni* (Fras.), if that is a distinct species. An adult *female* from Moshi, 1. 7. 1898, iris light yellow, has the back, breast, and wings oil-green, without the slightest mixture of purple-blue. This would be the true *L. caudatus*. The differences might be sexual (?).

78. **Spreo pulcher** (P. L. S. Müll).

♀ (moulting) Moshi, 30. 6. 1898. "Iris brown."

ORIOOLIDAE.

79. **Oriolus auratus** Vieill.

♂ ♂ ♂ Gambaga, December and January, ♂ ♂, August and December 1898.

## DICRURIDAE.

80. *Dicrurus afer* (Licht.).

♀ Gambaga, 16. 8. 1898. "Iris red." (*Bachangucassumbis*, *Cat. B.* III.).

## PLOCEIDAE.

81. *Vidua serena* (L.).

♂ Gambaga, 17. 9. 1898.

Of the three names given by Linnaeus to this hapless bird in the *Syst. Nat.* ed. XII. (in ed. X. it is not mentioned), that of *Emberiza serena*, based on the *Petite Veure* of Brisson, which is doubtless our bird, stands first, and should therefore be accepted.

82. *Steganura paradisea* (L.).

♂♂ Gambaga, August and January.

83. *Pyromelana franciscana* (Incert.).

♂ Moshi, 1. 7. 1898.

84. *Pyromelana flammiceps* (Swainson).

♂ Gambaga, 19. 8. 1898.

85. *Pytelia phoenicoptera* Swainson.

Two skins, ♂ ♀ Gambaga, 30. 7. and 8. 8. 1898. "Iris orange red."

These specimens have the throat and ashy bars on the underside rather pale, and may be worthy of subspecific rank, if a larger series can be compared.

The bird mentioned by Dr. Sharpe in *Cat. B. Brit. Mus.* v. XIII. p. 301, from Lado, agrees in every respect with one in the Tring Museum, collected by Emin Pasha at Lado, 14. 6. 1881. Its label has the following notes in the Pasha's handwriting: "Long. tot. 128 mm., rostr. a fronte 11, al. 66, caud. 37, tars. 13. Iride coccinea; rostro nigro; pedibus rubellis." These birds differ from Senegambian specimens of *P. phoenicoptera* in having the under wing-coverts barred with ashy grey, in having somewhat narrower white bars to the feathers of the breast and under tail-coverts, and in having the throat as dark ashy grey as the crown. The Lado form must be separated, and may be called

*Pytelia phoenicoptera emini* subsp. nov.

Type: ♂ Lado, 14. 6. 1881, in Mus. Tring.

86. *Plocepasser superciliosus* (Cretzschm.).

♂ ♀ Gambaga, common.

87. *Lagonosticta nigricollis* Hengstl.

♂♂ Gambaga, 7. 1. and 8. 8. 1898. "Iris red-brown."

88. *Lagonosticta caerulescens* (Vieill.).

♀ Gambaga, 30. 7. 1898. "Iris brown."

89. *Sporaeginthus melpoda* (Vieill.).

♂ ♀ from Gambaga seem to be much paler on the crown and back than specimens from Liberia and the Congo.

90. *Estrilda bengalus* (L.).

Gambaga.

91. *Anaplectes melanotis* (Lafr.).

♂ Gambaga, 15. 12. 1898. "Iris red, beak coral."

92. *Hyphantornis cucullatus* (P. L. S. Mull.).

Gambaga, common.

FRINGILLIDAE.

93. *Serinus butyraceus* (L.).

♂ Gambaga, 4. 8. 1898.

94. *Petronia dentata* (Sund.).

♂ ♀ ♀ Gambaga, January, August, and November 1898.

These birds seem to be somewhat paler below, than birds from North-east Africa, but the material at my disposal does not enable me to decide if this may be of any value. The species is principally a north-eastern one, and rarely found in West Africa.

95. *Emberiza cabanisi* Reichen.

♂ ♂ ♀ Gambaga, January, July, and August. "Iris hazel."

96. *Emberiza forbesi* (Hartl.).

♀ Gambaga, 20. 7. 1898. "Iris brown."

The plumage of this bird is very much worn, but it seems to agree with *E. forbesi*, which is, as far as I am aware, not known to extend to the West African region.

97. *Fringillaria septemstriata* (Rüpp.).

♂ Gambaga, 27. 10. 1898. "Iris brown"

This is also a north-eastern form, not formerly known to reach across to the Senegambian area.

ALAUDIDAE.

98. *Mirafra erythrogyia* (Strickl.).

♀ Gambaga 30. 11. 1898. "Iris brown."

This very rare lark has been described from Kordofan, and Dr. Büttner and the late Ernst Baumann have collected it in Togo. Specimens from Togo, and our *female* from Gambaga do not seem to differ from Kordofan examples. Cf. Reichenau in *Journ. f. Orn.* 1891, p. 399, and 1897, p. 43, Rothschild in *Bull. B. O. C.* v. VIII. p. 57 (June 1899).



99. *Heliocorys modesta giffardi* Hart.

♂ ♀ Gambaga 18. 7. and 20. 12. 1898. "Iris brown."

This pair of little larks differs from typical *Mirafra bacolica* Hartl., which are said by Sharpe (*Cat. B. Brit. Mus.* XIII. p. 623) to be the same as *Heliocorys modesta* (Heugl.), from Fadjuli and Kabajendi (Emin Pasha coll.) in being generally paler, with the breast lighter, the foreneck and chest heavily spotted with blackish brown, and in being slightly smaller. Wing ♂ 81, ♀ 79, tail ♂ 52, ♀ 48, tarsus about 18 mm. (Cf. *Bull. B. O. C.* v. IX. no. 1, October 1899.)

## MOTACILLIDAE.

100. *Motacilla vidua* Sundev.

♂ Gambaga, 27. 10. 1899.

It is probable that *M. vidua* can be separated into several subspecies. Cf. *Journ. f. Orn.* 1886 p. 582.

## NECTARINIIDAE.

101. *Nectarinia pulchella* (L.).

♂ juv., Gambaga, 15. 12. 1898. "Iris brown."

102. *Hedidypna platura* (Vieill.).

♂♂ Gambaga, 15. 12. 1898. "Iris brown."

103. *Cinnyris senegalensis* (L.).

♂♂ Gambaga, July and August 1898.

These two specimens have the glittering narrow bars across the feathers of the chest blue, and not so greenish as Senegambian skins. They may form a separate race (?).

104. *Cinnyris splendidus* (Shaw).

Cape Coast to Moshi. Common.

105. *Cinnyris cupreus* (Shaw).

♂ Cape Coast, 1. 5. 1899.

## PARIDAE.

106. *Parus leucopterus* Swains.

♀♀ Gambaga, January and July. "Iris light yellow."

## LANIIDAE.

107. *Lanius senator badius* Hartl.

♂ ad. and ♀ (or ♂ juv.) shot at Gambaga 10. 12. 1898, belong to the form known as *Lanius badius* (cf. *Cat. B. Brit. Mus.* VIII. p. 285).

The *male* has no white bases to the first primaries, so that the white patch behind the primary coverts, which is so conspicuous in our European *L. senator*, is

not visible, although the seventh to tenth primaries have white bases to the outer web. The adult ♂ of this form has the scapulars, chest, sides of neck and sides of the body washed with pale orange-buff, and the tips to the secondaries are buff. The wing measures 113 mm. There is also in the collection an adult ♀ and a young ♀, shot at Gambia on November 5th and 30th. Both these birds have a conspicuous white base to the first primaries, and I therefore believe that they belong to the typical European *Lanius senator senator*, which evidently migrates to West Africa and stays there during the winter months. They are, however, rather buff on the underside. It is evident that this form, which is supposed by ornithologists to be a resident tropical form, can only be regarded as a subspecies of *Lanius senator*. This species is very interesting on account of its various varieties or subspecies, of which the following can be distinguished.

(a) *Lanius senator senator* L.

Large white base to all primaries, central rectrices brownish black to the base, underside white, with very little rusty or cream-coloured wash. Breeds in Central and Southern Europe, migrates to tropical Africa.

With regard to its specific name this bird is one of the most unfortunate ones in Europe, but there is not a shadow of doubt that, according to modern rules of nomenclature, its name is *Lanius senator*, Linnaeus, *Syst. Nat.* Ed. X., v. 1. p. 94, based on Albin's red-headed butcher-bird.

(b) *Lanius senator pectoralis* v. Müll.

This is probably the name that is to be used for the North African form, generally known as *Lanius rutilans*, or better *Lanius senator rutilans* (Hartlaub, *Journ. f. Orn.* 1854, p. 100). Koenig (*Journ. f. Orn.* 1880, Pl. III.), figured and described this form as a paler race of *Lanius senator*, and I recognised it as such in the *Katalog Vogels. Frankfurt* p. 90, note 156, but Erlanger (in *Journ. f. Orn.* 1899, Pl. II. and explanation) says that the pale plumage is merely due to abrasion and old state of plumage, and this view is doubtless right, and that the North African form is, in fresh plumage, at least as bright as typical *L. senator*, but distinguishable by a rusty buff underside and upper tail-coverts. I have not sufficient material to discuss this form, but I wish to call attention to the birds from Spain, and to those shot in winter, before their return to Europe, in West Africa, which are often about as rusty in colour as Erlanger's figure. German examples too are not all as white below as Erlanger's figure, but often rusty buff on the sides of the body. The name *rutilans* (Temminck, *Man. d'Orn.* v. IV. p. 601) is not characterised, and merely based on Daubenton's bad figure of *Lanius senator* from the Senegal, of which Buffon himself says that it is the same as the European form! As our European birds migrate to West Africa, and the figure of the Senegambian bird is not more buff below than Daubenton's figure of a European example, the name *rutilans* cannot be accepted for the bird figured by Koenig and Erlanger, nor can it be used for the so-called *Lanius ludius*, as it has the bases of the first primaries white. The subsequent names referring to the Red-headed Shrike up to 1855 are all clearly synonyms of *L. senator*, several of them also being based on the "*Pie-grièche rousse du Sénégal*" of Buffon and Daubenton. In 1855 (*Journ. f. Orn.* p. 450) Baron von Müller, however, describes an "*Euuncortonus pectoralis*," of which he says

that it is "Simillimus *Eu. rufo*, sed pectore cinnamomeo, speculo alari minore. Hab. Sennaar." As the alar speculum varies in extent, and the words "pectore cinnamomeo," used by von Müller, whose descriptions are generally not too painfully exact, seems to refer to the underside as figured by von Erlanger, the name *pectoralis* seems to be acceptable. The distribution of this form (the *rutilans* of Koenig and Erlanger) is very imperfectly known. Besides breeding in North Africa it probably occurs in West Africa, where all the three forms *L. senator*, *L. s. pectoralis*, and *L. s. badius* may occur.

(c) *Lanius senator badius* Hartl.

*Lanius badius*, Hartlaub in *Journ. f. Orn.* 1854 p. 100; Shelley in *Ibis* 1875 p. 381; Gadow, *Cat. B. Brit. Mus.* v. VIII. p. 285.

