

PLATE VII.

Fig. 1. *Cotuja deficiens*, p. 74.2. *Agriopsis discalis*, p. 57.3. *Tavia catocaloides*, p. 71.4. *Fascellina viridis*, p. 79.5. *Episparis tortuosalis* (♂), p. 81.6. *Talapa caliginosalis*, p. 82.Fig. 7. *Echana plicalis*, p. 86.8. *Bertula chalybealis* (♂), p. 87.9. *Anoratha costalis* (♂), p. 82.10. *Pycnarmon virgatalis*, p. 92.11. *Glyphodes lacustralis*, p. 93.12. *Pycnarmon zebralis*, p. 91.

[End of Part II.]

January 24, 1867.

Dr. J. E. Gray, F.R.S., V.P., in the Chair.

Mr. P. L. Slater called the attention of the Meeting to a specimen of a species of Ratel (*Mellivora*), obtained by the Society on the 3rd of August 1866 from a dealer in Liverpool, who stated that he had received it by the West-African Mail. This animal appeared to belong to a species different from either the Indian *Mellivora indica* or the South-African *M. capensis*, of both of which the Society's Menagerie had for several years contained living specimens. Dr. Gray had diagnosed these two species of *Mellivora* in a recent communication to the Society* as follows:—

Mellivora indica. Black; the back iron-grey; crown of the head white. India.

Mellivora capensis. Black; the back iron-grey; the crown and a broad stripe down each side of the back to the tail white. South Africa.

To these species, both correctly figured in the second series of Wolf and Slater's 'Zoological Sketches,' Mr. Slater proposed to add a third, founded upon the present specimen, to be diagnosed as follows:—

Mellivora leuconota (Plate VIII.). Smaller: black; back white, purer towards the crown. West Africa.

The following papers were read:—

1. On a New Geckoid Lizard from Ceylon.

By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate IX.)

The British Museum has lately received from Mr. Cutter some specimens of a Gecko from Ceylon, which appear to be undescribed and to form a distinct genus, which may be called *Geckoella*.

Toes five on each foot; they are thick at the base, with the ends more slender and rather compressed; the under surface is furnished

* See P. Z. S. 1865, p. 680.

J. Smith del.



MELLIVORA LEUCONOTA

M. & N. Haszard sculp.



GECKOELLA PUNCTATA.

PZS 1867 Pl. X.



J. Süssmilch lith.

XIPHOCHILUS FASCIATUS.

W. West imp.

with a series of larger entire scales, which are rather far apart; those of the underside of the thicker basal portion are the larger, and the scale at the end of the thick portion, before it becomes contracted, is the largest.

The thumbs and toes are furnished with sharp compressed claws. The back is covered with minute scales, with a very large number of larger, convex, rather trihedral, tubercles. The outer side of the forearm and thigh have tubercles like the back, but smaller in size. The tail, I suspect, in the perfect state is furnished with rings of trihedral tubercles; but in all the specimens in the Museum the tail has evidently been reproduced, and is covered with square smaller scales.

There are no preanal or femoral pores. The scales of the underside of the body and throat are rhombic and smooth. The pupil oblong, erect. The lips have a single series of labial shields, with four chin-shields under the front lower labial shields.

This genus differs from *Homonota* and *Naultinus* in the back being tubercular, from *Eublepharis* in having no preanal pores, and in the pupil being oblong, erect. It is separated from *Naultinus* also by the absence of the preanal pores.

GECKOELLA PUNCTATA. (Pl. IX.)

Upper surface of head, back, and tail dark chocolate-brown (in spirits); under surface paler. The temple, occiput, and back with numerous small white spots; those on the back placed in four longitudinal rows; those on the tail more or less confluent, and forming transverse rings. The dorsal spots are formed of several white scales. There is a single spot in the centre of the hinder part of the occiput. The outer sides of the legs are obscurely spotted. The crown of the head is covered with small uniform granular scales.