Some West African birds are said to be distinguished from typical *L. senator* by the want of the alar speculum, a more robust bill and a more intensely rufous crown. There is not much in the more robust bill, but the crown seems to be slightly darker, and the alar speculum is indeed absent in the two Gambaga birds mentioned above, as well as in a number of West African skins in the British and other museums. Recent authors seem to believe that this is a resident West African form, but dates are required to find out whether this is the case or not. The birds that I examined were all—as far as they had dates—shot in winter, and it is very doubtful if these birds may not be winter guests in West Africa, like the common *L. senator*. Besides the West African birds I have before me, in the Tring Museum, an adult *male* shot at Porto Vecchio in Corsica, on 24 April, 1883, by the late John Whitehead, which, like the West African birds, has no white speculum to the first primaries! The crown of this bird is like that of German specimens. I doubt that *L. senator badius* is a resident in West Africa, although, with the exception of the one from Corsica, I have seen no specimen from anywhere but West Africa, not even in the large series of the Brehm collection. The actual breeding home of *badius* which, if anything more than an aberration, can only be a subspecies, is not yet known, and further investigations should be made. It is also possible that *L. s. badius* is a regular subspecies in West Africa, while the one from Corsica is a similar aberration, though it may be from "typical" *senator*-parents.

(d) *Lanius senator paradoxus* A. E. Brehm.

*Lanius paradoxus*, A. E. Brehm, in *Journ. f. Orn.* 1854 p. 75; C. L. Brehm, *Vogeljang*, p. 84; *L. cognatus*, ibidem; *L. jardiui* v. Müller in *Journ. f. Orn.* 1855 p. 450.

This form is described by Brehm and Müller as having the central rectrices pure white at base. I find this to be the case in all the specimens from North-east Africa before me, viz., the types of *L. paradoxus* Brehm: ♂ ad. 4. 4. 1850, Wadi Halfa, ♂ ad. 12. 1. 1851, Blue Nile, ♀ ad. 4. 4. 1850, Wadi Halfa, in one ♂ ad. Ladó, 1. 2. 1883 (Emin Pasha coll.), and one ♂ juv. Ladó, 30. 1. 1883 (Emin Pasha coll.). In the large series of *L. senator* from other countries before me I do not find this peculiarity, *i.e.* the white base to the central rectrices; only in one in the Brehm collection, unfortunately with only a bit of the label left, I find the **outer web** of the two central rectrices white for about 1 cm. In the *L. s. paradoxus* the base of **both** webs of central rectrices is white for more than

2 cm., and all the upper tail-coverts, the longest of which are grey in all the other forms, are pure white, the alar speculum to the primaries is very large, the tips to the secondaries pure white (in fresh plumage). This form seems to be a more constant one than *badius*, and is probably resident in certain parts of North-eastern Africa, but observations about its distribution and habits are wanted!

Messrs. Hemprich and Ehrenberg mention also a "var. dorso toto atro" from Southern Arabia. This may possibly be another subspecies!

KEY TO THE SUPPOSED SUBSPECIES OF LANIUS SENATOR.

1. { White alar speculum to base of outer primaries : 2.  
    { No white speculum to base of outer primaries : *L. s. badius*.
2. { Base of central rectrices pure white : *L. s. paradoxus*.  
    { Base of central rectrices black : 3.
3. { Underside without or with very little rusty-buff : *L. s. senator*.  
    { Underside rusty-buff : *L. s. pectoralis*.

108. **Telephonus senegalus** (L.).

♂ ♀ Gambaga, 27. 8. and 18. 8. 1898. "Iris grey."

109. **Laniarius barbarus** (L.).

♂ ♂ Gambaga, February and November 1898. "Iris brown."

110. **Malaconotus poliocephalus** (Licht.).

♂ ♂ Gambaga, January and December 1898. "Iris yellow."

111. **Corvinella corvina** (Shaw).

♂ ♂ Gambaga, February 1898.

112. **Dryoscopus gambensis** (Licht.).

♂ ♀ Gambaga, March, July, June and January 1898.

113. **Nilaus afer** (Lath.).

♂ ♂ Gambaga, August 1898.

114. **Melaenorhis edolioides** (Swains.).

Adult, Gambaga, January and July, young in July 1898.

115. **Prionops plumatus** (Shaw).

♂ ♀ Gambaga, 20. 2. and 10. 12. 1898. "Iris and skin round eye yellow, feet pink."

## MUSCICAPIDAE.

116. *Bradyornis modestus* Shelley.

♂ ♀ ♀ Gambaga, June and July 1898. "Iris brown."

This form is probably a subspecies of *B. pallidus*, from which it seems to differ in having longer wings, a longer bill, and a more brownish throat and chest.

117. *Muscicapa collaris* Bechst.

♀ ♀ Gambaga, November and January.

118. *Batis senegalensis* (L.).

♂ Gambaga, 4. 6. 1898. "Iris yellow."

At first sight this bird looks like *B. orientalis*, as it has a slaty grey crown, but its measurements are like those of western *B. senegalensis*, and the crown shows already signs of the coming black colour. There is, therefore, no doubt that the bird is *B. senegalensis*.

119. *Platystira cyanea* (P.L.S. Müll.).

♂ ♀ January, June and July 1898. "Iris grey, eyelid coral-red."

120. *Terpsiphone viridis* (P.L.S. Müll.).

♂ ♂ ♀ Gambaga, July and August 1898. "Iris brown, eyelids blue."

121. *Elminia longicauda* (Swains.).

♂ ♀ Gambaga, July and August.

122. *Parisoma plumbeum* (Hartl.).

♀ ♀ Gambaga, August 1898, January 1899. "Iris brown."

## CAMPEPHAGIDAE.

123. *Graucalus pectoralis* Jard. & Selby.

♀ Gambaga, 3. 2. 1898. "Iris hazel."

124. *Campephaga phoenicea* (Lath.).

♂ Gambaga, 29. 8. 1898. "Iris brown."

## TURDIDAE.

125. *Turdus chiguancooides* Seeb.

♂ ♀ Gambaga, December 1898, January 1899.

This is the thrush which in *Journ. f. Orn.* 1896 p. 577 I called *T. cryptopyrrhus*. The name *chiguancooides*, although very ugly, has the priority (cf. *Cat. B. Brit. Mus.* V. p. 231, *Journ. f. Orn.* 1882 p. 320). The distribution of these forms is not yet clear. It seems to be a mistake to identify West African and North-eastern birds. North-eastern birds are the true *T. pelios* Bp., or *icterorhynchus* Heugl.

126. *Monticola saxatilis* (L.).

♂ Gambaga, 20. 2. 1899.

127. *Cossypha verticalis* Hartl.

♂♂ Gambaga, August 1898, January 1899. "Iris light brown."

128. *Cossypha albicapilla giffardi* Hart.*C. g.*, Hartert in *Bull. B. O. Club*, vol. X. No. LXV. p. 5, October 1899.

♂♀ Gambaga, 29. 8. 1898 and 4. 1. 1899. "Iris crimson."

Similar to *C. albicapilla* from Senegambia, but differing in having much narrower white tips to the feathers of the crown and occiput, so that these parts do not appear white, but black with narrow white crescentic bars. Wings and tail longer than in *C. albicapilla albicapilla*, which seems to be restricted to Senegambia. Wing 135-37, tail 145-48 mm. Sexes alike.

A specimen from the Lower Niger in the British Museum belongs also to *giffardi*, and so does probably my specimen from the Benuë mentioned in *Journ. f. Orn.* 1886 p. 578.

129. *Bessonornis* (? *Cossypha*) *gambagae* Hart.*B. g.*, Hartert in *Bull. B. O. Club*, vol. X. No. LXV. p. 5, October 1899.

Very similar to *Bessonornis modestus* Shelley, from Nyasaland, but differing in its rusty rufous flanks and under tail-coverts. The lateral rectrices have only an elongate blackish mark on the outer webs and a small blackish spot on the inner web of the outermost rectrix, while in *B. modestus* they have a complete bar across the tips. The remiges and larger wing-coverts have pale rusky-brown edges, and the upper surface is paler and more ashy than in *B. modestus*. Wing and tail shorter. Wing 78 mm., tail 63 mm.

This interesting little bird has such a great similarity to a *female* Redstart (*Ruticilla phoenicurus*), that I, when seeing it for the first time, thought it was nothing else. A close comparison, however, showed that it was a bird closely allied to Shelley's *Bessonornis modestus*, but differing as described above. Dr. Sharpe's experienced eye at once saw its close relationship to Captain Shelley's species. I would, however, be in a difficulty, if I had to say by what structural characters this bird differed from a *Ruticilla*. It has such a different look from a *Cossypha*, and its tail is so square, that I am inclined, for the present, to follow Shelley, who places these forms in a genus called *Bessonornis*.

The type of *B. gambagae* is a *female* shot at Gambaga on August 27th, 1898. Its iris was brown.

130. *Saxicola oenanthe* L.

♀ Gambaga, 12. 12. 1898.

131. *Pentholaea albifrons* (Rüpp.).

♂♂ Gambaga, June and July 1898.

132. *Pratincola rubetra* (L.).

♀ ♀ Gambaga, October and November 1898.

133. *Hypolais opaca* Cab.

♂ Gambaga, 4. I. 1899.

TIMELIIDAE.

134. *Cisticola strangei* (Fras.).

♂ ♂ ♀ Gambaga, July and August 1898. "Iris brown."

135. *Cisticola rufa* (Fras.)

♂ Gambaga, 20. 7. 1898. "Iris hazel." Wing 53, tail 33 mm. ♀ ♀ August 1898. "Iris light brown." Wing 49 and 50, tail 33 and 35 mm. ♀ I. 1. 1899. "Iris grey." Wing 50, tail 53 mm.! The tail is usually much longer in winter plumage. Cf. Sharpe, *Cat. B. Brit. Mus.* vol. VII. p. 235.

A ♂ from Fadjulli, collected on May 10th by Emin Pasha, named "*Drymoica brachyptera*" by Dr. Hartlaub, differs in being much less rufous and more dark brown above, and in having a smaller first primary. It is evidently different from *C. rufa* (Fras.).

A skin from Léopoldville on the Congo, collected by Bohndorff in November resembles typical *C. rufa* from the Niger Region, but has a very much larger bill. It belongs probably to a different subspecies.

136. *Cisticola erythroptus* (Hartl.).

♂ ♂ Gambaga, 4. I. 1899. "Iris light brown."

137. *Melocichla mentalis* (Fras.).

♂ Gambaga, 12. 8. 1898. "Iris light yellow."

138. *Prinia mystacea* Rüpp.

♀ Gambaga, 16. 6. 1898. "Iris hazel, eyelid yellow."

139. *Camaroptera brevicaudata* Rüpp.

♂ ♂ Gambaga, March and June 1898. "Iris brown."

These two skins seem to be typical *brevicaudata*, but I doubt that it is possible to separate *C. brevicaudata* and *tincta*.

140. *Eremomela pusilla* Hartl.