Hab. Ceylon. Brit. Mus.

2. Descriptions of some New or little-known Species of Fishes in the Collection of the British Museum. By Dr. ALBERT GÜNTHER, F.Z.S.

(Plate X.)

CENTROPRISTIS DISPILURUS.

Allied to *C. phæbe*.

D. $\frac{10}{12}$. A. $\frac{3}{7}$. L. lat. 45. L. transv. 5/14.

Præoperculum rounded, finely serrated behind, entire below, without projecting angle. Eye of moderate size, two-ninths of the length of the head. Belly with a broad white cross band. A small round black spot above and below on the root of the caudal fin.

Trinidad.

The height of the body is equal to the length of the head, and is comprised twice and three-fourths in the total length (without caudal). Diameter of eye much more than the width of the interorbital

space, but somewhat less than the extent of the snout, contained four times and one-half in the length of the head. Opercles scaly; the scales on the præoperculum in seven or eight series, much smaller than those on the operculum and rest of the body. Cleft of the mouth oblique, the upper maxillary reaching to the vertical from the centre of the eye; præorbital somewhat wider than the maxillary. Præoperculum rounded, finely serrated behind, entire below; sub- and interoperculum entire. Operculum with three flat short points, the upper and lower of which are concealed by the scales, the middle one being the longest and sharpest.

Dorsal fin commencing just above the extremity of the operculum; its spinous portion scarcely lower, but longer, than the soft; the fourth, fifth, and sixth spines are the longest, more than one-third the length of the head; the first spine is very short, half as long as the diameter of the eye. Soft dorsal rounded; the anterior and middle rays the longest, the sixth being not quite twice as long as the last spine. Caudal fin truncated, slightly rounded at the angles, about one-sixth of the total length. Anal with the soft portion narrow and deeper than the dorsal fin; second anal spine strong and long, two-fifths the length of the head; third anal spine much longer than the first. Pectoral long, rounded, reaching to above the vent, four-fifths of the length of the head. Ventrals not reaching to the vent.

Teeth villiform; several larger teeth in the outer series of both jaws. Vomerine and palatine teeth in narrow bands. Tongue toothless.

Brownish olive, with indistinct darker cross bands extending on the dorsal fin. A broad white cross band on the belly, before the vent, extending upwards to the level of the pectoral fin. A small deep-black spot behind the top of the last dorsal spine, on the middle of the two first dorsal rays; several other, irregular, more or less distinct spots on the dorsal fin corresponding to the cross bands on the body. The soft vertical fins with transverse series of small brownish spots. A small black round spot above and below on the root of the caudal fin. Pectoral red; ventral blackish.

Two specimens, 4 inches long.

PLECTROPOMA SUSUKI, Schleg.; Günther, Cat. Fish. i. p. 160.

This species was known from the Chinese and Japanese Seas only; and as the præoperculum has not been well described by Schlegel, I think it necessary to give a description taken from two fine examples, 12 inches long, sent by Mr. Krefft from Sydney.

D. $\frac{11}{14}$. A. $\frac{3}{8}$. L. lat. 110.

The depth of the body is contained thrice or twice and two thirds in the total length (without caudal); the length of the head (opercular spine and membrane included) twice and two-thirds; snout moderately pointed, longer than the diameter of the eye. The cleft of the mouth is wide and oblique, the maxillary extending to the posterior margin of the orbit. Snout with minute rudimentary scales, upper maxillary and mandible scaleless; one-half of the præorbital with small distinct scales. Eye situated immediately beneath

the upper profile of the head; its diameter is contained five times and one-third in the length of the head, and equal to the distance between the eyes; forehead between the eyes convex. The other parts of the head are thickly covered with small scales. Præoperculum with the posterior margin finely serrated, and *with from two to five larger teeth on the lower limb*. Operculum with two flat prominent spines, the lower being smaller.