♂ ♀ Gambaga, August 1898. "Iris hazel."

141. *Eremomela caniceps* (Cass.).

♂ Gambaga, 6. I. 1899. "Iris dark yellow."

142. *Crateropus platycercus* Swains.

♂♂ ♀ Gambaga, 26. 2, 20. 7, and 29. 8. 1898. "Iris orange."  
The *female* is a little smaller than the male.

PYCNONOTIDAE.

143. *Andropadus virens* Cass.

♂ Prahsu, 28. 4. 1899. "Iris grey."

144. *Chlorocichla gracilirostris* (Strickl.).

♂ ♀ Prahsu, 28. 4. 1899. "Iris hazel."

145. *Pycnonotus barbatus* (Desf.).

♀ Gambaga, 12. 8. 1898. "Iris red-brown."

HIRUNDINIDAE.

146. *Hirundo senegalensis* L.

♀ Moshi, 4. 7. 1898. "Iris brown."

147. *Hirundo lucida* J. Verr.

♂ Gambaga, 14. 9. 1898. "Iris brown."

148. *Hirundo domicella* Finsch. & Hartl.

♂ Gambaga, 29. 7. 1898. "Iris brown."

There is no striation visible in this specimen, which is, according to the rusty brown edges to the upper wing-coverts and secondaries, a young individual.

149. *Psalidoprocne obscura* Hartl.

♀ Gambaga, 4. 8. 1898. "Iris hazel."

150. *Petrochelidon rufigula* Bocage.

♂ Gambaga, 4. 6. 1898. "Iris dark brown."

This specimen, although a young bird, seems to agree in all essential characters with *Petrochelidon rufigula*, described and only known, as far as I am aware, from Benguela. The occurrence at Gambaga is most remarkable. Cf. *Cat. B. Brit. Mus.* vol. X. p. 197; Sharpe & Wyatt, *Mon. Hirudin.* p. 603, p. 114.

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## ON SOME BIRDS FROM CAPE YORK, NORTH QUEENSLAND.

BY ERNST HARTERT.

THE following notes are made from specimens which formed part of a large and fine collection brought together at Cape York by Mr. Albert S. Meek's collectors during the months June and July, 1898. The excellent preservation and notes which were made in accordance with our instructions and on labels provided by us for the purpose, induced me to study some of the species, and these notes are the result of my investigations.

In addition to an unexpected new species of *Poipbila*, the collection contained a number of forms which differ subspecifically from those of other parts of Australia. The fauna of the Cape York Peninsula is of special interest not only in comparison with Australia, but also because so many Papuan forms extend there. There seems to be a tendency in many of the birds from Cape York to become brighter and smaller than those inhabiting the more southern parts of Australia. No doubt several more subspecies will be separated in future, when more material is available for comparison from different parts of Australia.

1. *Pachycephala peninsulæ* Hart.

In *Bull. B. O. Club*, v. VIII, p. 33 this form is described as follows: "♂ Top of head ashy brown; remainder of upper surface, including tail, olive-green. Remiges blackish; inner webs with whitish borders; outer webs edged with greenish olive. Lores ashy; an indistinct pale buffy eyebrow. Sides of head ashy brown. Throat white (with indistinct grey striations). Breast light yellowish grey, with darker shaft-lines; abdomen pale sulphur-yellow, with dark shaft-stripes. Under wing-coverts white, with a faint yellow tinge, those towards the bend of the wing brownish, with a yellow tinge. Iris brown, feet light bluish slate. Bill brown. Wing 78-79, tail 63, culmen 16.5, tarsus 20 mm."

Younger individuals have the crown uniform with the back and the quills rufous on the outer webs.

This interesting form is closely allied to *P. griseiceps* from Dutch New Guinea, which is considered to be the same as the Arn bird, and I believe rightly. It differs from *P. griseiceps* in being slightly smaller, in having distinct striations, in the form of shaft-lines, to the underside, especially to the breast, and in being more greenish, much less brownish and olive on the upperside. The crown is also purer grey, not so brownish.

*Pachycephala alberti* (Nov. Zool., v. V, p. 523) has also the distinct striations on the underside, like *P. peninsulæ*, but it has a longer beak, and is as olive-brown above as *P. griseiceps*.

A bird from Gagi, near Waigiu, is another form, a large subspecies of *P. griseiceps*, without a name, but resembling *P. griseiceps jobiensis* (Nov. Zool., v. V, p. 523).

### 2. *Artamus leucorhynchus parvirostris* subsp. nov.

Notwithstanding the various statements, by ornithological authorities, that the Australian specimens of *Artamus leucorhynchus* could not be distinguished from those of other countries, I noticed at once that they had strikingly small bills, and when comparing them with our large series from many localities I found that the Australian specimens were exceedingly much alike, and that the exposed part of their culmen was generally 15 to 16 mm. and never exceeded 17 mm., while it was 18 to 22 mm. in specimens from other localities. The difference, though numerically slight, is striking in the specimens. Those from Celebes and the Sunda Islands have the largest beaks, those from Timor, New Guinea, and from the Philippines, have them generally somewhat smaller, but the differences are very small and not constant enough for even subspecific separation, while those from the Andamans have their beaks of the same small size as those from Queensland! It would therefore, according to the diagnosis of my new subspecies, be necessary to call them also *A. l. parvirostris*. I believe it is very interesting, even for those who do not accept this subspecies, to know that *A. leucorhynchus* is not so constant as ornithologists made us believe, and that (as in some other cases) a form deviates from its average form in the centre (?) of its distribution in a similar way in both directions towards the outer limits of its area. Other such examples are *Cacatua triton*, *Nyctidromus albicollis*, *Macropteryx mystacea*.

I cannot agree with Sharpe and Salvadori in rejecting the oldest Linnaean name *leucorhynchus*. Brisson's figure is correct, his description leaves no doubt, and only this form inhabits the Philippines, so that there is no reason for rejecting this name; in fact, there are many less certain names in use in ornithology than *A. leucorhynchus*. The upperside may, in contradiction to the white underside, have been termed black without going far wrong.

### 3. *Piezorhynchus leucotis* (Gould).

A nice series from Cape York, whence the type came. The *male* is well figured in the "Supplement to the Birds of Australia." The *female* differs very much from the adult *male*. It has no black on the throat, has a buff shade across the lower throat, is dark brown above, has only white edges to the scapulars and the chest and sides of body brownish. The young *male* resembles the adult *female*. ♂ ad.: "Iris brown, feet slate-colour, bill bluish slate-colour with a black tip."

### 4. *Arses kaupi* Gould.

The young *male* (or *female*?) has a rusty brown band across the chest, no black chin, the collar on the hind-neck much narrower, upperside brownish. Another specimen, also marked "♂," and evidently becoming black on the back, is without a rusty band across the breast. The adult *male* has the bill "chalky blue, the eye surrounded by dark blue eyelids, the iris brown, feet bluish slate-colour."

### 5. *Poecilodryas albifacies* Sharpe.

♂♂♀, Cape York, 21. 7., 5. 8., 7. 8. 1898. "Iris brown, feet light horn-colour, bill black."

I cannot perceive any differences between New Guinea specimens and those from Cape York. The bird is described from New Guinea.

6. *Myiagra plumbea concinna* Gould.

There does not seem to be any difference between *Myiagra plumbea*, from the Louisiade Islands and New Guinea, and *M. concinna*, from Queensland, except that the latter has a deeper black loreal line! The two forms can only be regarded as two very close subspecies.

7. *Rhipidura setosa isura* Gould.

One fine *male* of this very distinct subspecies. Cf. Nov. Zool. v. V. pp. 525-6, where I divided *Rh. setosa* into five subspecies.

8. *Rhipidura rufifrons* (Lath.).

A *male*, shot 25. 7. 1898, has the wing only 69.5 mm. long.

9. *Malurus dorsalis* (Lewin).

Specimens from Cape York seem to be smaller than those from North-western Australia. Wing of ♂ 40—42 mm.

10. (?) *Sericornis magnirostris* (Gould).

Three skins from Cape York have very distinct whitish tips to the series of greater wing-coverts, and are rather brownish on the chest and flanks. Their iris is "blood-red, feet light horn-colour, bill dark brown."

11. (?) *Gerygone conspicillata* Gray.

♂ Cape York, 23. 6. 1898. "Iris bright hazel, feet slate-colour, bill black." According to the descriptions of Sharpe in *Cat. B.* v. IV. this specimen is *G. conspicillata* and not *G. magnirostris*. It agrees with specimens from Fergusson Island, which I consider to be *G. conspicillata*.

12. *Gerygone personata* Gould.

"Iris light red, feet bluish slate-colour, bill black and dark."

13. *Zosterops westernensis vegeta* subsp. nov.

The *Zosterops* from Cape York differs from specimens from New South Wales and Victoria (the type is from Western Port in Victoria) in being smaller and the colours somewhat clearer. The flanks are less brown, the under tail-coverts bright sulphur-yellow instead of white, with a faint tinge of yellow, as in *Z. westernensis westernensis*. "Iris light brown, feet dark slate-colour, bill black, bluish slate-colour towards the base of the lower jaw." Types shot in July, Cape York. The *female* is like the *male*; one of the *females* has a sulphur-yellow wash on the middle of the abdomen, ♂ wing 56—57, ♀ wing 56—57 mm.

*Zosterops westernensis tephroleuca*, from Lord Howe's Island, is more like the Cape York bird than like typical *Z. westernensis*, but larger, the wing more than 60 mm.

*Zosterops westernensis flaviceps*, from the Fiji Islands, seems to differ constantly from the Australian forms of *Z. westernensis* by having light-coloured feet and bills, though the colour of the plumage is very much like that of *Z. westernensis westernensis*. (Cf. Sharpe in *Cat. B. Brit. Mus.* v. IX. pp. 156-8.)

#### 14. *Myzomela pectoralis* J. Gould.

I am not aware that the striking resemblance of the upperside of the *female* to the upperside of *Sittella striata* from the same country has ever been noticed. It is a perfect "mimicry" with regard to the black cap, the striped back, the white rump and upper tail-coverts, and the black tail with white tips, only the colour of the bill is different. The underside is totally different in the two birds. "Bill and feet black, iris brown."

#### 15. *Ptilotis flava* J. Gould (?).

One skin, marked ♂, differs from the specimens of *P. flava* in the British Museum in having shorter wings and an indication of a defined dusky cap on the crown. "Iris dark brown, feet light greenish slate, bill black." Wing 87 mm.

#### 16. *Ptilotis notata* J. Gould ;

and

#### 17. *Ptilotis gracilis* J. Gould.

These two species, which have generally been confounded, and which in the skin hardly differ, except in size, were both found commonly at Cape York. Mr. Le Souëf (*Ibis* 1898, p. 56, pl. I.) has shown that *gracilis* differs from *notata* in being much smaller, and also in its life-history. In *Nov. Zool.* 1898 p. 527 I have shown that *P. notata* and *P. analoga* are two distinct species. We have thus three closely allied species, and it would seem that *P. notata* and *P. gracilis*, as well as *P. notata* and *P. analoga*, are found together, the former two in New Guinea, the latter two in Queensland, while we have not yet a proof that *P. analoga* and *P. gracilis* occur together. I hope to be able to publish some more details about these forms before long.