Dorsal fin rather elevated, no notch before the soft portion. Vertical fins covered with minute scales at their base and basal half. The first dorsal spine is above the base of the longest spine of the operculum, and is not quite one-half the length of the last spine; the second is rather more than twice as long as the first; the third and fourth are the longest, nearly half as long as the head; membrane between the spines very deeply notched: the length of the base of the soft portion is two-thirds of that of the spinous; it is slightly, if at all, inferior to the spinous portion in height, and has the upper margin convex. Distance between dorsal and caudal fins equal to the depth of the free portion of the tail. Caudal truncated, one-sixth of the total length.

The first anal spine is short, less than half the length of the second; the second is of moderate thickness, the third is the longest, much shorter than the first ray, and not quite one-third of the length of the head; the soft portion is rounded, and its distance from the commencement of the caudal is one-half of the depth of the body. Pectoral well developed, rounded, reaching to the level of the vent, its length being contained five times and one-half in the total; its base has very minute scales. Ventrals as long as or longer than the pectorals, inserted below the base of the pectorals; their spine is three-fifths of their entire length.

Teeth rather coarse, *cardiform*; a pair of canines in the front of both jaws; palatine teeth in narrow bands; vomerine teeth in a triangular patch.

Coloration as in the specimen figured by Schlegel.

XIPHOCHILUS FASCIATUS. (Plate X.)

D. $\frac{12}{8}$. A. $\frac{3}{10}$. L. lat. 29. L. transv. 4/10.

The height of the body is one-third of the total length, the length of the head nearly one-fourth. Head rather longer than high, compressed, the width of the interorbital space (which is flat) being equal to the diameter of the eye. Eye immediately below the upper profile, in the middle of the length of the head. Anterior and posterior canine teeth greenish blue. Scales on the cheek in six series. Opercular membrane of moderate extent. Pectoral fin without a notch behind, nearly as long as the head, extending to the vent. Caudal fin truncated. The ground-colour of the head and upper part of the trunk appears to have been reddish orange, of the hinder and lower parts greenish. Head and body with bluish-ashy cross bands, each edged with violet. Three such bands across the upperside of the head, two being narrow and in front of the eyes, the third broad

and between the eyes. Another band runs from the eye to the extremity of the maxillary and round the chin. The succeeding band encircles the head entirely; crossing the nape, and descending over the præoperculum, it reaches across the isthmus of the throat. Body with five cross bands, the posterior becoming broader, leaving only a narrow interspace between them:—the first from before the dorsal fin across the operculum; the second from the third, fourth, and fifth dorsal spines to behind the pectoral; the fifth occupies the space between the posterior dorsal and anal rays and nearly the whole of the free portion of the tail. Dorsal fin violet at the base, orange-coloured above, with violet tips to the rays and spines; anal and ventrals similarly coloured; pectoral and caudal fins orange-coloured.

Two dried examples, 8 inches long, of this species were received from Cape York, Australia.

CHAMPSODON (g. v. TRACHININORUM).

Body compressed, elongate, covered with minute granular scales. Cleft of the mouth oblique, very wide. Eye lateral, directed upwards. Two dorsal fins; ventral fins jugular; pectorals composed of very fine branched rays, united by a thin membrane. Teeth in the jaws in a single series, not closely set, of unequal size, those of the lower jaw longer than the upper ones. Vomerine teeth cardiform, in two separate patches; palatine teeth none. Gill-openings exceedingly wide. None of the bones of the head armed.

China Seas.

CHAMPSODON VORAX.

D. 5|20. A. 17. V. 1/5.

The head is compressed, nearly twice as long as deep, and its length is two-sevenths of the total (without caudal). The cleft of the mouth is exceedingly wide, extending behind the eye, and its width being much more than one-half of the length of the head. The lower jaw is bent upwards and projects far beyond the upper. The snout (without the projecting part of the lower jaw) is not much longer than the eye, the diameter of which is one-fifth or one-sixth of the length of the head. The eye is situated in a notch of the upper profile; the interorbital space slightly concave, and rather narrower than the eyes. Crown of the head scaly. Opercular margin very thin, flexible, radiated. The height of the body is contained five times and one-half in the total length (without caudal). Caudal fin emarginate. Pectorals much shorter than ventrals, which extend nearly to the vent. Coloration uniform.