#### 18. *Poephila nigrotecta* Hart.

In *Bull. B. O. Club*, June 1899, p. 59, this surprising little novelty is described as follows:—

"Similar to *P. cincta*, from which it differs in being considerably smaller, and in having the upper tail-coverts black like the rump." In *P. cincta* the upper tail-coverts are perfectly white, not black with white tips, as described in Butler's "Foreign Finches," where, however, an excellent plate is given. Total length about 100 mm., wing 59—60 (about 63 in *P. cincta*), tail 41, culmen 9.5 mm.

There are two skins in the collection, a ♂ and a ♀, both shot at Cape York on 18. 6. 1898. "Iris reddish brown, feet red, bill black."

19. *Poëphila leucotis* J. Gould.

Two fine *males* of this rare species shot on 20. 6. 1898. "Iris reddish brown, feet bright red, bill light yellow."

20. *Aegintha temporalis* (Lath.).

Three *males* have the wing about 2 mm. shorter than other specimens and the back rather more golden. Comparison of a larger material will probably justify the separation of the Cape York bird as a subspecies.

21. *Bathilda ruficauda clarescens* subsp. nov.

An adult *male*, Cape York 14. 6. 1898, is smaller than all examples in our collection, the red extends nearly over the whole crown, encircles the eye, and extends further down on the throat, and the abdomen is rather bright yellow. "Iris light red, feet dirty yellow, bill dark red."

Wing 50, tail 45 mm.

22. *Alcyone azurea pulchra* (J. Gould).

The collection contains a very fine series of this Kingfisher. I agree with Dr. Sharpe, who, in *Cat. B. Brit. Mus.* v. 17 p. 169, calls it a subspecies of *A. azurea*, but the characters and the distribution of the two forms, as given in the *Cat. B.*, are not very clear. The deeper and brighter cinnamon or bay colour of the under surface is not a character to distinguish this form with any certainty, for a number of those before me (either younger birds or individuals in older, more faded plumage) are paler than any *A. azurea azurea* I ever saw. The richer and more purplish blue colour of the upperside is generally apparent enough, but sometimes difficult to see. Another character, however, is not mentioned by Sharpe, viz., the smaller size, especially the shorter bill of *pulchra*. The bill in *A. a. azurea* is about 46—49 mm. (exposed part of culmen measured), the wing 75—79. In *A. a. pulchra* these measurements are: exposed culmen: 42—44, wing 72—74 mm. The flanks are more suffused with lilac in *A. a. pulchra*, and the blue purplish extends sometimes along the flanks, but by no means always.

If *A. a. pulchra* is the northern representative of *A. azurea azurea*, then Sharpe's specimens *x, y, z, a',* and *b'*, in the list of specimens of *azurea*, must belong to *pulchra*, and I think they do so undoubtedly. "The iris is dark brown, feet bright red, bill black, whitish at the utmost tip."

23. *Alcyone pusilla* J. Gould.

♂: "Iris dark brown, feet dark smoky brown, bill black."

24. *Syma flavirostris* J. Gould.

Four *females* and one *male*. This species (or subspecies) differs from *S. torotoro* in being paler and more greenish on the back and wings, and having invariably a black mark along the anterior half of the culmen. The underside is rather pale, throat and middle of abdomen sometimes quite white. I have already on a former

occasion pointed out that the characters of the two species are reversed in the *Cat. B. Brit. Mus.* v. XVI. pp. 196-8, both in the "Key" and in the description. "Iris dark brown, feet and bill orange."

25. *Dacelo leachei* Vig. & Horst.

"Iris silvery white, feet horn-colour, maxilla blackish, mandible whitish horn-colour."

Two *males* from Cape York seem to belong undoubtedly to *D. leachei leachei*, and not to *cervina*.

26. *Ptistes erythropterus coccineopterus* J. Gould.

The very short wing shows the single specimen to belong to the subspecies *coccineopterus* Gould. "Iris brown, feet black, bill red with pale cadmium tip."

27. *Trichoglossus novaehollandiæ* (Gm.).

Several skins from Cape York are rather small and brightly coloured, and may belong to a northern subspecies.

28. *Geophaps scripta* (Temm.).

One *male*, iris brown, bill blackish, feet dark purple. This bird agrees in coloration with *scripta*, but the wing is only 140 mm.

ON *MYZOMELA RUBROCUCULLATA* TRISTR.

By ERNST HARTERT.

THIS bird is described in *Ibis* 1889, p. 228, as having been found on St. Aignan. The head all round (except the lores, which are black) and a broad line along all the upper parts to the upper tail-coverts scarlet, remainder of the plumage black, inner edges of the remiges greyish white. Bill black, feet dark brown. Wing 74 (285, as given by Tristram, is too short, it should be 295), tail 53 mm. I am indebted to the authorities of the Liverpool Museum for the loan of the type of this most interesting species. No such bird, however, was found by Meek on St. Aignan, or on any of the other islands of the Louisiade Archipelago. I cannot help suspecting that *M. rubrocucullata* Tristr. really came from one of the Solomons and not from St. Aignan, where it would seem to be more out of its way than in the Solomons. It is hardly to be expected that a collector like Meek should have missed such a very conspicuous bird. There is no original collector's label on the type of *M. rubrocucullata* Tristr.

In the "List of the Birds from St. Aignan," *antei*, p. 206, the mention of this species is omitted.

## ON SOME NEW LEPIDOPTERA FROM THE EAST.

By THE HON. WALTER ROTHSCHILD, Ph.D., AND K. JORDAN, Ph.D.

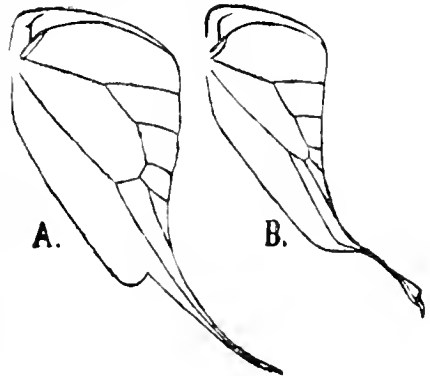
## PAPILIONIDAE.

1. *Troides meridionalis*.*♂ Troides paradiseus meridionalis* Rothschild, Nov. Zool. IV, p. 180 n. 3 (1897).

WHEN describing this insect in April 1897 I had only one ♀. The distinguishing characters presented by that individual did not seem to me to justify a specific separation of *meridionalis* from *paradisens*. Towards the end of 1897 I received a second ♀, caught at the south-eastern extremity of New Guinea, near, or not far from, Samarai. Mr. A. S. Meek, who has for years been sending us very fine collections from the Papuan region, succeeded in capturing a third ♀, and had also the great luck of discovering the ♂. The three ♀♀ are all alike, except in small details. The ♂, however, is very different from what I expected it to be. As in geographical races of *Papilioninae* the ♀♀ are generally much more different than the ♂♂, the latter being often indistinguishable (compare, for instance, *Troides tithonus waigeuensis* and *tithonus*), I presumed that the ♂ of *meridionalis* would be essentially the same as that of *paradisens*. I was, therefore, very much astonished, when receiving Mr. Meek's fine capture, to find that the ♂ of *meridionalis* presented such striking differences from *paradisens* in the shape, colour, and venation of the wings that I could not hesitate to regard *meridionalis* as specifically distinct.

The forewing is narrower than in *paradisens*, its distal margin nearly straight, the anterior green streak is narrower, the posterior one wider, entering the cell and distally running up to the anterior one; on the *underside* the forewing has a broad black band, beginning at the costal margin before the middle of the cell, running to upper angle of cell, and thence to the disc, being distally limited by veins R<sup>1</sup> and R<sup>3</sup>, the yellowish green scaling between these veins reduced to two small submarginal spots; the yellowish streaks between the subcostals also reduced, the apex of the wing being black, with an ill-defined green streak of dispersed scales between SC<sup>3</sup> and SC<sup>4</sup> and a few more green scales behind SC<sup>4</sup>.

The outlines and neuration of the hindwings of *T. paradisens* (A) and *meridionalis* (B) are represented by the accompanying diagrams. The wing of *meridionalis* is more reduced in size than that of *paradisens*, narrower, the distal margin is gently concave; the tail is shorter, not gradually narrowing to the tip, but dilated before the apex; the outline of the dilated portion when flattened out is as in figure, but appears in the specimen, on superficial examination, to be rhombiform, the tail being twisted; the anal angle is not produced; the fringe of hairs upon the abdominal fold is much longer, and not so dense. In neuration



very striking differences will be noticed by comparing the diagrams. The cell is much narrower in *meridionalis*,  $R^3$  and  $M^1$  come from the cell, while in *paradisus* they are stalked together. The pattern of the wing is also very peculiar. The black distal border of *paradisus* is in *meridionalis* indicated only at the extreme edge of the wing: veins all yellowish green, a narrow outer border to wing and a broader streak from near base to tail in front of submedian fold also yellowish green, abdominal area up to submedian fold black, with a yellowish green streak at basal edge, and another, more distal, streak of dispersed scales gradually disappearing distally; the golden yellow area divided by the green veins, cell all golden yellow. The *underside* of the hindwing as above, but abdominal margin from edge to fringe of long hairs greyish white, a narrow streak of the same colour behind submedian fold, tail with yellowish green scales.

Femora (as in ♀) not striated with yellow, tibiae broader than in *paradisus*.

Length of forewing: ♂ 60 mm.

” ” ♀ 72, 73 and 80 mm.

Mr. Meek caught the ♂ at Milne Bay, Brit. New Guinea, on February 4th, 1899, and the ♀ on February 13th.

The species will be figured by Mr. Grose Smith in *Rhopalocera Exotica*.

#### NYMPHALIDAE.

*Helegra* Felder, *Sitz.-Ber. Ak. Wiss. Wien* LX. p. 450 (1860): id., *Neues Lepid.* pp. 37, 44. t. 1 (1861).

In the description of this genus Felder emphasizes as a peculiarity of *Helegra* that the subcostal nervure of the forewing has only 4 branches instead of 5. The Indian and Chinese species of *Helegra*, discovered after 1861, are known to possess 5 subcostal branches. Moore, who in *Lepidoptera Indica* defines the genera mostly according to the characters exhibited by the Indian species only, says that there are 5 subcostals in *Helegra*, while Schatz, in *Fam. und Gatt. der Tagf.*, accepting Felder's statement as correct, attributes 4 and 5 subcostal branches to the genus.

We possess two specimens of *Helegra* from New Guinea which we thought to represent apparently a geographical race of *H. chionippe*, the species upon which Felder based the genus *Helegra*, but on examining them more closely we found that these two individuals had 5 subcostal branches, not 4 as Felder says of *chionippe*. To clear up the discrepancy we have compared the venuration of the type of *chionippe* with Felder's figure. Felder is wrong in describing and figuring the forewing as having 4 subcostals, but there is some excuse for this error. The second branch, namely, which arises shortly after the upper angle of the cell, fuses with the third branch shortly after the origin of the latter, and thence the two veins run as one to the apex of the wing, terminating where in the individuals of *H. henna* vein  $SC^3$  terminates. Thus the free portion of  $SC^3$  appears only as a short bar, overlooked by Felder, which connects the stem of  $SC^{4.5}$  with  $SC^2$ ; what in Felder's figure is designated as  $SC^2$  and incorrectly drawn as terminating far before the apex of the wing is in fact  $SC^2 + SC^3$ .

That peculiarity in the venuration of the type of *H. chionippe* is the same on both forewings. The type specimen has remained unique; we can, therefore, not know whether the fusion of  $SC^2$  and  $SC^3$  is of normal occurrence in the Moluccan form of *H. chionippe*, but are of opinion that this is not the case.



2. *Helcyra chionippe marginata* Rothsch., subsp. nov.

*Helcyra chionippe*, Smith (non Felder, 1860), Nov. Zool. I. p. 356. n. 122 (1894) (Humboldt Bay); Hagen, *Jahrb. Nass. Ver. Nat. L.* p. 89. n. 135 (1897) (Simbang, Germ. N. Guinea).

Smaller than *chionippe* from Amboina. *Upperside*: black apical area of forewing relatively wider, 16—18 mm. broad behind costal margin, with a minute dot before  $R^2$  and the trace of another before  $R^1$ , or with three dots as in the type of *chionippe*, but the dots smaller; hindwing with a black outer-marginal band, measuring about 5 mm. between veins, the black post-discal dots  $M^1$ — $SM^2$  included into the band, admarginal whitish lunules very thin, vestigial, shaded with black.

On the *underside* the brown border of the hindwing is a little narrower than the black border of the upperside.

Length of forewing: 31—32 mm.

*Hab.* Humboldt Bay, Dutch N. Guinea, September, October 1892 (W. Doherty). 1 ♂ (*type*); Simbang, German N. Guinea, January 20th, 1895 (Dr. Hagen), 1 ♂.

The Simbang example has three white spots in the black area of the forewing; that area is also a little wider than in the *type* from Humboldt Bay; the brown line at the edge of the apical area of the underside is rather heavier, as is also the brown discal line of the hindwing which borders the yellow band proximally.

3. *Mynes websteri histrionalis* Rothsch., subsp. nov.

Mr. A. S. Meek found at Milne Bay, Brit. N. Guinea, two pairs of this pretty species, which on examination prove to be slightly different from the examples of *websteri* from Simbang, German N. Guinea.

On the *upperside* of the hindwing the black marginal line and admarginal spots are reduced, especially between C and  $R^3$ , the bluish white admarginal line continued to C, the black admarginal spots separated from each other: the black submarginal dots  $R^2$ — $M^2$  or  $R^1$ — $M^2$  marked, placed at the proximal edge of the pale glaucous blue border of the bluish white basi-discal area. On the *underside*: the golden spot at the anal angle of the forewing larger than in *M. w. websteri*: the brownish black band crossing wing at apex of cell narrower upon cross-veins than in *websteri*, but suddenly dilated at costal margin, the band crossing middle of cell, stopping at C in *type*, but in the second specimen with a minute, separate spot before C.

The ♀ is similar to the ♂, larger, the outer margin of the forewing more convex, the black and the white postdiscal bands of the forewing *below* more curved between  $R^3$  and  $M^2$ ; the pale glaucous blue scaling of the hindwing *above* is more restricted than in the ♂, there are no black submarginal dots, the admarginal ones as in ♂.

Length of forewing: ♂, 30 mm.; ♀, 33—35 mm.

*Hab.* Milne Bay, Brit. N. Guinea, January and February 1899 (A. S. Meek). 2 ♂♂, 2 ♀♀.

## SATURNIIDAE.

4. *Antheraea compta* Rothsch., sp. nov.

♂. Allied to *A. assamensis*. Body and wings *above* orange ochraceous, wings shaded with pink.—Forewing: basal two-thirds of costal margin fuscous, with

some whitish scaling, antemedian band rose-pink, edged with white proximally, placed as in *assamensis*, ocellus ochre-yellow, encircled by an extremely thin pinkish brown line, the proximal part of which is feebly bordered with white distally; a very small linear hyaline centre; a postdiscal black line contiguous with a white one of about half the width, almost parallel to outer margin; anteriorly stopping at  $SC^5$ , 9 mm. from edge of wing at  $M^2$ ,  $6\frac{1}{2}$  mm. at  $R^1$ ; a conspicuous but small black costal spot about 6 mm. from apex; a submarginal pink patch below apex, between  $SC^1$  and  $SC^5$ , outwardly bordered by a broad brick-red line; outer edge clayish buff, fringe more clay-colour.—Hindwing: ocellus as in *assamensis*, larger, its proximal portion black, outer portion ochre-yellow, a white line in cell, about 3 mm. distant from black wing of ocellus, continued to abdominal margin, heavily bordered with rose-red distally, this red colour touching the ocellus; a very faint orange band between ocellus and abdominal margin, being the continuation of a similar band on the forewing, which touches the ocellus of the forewing at the outer side; a black and white submarginal line as on forewing, faintly bordered with pink proximally, terminating before  $R^1$ , not curved towards base, almost quite straight, situated about midway between ocellus and outer margin, crossing  $M^1$  9 mm.,  $SM^2$  6 mm. from edge of wing, the latter coloured as on forewing; the marginal area outside the black and white line orange on both wings, crossed by the yellow veins.

*Underside* similar to *assamensis*, brighter in tint.

*Hab.* Khasia Hills, Assam, ♂ ♂, no ♀.

#### AGARISTIDAE.

##### 5. *Phalaenoides aequalis salomonis* Rothsch., subsp. nov.

♀. Much larger than the [other forms of *aequalis* (*dohertyi*, *coeruleotincta*, *aequalis*)].

*Wings, above*.—Forewing: white spot in cell minute, band rather wider than in *dohertyi*, not concave proximally, indented upon  $M^1$  distally, but  $R^3$  and  $M^1$  not wholly black; discal and submarginal blue spots distinct.—Hindwing: the two white patches fused together, the central patch being enlarged basad.

*Underside*.—Forewing: cell-spot smaller, and band wider, than in *dohertyi*.—Hindwing: central patch dilated basad, including a small black spot at proximal side of upper cross-vein; blue discal spots C— $M^2$  large, except spots  $R^1$ — $R^3$ . White fringe of abdominal segments short above and below.

Length of forewing: ♀, 26 mm.

*Hab.* Tugela, Solomon Islands (Woodford), 1 ♀.

##### 6. *Phalaenoides fractus* Rothsch., sp. nov.

♂. Similar to *aequalis*, but differs as follows:—First and second segment of palpi white beneath, not yellow, third shorter than in *aequalis*; *underside* of abdomen not banded black, in ♂ long hairs at apex of 8th segment, and extreme base and tip of claspers black not orange, claspers clayish ochreous, the harpe less curved than in *aequalis*.

Forewing: band more curved than in *aequalis dohertyi*; all the veins traversing it black, last partition the longest, blue discal spots much more distal than in *aequalis*, the series consisting of only 3 to 5 dots, which stand midway between

the white band and the blue submarginal dots, and are situated *upon* the veins like the submarginal ones, not *between*. On hindwing the central white spot stands separate from the cross-veins, the second white spot is more transverse, being narrower than in *aequalis*, the two spots farther apart, a heavy blue streak at base upon M. On the *underside*, the hindwing is devoid of blue discal spots: the brush of hairs upon M of the forewing partly yellow.

Length of forewing: ♂, 18 mm.; ♀, 19 mm.

*Hab.* Kapanur, Dutch N. Guinea, December 1896 to January 1897 (W. Doherty), 1 ♂ (*type*): Milne Bay, Brit. N. Guinea, December 1898 (A. S. Meek), 2 ♂♂: Queensland, 1 ♂, 2 ♀♀.

#### AGANAIDAE.

##### 7. *Asota albiluna* Rothsch., sp. nov.

♂. Similar to *A. versicolor* Don., but forewing, *above*, with one small white costal spot at base, separated by a heavy black spot from a white band of  $1\frac{1}{2}$  mm. width, which expands between costal margin and  $SM^2$ ; instead of the discal band of *versicolor* there is a white half-moon upon the cross-veins, about  $4\frac{1}{2}$  mm. long, 2 mm. broad; on *underside* the half-moon is much smaller: abdomen *below* with a series of black dots on each side which are not fused to bands: harpe of clasper less spoon-shaped than in *versicolor*.

Length of forewing: ♂, 28 mm.

*Hab.* Milne Bay, Dutch N. Guinea, October 1898 (A. S. Meek), 1 ♂.

#### ZYGAENIDAE.

##### 8. *Aphantocephala centralis* Rothsch., sp. nov.

♂ ♀. Body dark greenish blue above and below, glossy, somewhat purplish, especially the underside of the abdomen.

*Wings above* like body, each with a white patch in centre; patch of forewing in or before middle, longer than broad, not reaching either costal or internal margin: patch of hindwing also not reaching the edges of the wing, often ill-defined, sometimes indistinct.

*Underside* less blue than upperside, patches as above, but a little larger and generally clearer defined.

Subcostals of forewing individually variable in position,  $SC^5$  absent;  $R^2$  and  $R^3$  from a point or shortly stalked,  $R^1$  sometimes stalked with  $SC^{3+4}$ ;  $R^1$  of hindwing absent, upper cross-vein at right angles to C.

Length of forewing: ♀— $13\frac{1}{2}$  mm.

*Hab.* New Guinea, Louisiade Archipelago, d'Entrecasteaux Islands, and Woodlark Island; several subspecies, as follows:—

##### *sa. A. centralis centralis* Rothsch.

♂. Patch of hindwing *above* distinct, on *underside* extending to C; patch of forewing 2 to 3 mm. broad, proximal of base of  $M^2$ .

Length of forewing: ♂ ♀, 11—12 mm.

*Hab.* Milne Bay (*type*), November 1898 and January 1899 (A. S. Meek), 6 ♂♂, 2 ♀♀; Fergusson Island and d'Entrecasteaux Islands, November and December 1894 (A. S. Meek), 5 ♂♂: Woodlark Island (A. S. Meek), 1 ♀.

The Woodlark Island individual is much larger than all our other specimens (forewing measuring  $13\frac{1}{2}$  mm.), and represents most likely a separate subspecies: the base of the forewing is green; on the left forewing  $SC^2$  is fused with  $SC^{3,4}$ , but branches off again close to tip of  $SC^3$ , on the right forewing  $SC^2$  comes from the upper angle of the cell and  $SC^3$  is absent.

8b. **A. centralis diluta** Rothsch., subsp. nov.

♂. Patches of both wings larger than in the preceding subspecies; that of forewing measuring over 3 mm. in breadth, reaching the base of  $M^1$  and expanding from  $C'$  to beyond  $SM^2$ .

Length of forewing: ♂,  $9\frac{1}{2}$  mm.