A single specimen of this species, $2\frac{1}{2}$ inches long, and not in a good state of preservation, was presented by Vice-Admiral Sir E. Belcher to the British Museum.

MASTACEMBELUS CRYPTACANTHUS.

D. 24|100. A. 2|ca. 100.

Præoperculum with two spines. The maxillary extends to the

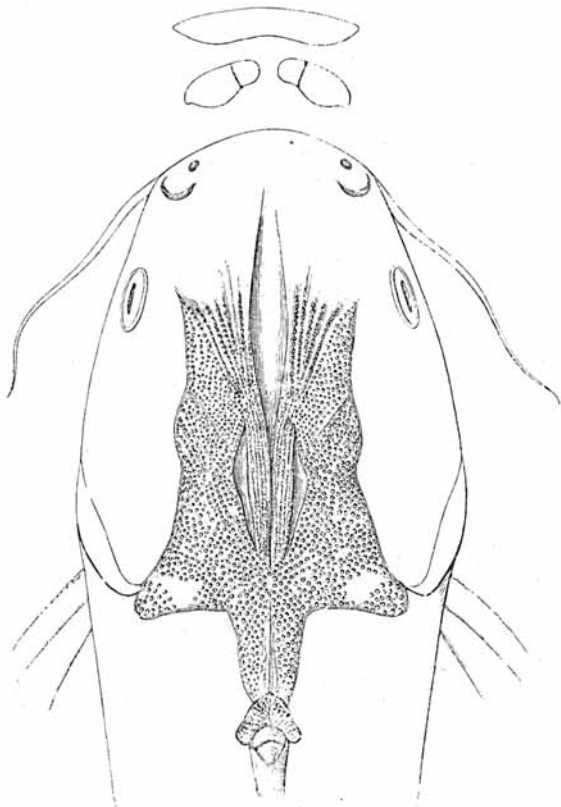
vertical from the front margin of the eye. Vertical fins united, the anal very low; dorsal spines small, feeble, almost hidden in the skin. Body much elongate, its greatest depth being one-half of the length of the head (without rostral appendage), which is one-tenth of the total. Brownish black; posterior part of the tail finely and irregularly punctulated with black.

A single specimen, 9 inches long, was presented by Dr. J. A. Smith with other fishes from the Camaroon country. The occurrence of Indian forms on the West Coast of Africa, such as *Periophthalmus*, *Psettus*, *Mastacembelus*, is of the highest interest, and an almost new fact in our knowledge of the geographical distribution of fishes.

ARIUS AUSTRALIS.

To judge from the description, this species would appear to be allied to *A. surinamensis*.

D. 1/7. A. 16-17. P. 1/10.



Arius australis.

The height of the body is contained from four times to four times and a half in the total length (without caudal), the length of the head thrice and a third or thrice and a fourth; the greatest width of the head is five-sixths of its length. Occipital process as long as or longer than broad, granulated, with a very obtuse median ridge, extending to the small basal bone of the dorsal fin. Eye of moderate size, much nearer to the snout than to the extremity of the operculum, the length of the snout being nearly one-half of that of the postorbital portion of the head; upper jaw somewhat longer than the lower. The teeth on the palate form a broad arched band, the vomerine patches being slightly separated from the palatine, and either perfectly continuous in the middle or but slightly interrupted. The maxillary barbels extend to, or sometimes not quite to, the root of the pectoral; the outer ones of the mandible to the gill-opening. Dorsal spines strong, half as long as the head, slightly serrated in front and behind. Adipose fin as long as or shorter than the dorsal, its length being less than one-third of the distance between the two fins. Pectoral spine stronger and a little longer than that of the dorsal fin; ventral fins more or less shorter than pectorals. Porus axillaris minute. Sides of the body silvery, upper parts uniform blackish.

Mr. Krefft has sent us three specimens of this *Arius*, the largest being 18 inches long. They were caught in the Hunter River, New South Wales, near Ash Island, by the Hon. A. W. Scott, M.A., and are also to be obtained in nearly all the streams further north.

3. Descriptions of some New Species of *Satyridæ* belonging to the Genus *Euptychia*. By ARTHUR G. BUTLER, F.Z.S., Assistant in the Zoological Department, British Museum.

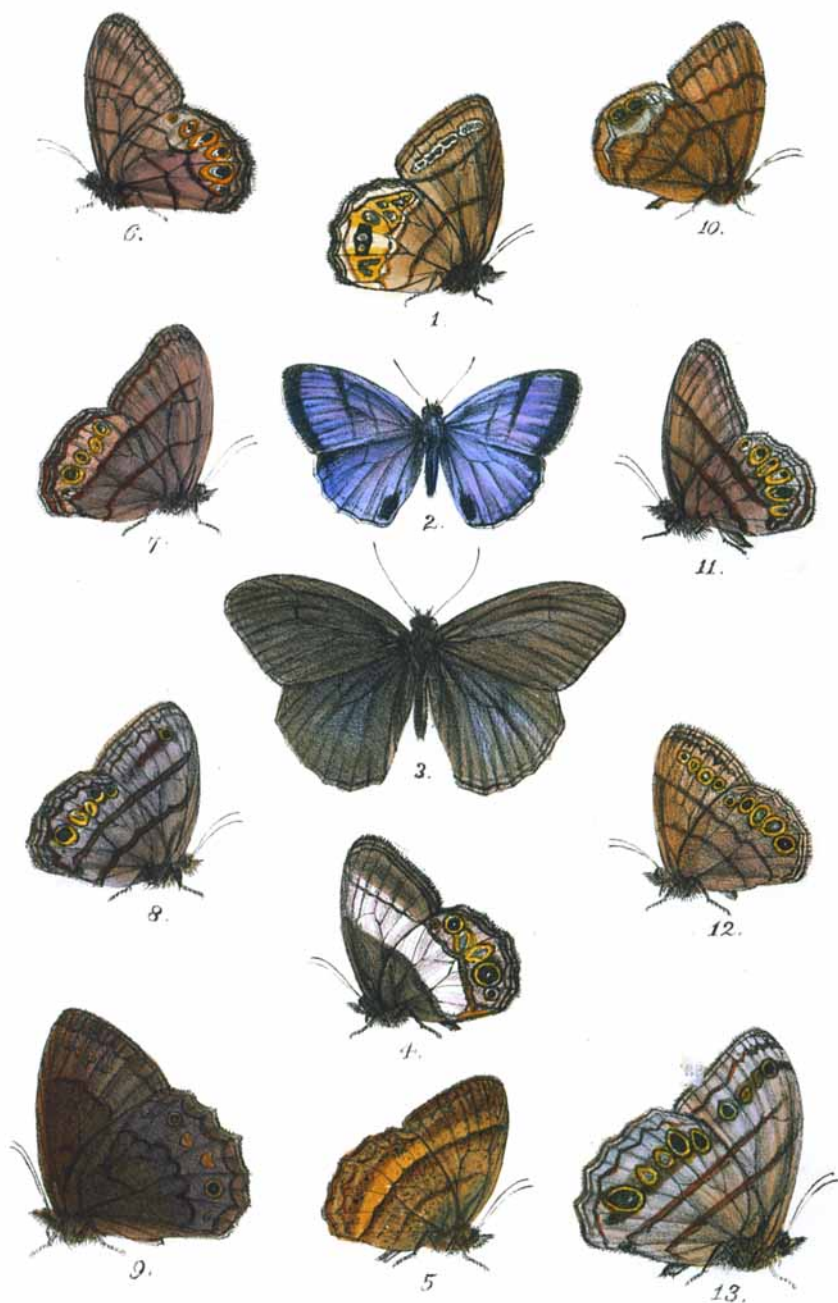
(Plates XI. & XII.)