$R^1$  of forewing stalked with  $SC^{3,4}$ ,  $R^2$  and  $R^3$  on a short stalk.

*Hab.* Kapaur, Dutch N. Guinea, December 1896 (W. Doherty), 1 ♂.

8c. **A. centralis suffusa** Rothsch., subsp. nov.

♂ ♀. Patch of hindwing *above* suffused with black, sometimes absent, small on *underside*, anteriorly not reaching beyond cell-vein.

Length of forewing: ♂,  $9-11\frac{1}{2}$  mm.; ♀,  $10-12$  mm.

Vein  $SC^3$  of forewing often absent.

*Hab.* Louisiade Archipelago: Rossel Island (*type*), March 1898 (A. S. Meek), 5 ♂♂, 3 ♀♀; St. Aignan, September and October 1897 (A. S. Meek), 4 ♂♂, 4 ♀♀.

9. **Aphantocephala moluccarum** Feld., *Sitz.-Ber. Akad. Wiss. Wien*

XLIII. p. 30. n. 65 (1861).

♂ ♀. *Body above*, breast and legs bistre brown: *upper side* of antennae and abdomen, violet purple, glossy; *underside* of abdomen yellow, except the apex, which is glossy purple. Wings uniformly bistre brown on both sides, iridescent in side-light, semidiaphanous.

$SC^6$  of forewing absent,  $SC^3$  and  $SC^4$  stalked together;  $R^1$  of hindwing absent, upper cross-vein at right angles to  $C'$ , or its upper end pointing distad.

Length of forewing: ♂,  $8\frac{1}{2}-9\frac{1}{2}$  mm.; ♀, 10 mm.

*Hab.* Described by Felder from Amboina; W. Doherty, in February 1892, found 2 ♂♂ and 1 ♀ of this species on the same island.

10. **Caprima spectabilis** Rothsch., sp. nov.

♂. Face, anterior part of collar, tegulae in front of wings, extreme edges of tergites of abdomen, legs and underside of abdomen pale yellow, rest of body brownish black, somewhat purplish, thorax above and below with some metallic glaucous blue scales.

*Wings, upper side*, black.—Forewing with a yellow band from costal margin, which it does not quite reach, across end of cell to  $M^2$ ; the band is straight, widest in front, about 2 mm., its inner edge crosses  $M$  at or before base of  $M^2$ .—Hindwing: a large yellow patch extends from the base to the disc, the patch is limited posteriorly by  $SM^2$ , about 1 mm. distant from outer edge at  $M^2$ , rounded outwardly, obliquely cut off between  $R^1$  and  $R^3$ .

*Underside* black, both wings with a metallic blue subapical band.—Forewing : yellow band much broader than above, longer, almost reaching posterior angle of wing ; costal margin yellow from base to band, a yellow basal streak in cell.—Hindwing : yellow area dilated basally to abdominal margin.

♀. Like ♂, larger, band of forewing broader, reaching posterior angle, only the extreme edge of the wing remaining black ; yellow area of hindwing extended basally to abdominal margin. On *underside* the yellow band and area are also wider than in ♂, the blue subapical band developed to a complete submarginal band ; costal edge of forewing blue at base, retinaculum yellow. Head, thorax, and legs (above and below) more metallic blue than in ♂, face brown, with some blue scales.

Length of forewing : ♂, 13 mm. : ♀, 17—20 mm.

Vein SC<sup>3</sup> of forewing mostly present, stalked with SC<sup>4</sup> and SC<sup>5</sup>, much more distal than SC<sup>6</sup>.

*Hab.* Milne Bay, British New Guinea, a number of specimens of both sexes, collected by A. S. Meek in October, November and December 1898.

#### 11. *Caprima obliqua* Rothsch., sp. nov.

♂. *Body above* metallic pearly purple : abdomen less bright than thorax, more coppery ; head, except a patch upon occiput, underside of body, legs, yellow, upperside of tarsi and the basal half or two-thirds of abdomen fuscous, with purple gloss, shaft of antennae violet purple.

*Wings, upperside*, black, shot with purple, especially in side-light.—Forewing : two oblique, parallel, yellow bands, not reaching costal margin, the first 3 mm. from base in front, stopping at SM<sup>2</sup>, the second somewhat broader, 1½ mm. wide, rounded off at ends, crossing cell beyond base of M<sup>2</sup>, stopping at M<sup>2</sup>.—Hindwing : a large yellow patch, rhomboidal, reaching base behind cell, borders of wing all black, except extreme base of abdominal margin, the black outer border of even width (⅔ mm.) from M<sup>1</sup> to SM<sup>1</sup>, suddenly widened before R<sup>3</sup>, the whole costal and apical area, inclusive of upper part of apex of cell, black.

*Underside* purplish black, yellow markings larger than above.

♀. Like ♂, yellow markings a little larger.

R<sup>1</sup> of forewing shortly stalked with SC<sup>4,5</sup>, SC<sup>3</sup> absent.

Length of forewing : ♂, 12 mm. : ♀, 12½—14 mm.

*Hab.* Milne Bay, British New Guinea, November and December 1898 (A. S. Meek), several specimens of both sexes.

Easily distinguished from *C. mutilata* Walker, *List. Lep. Het. Brit. Mus.* xxxi. p. 121 (1864) & Swinh., *Cat. Lep. Het. Oxford* I. p. 61. n. 266. t. 2. f. 15 (1892), by the colour of the head and legs and the narrow, oblique, antemedian band of the forewing.

#### 12. *Caprima aurantiaca* Rothsch., sp. nov.

♂. *Body above and below* black, glossy blue, head (except a patch on occiput behind antennae) and legs buff, tarsi and end of tibiae fuscous on upperside with blue gloss.

*Wings above* black, purple in side-light.—Forewing : a large orange yellow patch 1½ mm. from base, between costal and internal margins, not reaching edges of wing, subrotundate, about 2 mm. broad, a second patch between SC<sup>2</sup> and M<sup>2</sup>,

reddish orange, convex outwardly, straight or concave proximally, oblique, tapering behind, sometimes stopping short at  $M^1$ , just entering apex of cell, measuring about 2 mm. along  $R^1$ .—Hindwing: greater part of wing occupied by a large orange yellow patch which extends from costal margin to  $SM^2$ , reaches nearly the base and is rounded distally: black outer border nearly 3 mm. broad in front,  $\frac{1}{2}$  mm. wide between  $M^2$  and  $SM^2$ .

*Underside* as above, but with scarcely any purple reflections: orange patches larger than above, that of hindwing nearly reaching abdominal margin.

♀. Larger than ♂, the patches of the forewing large: subapical band extended in front to near costal margin and posteriorly beyond  $M^2$ . Face fuscous with blue gloss, luteous only at mouth: occiput darker than in ♂, legs also more fuscous than in ♂, the inner- and underside being luteous, the rest fuscous.

$R^1$  of forewing from upper angle of cell,  $R^2$  and  $R^3$  from a point or stalked together,  $SC^3$  absent.

Length of forewing: ♂, 10 mm.: ♀, 12 mm.

*Hab.* Sudest Island, Louisiade Archipelago, April 1898 (A. S. Meek), 3 ♂♂, ♀♀.

### 13. *Caprima albifrons* Rothsch., sp. nov.

♀. *Body above* black, somewhat glossy with metallic purple; face white, tegulae with a white or buffish dot in front of wings, inner- and underside of legs clayish.

*Wings above* black, slightly purplish in side-light.—Forewing: a large yellow patch  $1\frac{1}{3}$  mm. from base, between costal and internal margins, its outer edge forming almost a right angle, the point of which lies upon  $M$  at or near base of  $M^2$ , width of patch  $4\frac{1}{2}$  mm. along  $M$ ,  $2\frac{1}{2}$  mm. behind costal margin (extreme edge of wing black), and 4 mm. at internal margin; a second, orange rufous, patch in apical area, strongly convex outwardly, straight or slightly rounded proximally, between  $SC^2$  and  $M^2$ , 3 mm. broad at  $R^1$ , its distal and costal edges parallel to distal and costal margins of wing, the patch a little nearer the costal than the distal margin.—Hindwing: a large yellow patch, as prolongation of the yellow patch of the forewing, occupies the basal half of the wing, but does not quite reach the base, abdominal margin also remaining black; it is triangular, the distal point of the triangle near the tip of  $SM^2$ , outer edge of patch slightly concave; black outer area 4 mm. wide in front.

*Underside* black: the yellow patches larger than above, that of forewing joined along cell-vein to subapical patch, which is orange.

♀. Unknown.

$R^1$ ,  $R^2$ ,  $R^3$  of forewing from cell.

Length of forewing: ♂, 10—11 mm.

*Hab.* New Hanover, Bismarck Archipelago, February and March 1897 (Capt. H. C. Webster), 4 ♂♂.

### 14. *Caprima fragilis* Rothsch., sp. nov.

♂. *Body and legs* yellow, meso- and meta-thorax above, and antennae black with purplish metallic gloss, abdomen above (except four first tergites), black with blue gloss.

*Wings above* black, reddish purple in side-light.—Forewing : outer margin longer than in the preceding species, the wing more elongate, a yellow, irregular, oblique band from  $Sc^{12}$  to middle of internal margin,  $3\frac{1}{2}$  mm. broad behind, shallowly excavated in cell, rather deeply biconcave outwardly, between costal end of band and  $R^2$ , and again between  $R^3$  and  $SM^2$ .—Hindwing : triangular, outer margin strongly oblique, yellow band continued to abdominal margin : band outwardly again biconcave, base purplish black.

*Underside*, as above, band very little wider.

♀. Like ♂.

Veins  $SC^3$  and  $SC^5$  (or  $Sc^{13}$  and  $SC^5$ ?) of forewing absent from ♂,  $SC^5$  present in ♀ :  $R^1$ ,  $R^2$ ,  $R^3$  from cell ;  $R^1$  of hindwing absent from both sexes,  $R^3$  and  $M^1$  rather widely separate.

Length of forewing : ♂,  $11\frac{1}{2}$  mm., ♀,  $11\frac{1}{2}$  mm.

*Hab.* Ron I., Geelvink Bay, Dutch New Guinea, July 1897 (W. Doherty), ♂ ♂, 1 ♀.

### 15. *Caprima dohertyi* Rothsch., sp. nov.

♀. *Body above* purplish black ; face, collar, *underside* of the abdomen, especially at the apex, femora and tibiae, especially the posterior ones, creamy, with an opalescent gloss.

*Wings above* purplish black.—Forewing : a large yellow patch from  $Sc^1$  to internal margin,  $6\frac{1}{2}$  mm. broad before  $SM^2$ , its outer edge straight in middle, slightly oblique ; a second, ferruginous red, patch, or rather band, from costal margin, which it does not touch, to  $SM^2$ , tapering behind, somewhat widened basad in upper angle of cell, hence broadest between  $R^1$  and  $R^2$ , inner edge of this band straight from  $R^2$  to  $SM^2$ , at right angles to the veins, outer edge strongly rounded in costal region, then nearly straight, veins within band black, except base of  $R^2$ .—Hindwing : yellow area of forewing continued to abdominal margin, the extreme edge of the margin and the base remaining black, the yellow patch rounded behind, somewhat angled upon  $SM^2$ , distally straight, faintly concave before  $R^1$ , black outer area gradually decreasing in width abdominad, 4 mm. broad in front.

*Underside* similar to upperside, the patches slightly paler ; hindwing with a greenish plumbeous patch of 3 mm. length between costal margin and  $SC^2$  in apical angle.

Length of forewing : ♀, 16 mm.

*Hab.* Kapaur, Dutch New Guinea, January 1897 (W. Doherty), 1 ♀.

### 16. *Doclea dohertyi* Rothsch., sp. nov.

♂. *Body above* black, very slightly glossy, neck, anterior edge of mesothorax and some scales upon centre of same, and the underside yellow, bases of abdominal segments purplish black ; antennae purple, but proximal and distal sides of branches buff.

*Wings above* black, not glossy, marked with orange ochraceous.—Forewing : basal half orange yellow, this area extending to near base of  $M^2$ , but costal and internal edges and vein  $M$  black, the black colour of internal margin reaching  $SM^2$  at base for a distance of 4 or 5 mm., the yellow area consisting of two large partitions, one in cell, the other beyond, the latter rounded off distally.—Hindwing :

costal margin, except at apex, outer half of cell, two small patches between  $R^2$  and  $M^2$ , orange ochraceous, these patches all fused together; an indistinct patch between  $M^1$  and  $M^2$ , another, rather large one, behind  $M^2$ , stand separate.

*Underside* black, not glossy.—Forewing: orange ochraceous from base to beyond  $M^2$ , costal edge black,  $M$  not black, vestiges of two yellow patches between  $R^3$  and  $M^2$ .—Hindwing: greater part orange ochraceous, the black colour reduced to the abdominal and outer margins, yellow area limited posteriorly by  $SM^2$ , but there are some yellow scales near anal angle, and  $SM^3$  is also yellow, black outer marginal band dilated between  $C$  and  $R^2$ , here about 5 mm. broad, only  $1\frac{1}{2}$  mm. wide between  $R^2$  and  $M^2$ , slightly dentate behind  $M^1$  and  $M^2$ .  $SC^1$  and  $SC^2$  of forewing close together,  $SC^3$  absent,  $SC^4$  and  $SC^5$  stalked together,  $R^2$  and  $R^3$  on a short stalk, or from a point;  $R^1$  of hindwing present, originating rather close to  $SC^2$ .

Length of forewing: ♂, 22 mm.

*Hab.* S. Celebes, August and September 1891 (W. Doherty), 2 ♂♂.

### 17. *Doclea fumigata* Rothsch., sp. nov.

♂ *Body above* black, thorax and antennae with purple gloss; collar, neck, and sides of abdomen yellow, underside of abdomen and legs fuscous, the latter purplish in side-light (breast apparently yellow laterally, but too much denuded of scaling to allow a determination of the colour).

*Wings above* brownish black, semidiaphanous, especially the hindwing, iridescent; forewing reddish purple in side-light with vestiges of three white spots, one in upper angle of cell, and two on disc between  $R^3$  and  $M^2$ .

*Underside* somewhat paler than upperside, both wings with ochraceous scales in cell, which, however, do not form distinct patches; dirty white spots of forewing as above, but somewhat larger.

Neruration as in the species of *Doclea* from the Sula Islands, figured in Swinhoe, *Cat. Lep. Het. Oxford* I. p. 60. t. 2. f. 10 (1892) under the name of "*D. syntomoides* Walker," but  $SC^2$  of forewing closer to stalk of  $SC^{3+4}$  than to  $SC^1$ .

Length of forewing: ♂,  $12\frac{1}{2}$  mm.

*Hab.* S. Celebes, August and September 1891 (W. Doherty), 1 ♂.

### 18. *Pintia celebensis* Rothsch., sp. nov.

♂. Head, thorax, and shaft of antennae bluish green, metallic, abdomen purplish black, edges of segments bluish green; face, breast, abdomen and legs buffish cream-colour, sides of breast and upperside of tibiae partly metallic blue-green.

*Wings above* blackish brown, purplish in side-light.—Forewing: a creamy buff band between  $C$  and  $M^1$  crossing apex of cell, oblique to costal margin, at right-angles to distal margin, which the band, however, does not reach, consisting of two somewhat rounded patches which touch each other at  $R^2$ , the band thus resembling the number 8.—Hindwing: veins slightly darker than ground of wing, indications of buffish patches on disc before apex of cell and between  $R^2$  and  $M^1$ .

*Underside* blackish brown.—Forewing: costal edge greenish blue with a long creamy streak in basal half, a streak in cell and a broader behind cell also cream-colour, ill-defined, band as above, a little wider, more yellow, with an additional,



small, spot behind  $M^1$ .—Hindwing: basal two-thirds of costal margin cream-colour, a broad streak in cell also creamy, changing into pale yellow distally, the whole abdominal area yellowish cream-colour, slightly shaded with fuscous purple, a line before  $SM^1$  fuscous purple, four discal spots pale yellow, the uppermost between C and  $R^1$  nearly rounded, the other three standing in a row between  $R^2$  and  $M^2$ , becoming gradually more elongate, spot  $R^2$ — $R^3$  more distal than spot C— $R^1$ .

Length of forewing: ♂, 22 mm.

*Hab.* Toli-Toli, North Celebes, November—December 1895 (H. Fruhstorfer), 1 ♂.

19. **Herpa meeki** Rothsch., Nov. Zool. III. p. 325. n. 12, ♀. (1896) (Woodlark).

♂. Smaller than ♀; body above all green, neck with a thin reddish ochraceous ring, below creamy white, slightly yellowish in front, tibiae and tarsi brown, with some blue scales.

*Wings above* purplish black.—Forewing: greenish blue at base, a creamy white band across disc, about  $2\frac{1}{2}$  mm. broad in cell, rounded costally, tapering towards posterior angle, stopping at  $SM^2$ , 2 mm. from tip of that vein.—Hindwing: abdominal area metallic blue, but outer half or two-fifths of cellule  $M^2$ — $SM^1$  black; a triangular patch across apex of cell creamy white, produced to base behind costal margin.

*Underside* more extended blue; forewing with a blue spot near apex, hindwing with a blue submarginal band.

Length of forewing: 18 mm.

*Hab.* Woodlark Island, 2 ♂♂, 5 ♀♀ collected by A. S. Meek, partly in 1895, partly in April 1897.

20. **Herpa albivitta** Rothsch., sp. nov.

♂. *Body above* metallic green or blue, abdomen more black; *underside*, breast metallic green-blue, abdomen yellowish buff.

*Wings above*.—Forewing: purplish black, with a narrow creamy white band from C to  $SM^1$ , tapering behind, crossing M at  $M^1$  or beyond, posterior part shaded with purplish black scaling; base with a short green streak.—Hindwing black, not purple, a triangular patch from near base to  $M^1$  or  $R^3$ , posteriorly limited by  $SM^2$ , anteriorly by the cell-vein, either smoky grey or white.

*Underside* black, both wings with metallic blue scaling, especially in costal area, outer marginal area not blue, band of forewing broader and longer, patch of hindwing wider than above, white.

Vein  $SC^1$  of forewing free, or anastomosed with C, or fused with it.

♀. Larger than ♂. *Wings above*.—Forewing purplish black, streaked with metallic green at the base; a broad white band from costal to internal margin in middle of wing, somewhat dilated basad posteriorly, about 5 mm. broad, the band not reaching the extreme edges of the wing.—Hindwing all black, or abdominal area grey, especially towards anal angle, this grey scaling condensed between base of  $M^2$  and  $SM^2$  to a white patch, or the wing all black with an indication of the white patch behind base of  $M^2$ .

*Underside*.—Forewing: band wider than above, base and disc at outside of band metallic blue.—Hindwing shaded with metallic blue, but outer margin and a space of variable width before middle black, the grey and white scaling as above, or more extended, mostly absent.

Vein SC<sup>1</sup> of forewing free.

Length of forewing : ♂, 15—16 mm. ; ♀ 20—21 mm.

*Hab.* New Guinea. Two local races.

20a. **Herpa albivitta fumosa** Rothsch., subsp. nov.

♂. Band of forewing curved, its inner edge crossing M just at base of M<sup>1</sup>; basi-median area of hindwing smoky grey above, reaching base; body above dark metallic green.

*Hab.* Dorey, Dutch N. Guinea, June 1897 (W. Doherty), 1 ♂.

20b. **Herpa albivitta albivitta** Rothsch.

♂. Band of forewing straight from C to M<sup>2</sup> or SM<sup>1</sup>, crossing M a little beyond M<sup>1</sup>; hindwing with a white patch above, which does not reach the base; body above greenish blue, abdomen with few metallic scales, purplish black.

♀. See above.

*Hab.* Milne Bay, British New Guinea, a series of both sexes, collected by A. S. Meek in November and December 1898.

21. **Herpa acrita** Rothsch., sp. nov.

♀. *Body above* metallic greenish blue, breast and femora also scaled greenish blue, abdomen beneath pale buff; middle branches of antennal joints about 1½ mm. long.

*Wings above* purplish black.—Forewing: metallic blue scales at base, especially upon SC; a white band of nearly even width, 3 mm., gently curved, expanding between costal and internal margin, bordered with blue at both sides, its inner edge crossing M at base of M<sup>2</sup>, its outer edge at SM<sup>2</sup>, 2 mm. from tip of that vein.—Hindwing: the greater part of the wing occupied by a white patch extending from SC to abdominal margin and almost reaching the base, externally rounded, the black outer border of the wing tapering towards anal angle, 7 mm. broad at R<sup>1</sup>, just entering apex of cell, 2 mm. wide at SM<sup>2</sup>.

*Underside* as above, but much shot with metallic blue, except at outer margin.

SC<sup>1</sup> of forewing fused with C.

Length of forewing : ♀, 23 mm.

*Hab.* Etna Bay, Dutch New Guinea, July 1896 (Capt. H. C. Webster), 1 ♀.

22. **Herpa stigma** Rothsch., sp. nov.

♂. *Body above* blue, thorax and underside of abdomen purplish; collar and tip of abdomen orange.

*Wings above and below* brownish black, somewhat diaphanous, rather obviously reddish purple; forewing with a white, somewhat oblique, spot between C and R<sup>1</sup>, not quite reaching costal edge, about 2 mm. from apex, diameters about 1½ and 2 mm. Vein R<sup>1</sup> of forewing stalked with SC<sup>3+5</sup>, R<sup>2</sup> and R<sup>3</sup> on a short stalk; middle branches of antennae about 2 mm. long.

Length of forewing : ♂, 20½ mm.

*Hab.* Toli-Toli, North Celebes, November—December, 1895 (H. Fruhstorfer), 1 ♂.

23. *Histia libelluloides*.