I am now enabled, through the kindness of Mr. Hewitson, to describe some beautiful new species of *Euptychia*, the names of which I introduced in my monograph of this genus in the Society's 'Proceedings' for 1866 (pp. 458 *et seq.*).

The first of these species is in some respects much like my *E. erigone*; it is perhaps most closely allied to *E. usitata*, and belongs to the same group with *E. myncea* and *E. camerta* of Cramer. It is included in my monograph under the name of *Euptychia themis*.

1. *EUPTYCHIA THEMIS*, Butler, MS. (Pl. XII. fig. 13.)

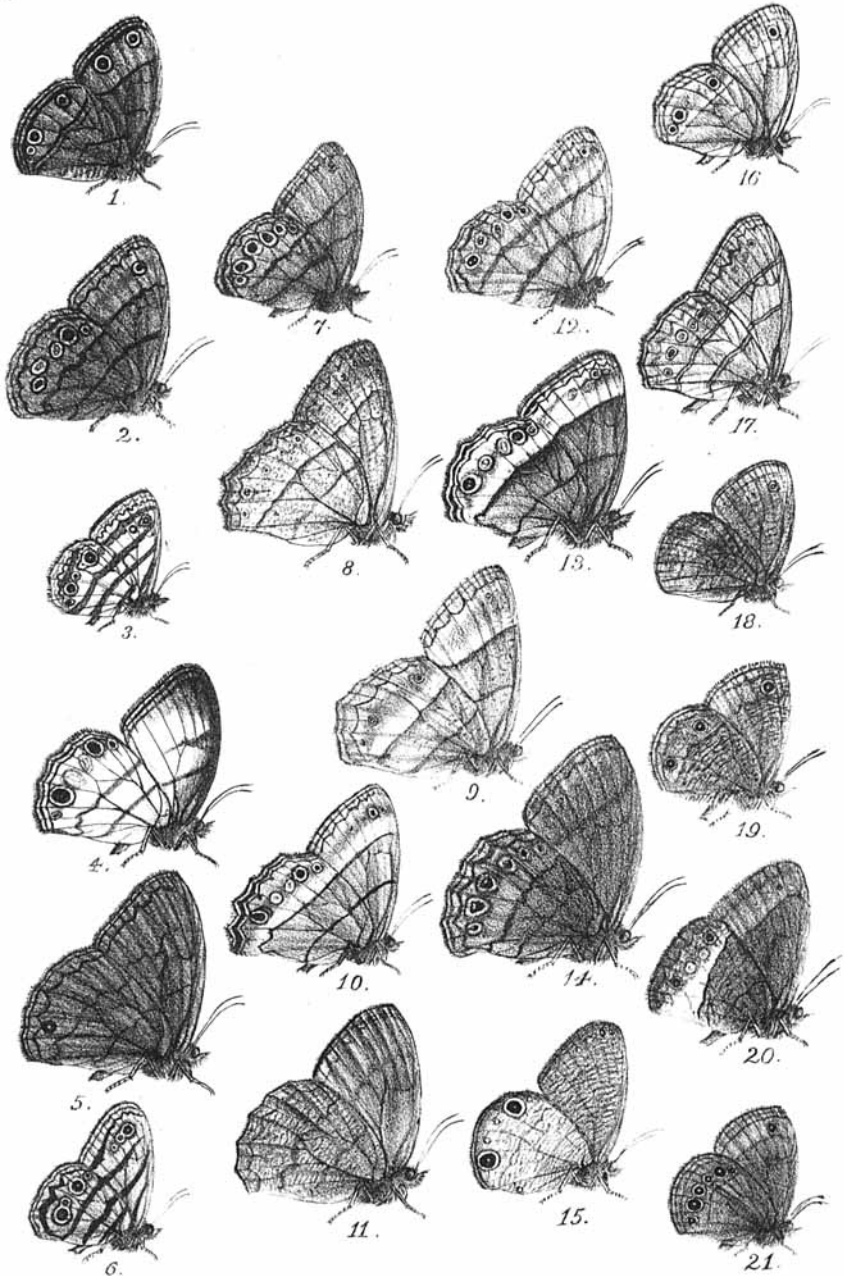
♂. *Alæ supra olivaceo-fuscae; anticae linea apud marginem undulata et margine ipso nigris; alis de linea undulata fusciscentibus; linea marginali ochreo-alba, puncto ocellari subapicali nigro-fusco; ciliis fuscis, radicibus pallidioribus; postica fascia antemarginali nigro-fusca undulata, lineam ochreo-albam*