- ♂ ♀. *Gynautocera libelluloides* Herr.-Schäff., *Auss. Schmett.* p. 7 (and on cover) t. 31 f. 11, 12, 13 (1850-53) (Java).
- Histia selene* Walker (non *Chalcosia selene* Kollar, 1844). *List. Lep. Ins. Brit. Mus.* II. p. 413. n. 2 (1854) (pt.; Java); Moore, *Cat. Lep. Ins. E. I. C.* II. p. 312 (1859) (*syn. ex parte*; Java); Kirby, *Cat. Lep. Hbt.* I. p. 55. n. 2 (1892) (pt.; "E. Indies"!).
- ♀. *Histia vacillans* Walker, *l.c.*, p. 413. n. 3 (1854) (Java).
- ♂. *Gynautocera selene*, Herr.-Schäff., *l.c.*, p. 57. t. 77 (1855-58) (Java).
- ♀. *Gynautocera vacillans*, *id.*, *l.c.*
- ♀. *Histia albimacula* Hampson, *Moths of India* I. p. 280. n. 598 (1892) (♀ Java, non ♂ Burma).
- ♀. *Histia libelluloides*, Kirby, *l.c.*, p. 55. n. 4 (1892) (Java).

In this species the sexes are different, the *female* having a buffish white band across the hindwing which is absent from the *male*.

Walker wrongly identified a *female* of this species with Kollar's *Chalcosia selene* from Kashmere, and described another *female* specimen as *H. vacillans*. Herrich-Schäffer, who had previously figured and named the sexes of the present insect as *libelluloides* ♂ ♀, afterwards accepted the two names given by Walker, calling the ♂ *selene* and the ♀ *vacillans*. In *Moths of India* I. Sir George Hampson correctly treated Kollar's *selene* as being the same species as *Gynautocera rhodope* Cramer, 1775, = *jabellicornis* Fabr., 1775, but considered the white-banded ♀ from Java to be that sex of *H. albimacula*, the ♂ of which came from Burma.

We have *H. libelluloides* from Sumatra, Java and Lombok. The individuals from the three islands present the following slight differences:—

23a. *H. libelluloides sumatrana* Rothsch., subsp. nov.

♂. Abdomen more extended red, the black spots of the sternites absent or minute, red spot at anterior margin of mesonotum very small.

*Wings above* as in the Java form; but the brownish grey streaks upon the veins of the forewing less clearly defined; *underside* of both wings less black, the cellules more shaded with metallic pale glaucous blue than in the Java subspecies, the hindwing especially being more extended blue; the black streaks between the veins of the forewing nearly reach the outer margin, being longer than in *lib. libelluloides*, and are less well defined.

♀. *Hindwing above* more extended pale glaucous blue, nearly the whole area from cell to abdominal margin being occupied by this colour; the buffish white band is broad and enters the cell in two out of our three individuals, in the third specimen the band touches the apex of the cell, and its upper partition, C—Sc<sup>2</sup>, is obsolete. On the *underside* the wings are more metallic than in the Java race, especially the abdominal region of the hindwing; the outer area of the forewing is less pale and the band of the hindwing is broader at and beyond M<sup>2</sup> than *lib. libelluloides*.

*Hab.* Setinjak, W. Sumatra, May and June 1898 (*type*, ♂) and Padang Sidempoean, W. Sumatra (Ericsson), 5 ♂♂, 3 ♀♀.

23b. *H. libelluloides libelluloides* Herr.-Schäff., *l.c.*

The band of the hindwing of the ♀ is variable in width, but does not seem to ever enter the cell on the upperside, though it occasionally does so below: the band

reaches always to  $C^1$ , even in the specimens in which its width does not exceed 3 mm.

The position of the last three subcostal branches of the forewing, which are stalked together, namely,  $SC^3$ ,  $SC^4$ ,  $SC^5$ , is not constant. In the ♂  $SC^5$  stands nearer the cell than  $SC^3$ , this latter vein and  $SC^3$  forming a fork, but the distance between the points of origin of  $SC^5$  and  $SC^3$  is very variable. In most ♀♀ the position of  $SC^3$  and  $SC^5$  is normal, in one example  $SC^5$  is about 1 mm. distant from  $SC^3$ , while in two others  $SC^3$  branches off before  $SC^4$ ,  $SC^4$  and  $SC^5$  forming the distal fork.

*Hab.* Java: Mt. Gede (Prillwitz leg.: received from Herr Fruhstorfer); coll. Felder; 10 ♂♂, 8 ♀♀.

### 23c. *H. libelluloides lombokensis* Rothsch., subsp. nov.

♀. *Wings above*.—Forewing: black basal area less extended than in the preceding races, the apex of the cell down to  $M^2$  being as pale as the outer area of the wing.—Hindwing: basal area nearly all pale glaucous blue; band broad, entering cell, its proximal edge faintly concave or straight, crossing  $M$  at or before  $M^1$ .

*Underside*.—Both wings somewhat more extended greenish blue than in *sumatrana*; apex of cell of forewing and disc paler than the outer marginal area, this pale scaling almost forming an ill-defined discal band.

Length of forewing: 31—33 mm.

*Hab.* Sapit, Lombok, 2000 feet, May—June 1896 (H. Fruhstorfer), 2 ♀♀.

### 24. *Gynautocera virescens reducta* Rothsch., subsp. nov.

♂♀. *Hindwing, above*, deeper green than in the individuals from the Southern Moluccas, the green colour, moreover, less extended in cell and towards base, the greater part of the cell being black. On the *underside* the bluish green scaling is also reduced, the abdominal area of the hindwing, especially, being more black than bluish green.

The black basal rings of the sternites of the abdomen are narrower than the red portions of the segments.

*Hab.* Batchian, March 1892 and August, September 1897 (W. Doherty), 5 ♂♂, 1 ♀; also on Morty and Halmahera (Mus. Brit. and Oxon.).

In this form  $SC^2$  of the forewing is sometimes stalked with  $SC^{3,4,5}$ , and  $R^2$  and  $R^3$  are on a short stalk in all six specimens. Two ♂♂ have  $R^2$ , and the ♀  $R^1$  of the left forewing forked.

Walker, in *List Lep. Ins. Brit. Mus.* XXXI. p. 111 (1864), records *G. virescens* from Timor. This locality is, we think, erroneous. The specimen was contained in a collection purchased by the British Museum from Mr. Stevens; the collection was said to be made by Mr. Wallace in Timor. However, in this same collection there were a good many species which are known only to occur in the Northern Moluccas. As the supposed Timor individuals, for instance, of *Charaxes latona* and *Bordeta quadriplagiata*, do not differ from examples obtained in the Northern Moluccas, while it is well known that extremely few forms are identical on

Timor and the Northern Moluccas, we have no doubt that the locality "Timor" of the collection mentioned before was erroneous, the specimens having been obtained by Wallace most likely on Batchian or Ternate.

25. *G. virescens buruensis* Rothsch., subsp. nov.

♂ ♀. A very large form, resembling *G. paronina*, described by Dohrn from Sumatra.

*Wings above*.—Forewing: outer margin concave; greenish black, veins in outer half pale greenish olive buff.—Hindwing: azure blue, faintly shot with green, base black for the greater part, this colour forming an ill-defined streak in cell along M; disc with indications of black patches between veins, patch M<sup>1</sup>—M<sup>2</sup> distinct in ♂, outer margin much less rounded than in *virescens reducta* and *v. virescens*, almost straight in ♂.

*Underside*.—Forewing: black, veins blue, except SC<sup>123</sup>; outer half of cellule SM<sup>1</sup>—SM<sup>2</sup> pale azure blue.—Hindwing: cell black, middle line blue, costal margin black, except distally; abdominal area black in basal half, this colour extending more distad between than upon the veins; rest of wing blue, but there are three large black discal patches between R<sup>2</sup> and M<sup>2</sup>.

Length of forewing: ♂, 41 mm; ♀, 44 mm.

*Hab.* Mt. Mada, Bunn, 3000 ft., September 1898 (Dumas), 1 ♂, 1 ♀.

26. *G. virescens celebensis* Rothsch., subsp. nov.

♂ ♀. *Wings above* resembling *buruensis* in colour, shorter, hindwing more rounded; hindwing black from base to apex of cell, mesial line of cell and outer third of wing blue, four black patches between R<sup>1</sup> and M<sup>2</sup> separated from each other by the rather thin blue veins, and limited basally by the blue cross-veins.

*Underside* purplish black.—Forewing: basal two-thirds of costal margin, outer part of cell-vein and subcostals thinly, veins R<sup>1</sup>—M<sup>2</sup> broadly, glaucous blue; outer half of cellule SM<sup>1</sup>—SM<sup>2</sup> also glaucous blue.—Hindwing: outer marginal area glaucous blue, somewhat creamy at veins R<sup>2</sup> to M<sup>1</sup>, the blue colour extending proximad along veins, separating two patches from the purplish black basi-discal area, a third patch between M<sup>1</sup> and M<sup>2</sup> not completely isolated, the base of vein M<sup>2</sup> and partition M<sup>1</sup>—M<sup>2</sup> of M not being blue; cross-veins blue; mesial line of cell very thinly blue; the blue scaling in abdominal area restricted to outer margin, but extending down a little along veins.

Length of forewing: ♂, 33 mm; ♀, 31—38 mm.

*Hab.* S. Celebes, August, September 1891 (W. Doherty), 1 ♂ (*type*), 1 ♀; Samanga, S. Celebes, November 1895 (H. Fruhstorfer), 1 ♀.

COSSIDAE.

27. *Xyleutes maculatus* Rothsch., sp. nov.

♀. This species is closely allied to *X. boisduvali* mini, but can be distinguished at a glance by its much more ashy grey colour due to the wings being powdered with black scales instead of red.—Forewing: ashy grey, paler towards the apex and

on disc, a long streak in cell and a series of elongated patches from veins  $SC^{45}$  to  $SM^2$  black; this series crosses the wing just beyond the cell almost parallel to outer margin. Between cell and  $SM^2$  is a large black patch divided by the submedian fold, situated between the transverse series and base of wing, but nearer the former. A second series of spots, mostly linear and longitudinal, are situated near the outer margin. The spot between  $R^1$  and  $R^2$  of outer series is angulate.—Hindwing: brownish black instead of clay-brown as in *X. boisduvali*.

*Underside*: centre of both wings much more blackish than in *X. boisduvali*, on forewing the submarginal row of spots shows through. Body as in *X. boisduvali*, but meso- and metathorax greyish black, instead of whitish grey, abdomen above much blacker.

Length of forewing: 102 mm.

Breadth „ „ 38 „

*Hab.* Taylor Range, Brisbane district, Queensland (Mr. Dodd leg.).

This species can easily be distinguished from *X. sordida* mihi by the black ring to the thorax which it has in common with *X. boisduvali*.

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As we have very little time to work at Coleoptera, we have decided to sell in families the Private Collection of Beetles of the Tring Museum, with the exception of the African ***Longicornia*** and the ***Anthribidae***. The Collection contains about 43,000 Specimens of ***Lamellicornia*** (110 ***Plusiotis*** in 30 Species), 32,000 ***Cerambycidae*** (exclusive of African), 70,000 ***Chrysomelidae***, etc., etc.

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