A. G. Butler lith.

Hannhart imp.

NEW SPECIES OF EUPTYCHIA



A. C. BUTLER LITH.

M. & N. HANBART IMP.

NEW SPECIES OF EUPTYCHIA

includente; linea marginali albida; margine ipso nigro; ciliis ad venarum apices fusciscentibus, aliter velut in anticis; ocello magno subanali alteroque minimo ovali ad marginem internum propiore nigris flavo cinctis et chalybeo pupillatis, majore bipupillato: corpus olivaceo-fuscum, antennis ochreo-fuscis nigro annulatis.

Alæ subtus multo pallidiores, area apicali roseo-albicante; striis duabus mediis rufo-fusciscentibus late separatis, ad costam anticarum divergentibus, externa ad angulum ani posticarum angulata, et intus fusco paulum marginata; linea submarginali undulata et dentata, nigra; areola externa, præcipue ad marginem, lactea et lineam nigram, quæ apud angulum ani sat grossa fit, includente; hæc linea in anticis subintegra, in posticis autem angulis alternis undata et ad plicas alarum dentata est; margine ipso nigro; ciliis velut supra; fascia discali indistincta, ocellos includente, anticarum flavescens, posticarum fusciscente: anticæ ocellis quatuor apud apicem, nigris, flavo cinctis et chalybeo pupillatis, apicali minimo, secundo maximo, aliis duobus geminatis: posticæ ocellis sex, quinque antemarginalibus, unoque minimo lineam externam medium terminante, flavo cinctis et chalybeo bipupillatis, secundo et quarto maximis nigris: corpus cinerascens, antennis flavescens et nigro clavatis.

Exp. alar. unc. 2.

Hab. — ? (Coll. Hewitson).

2. EUPTYCHIA VESTIGIATA, Butler, MS. (Pl. XII. fig. 17.)

♂. *Alæ supra olivaceo-fusæ, striis duabus mediis bene separatis; stria denticulata antemarginali et linea altera submarginali nigro-fuscis; margine ipso nigro: posticæ ocellis duobus consuetis minutissimis, vix distinguendis, subanalibus, argenteo pupillatis: corpus nigro-fuscum, antennis nigris albido annulatis et flavo cinctis.*

Alæ subtus multo pallidiores, atomis plurimis fuscis rorata; fasciis duabus mediis tenuibus flavis utrinque nigro cinctis, posticarum minus regularibus et ad marginem internum angulatis: posticæ linea simili, angulis alternis undata, submarginali; linea ad marginem communi ochreo-albida; margine et stria antemarginali nigris: anticæ ocellis tribus apud apicem parvis, apicali majore nigro, ochreo cincto et argenteo pupillato, secundo partim simili sed geminato, parte inferiore indistincta fusca, tertio ovali fusco indistincto; linea submarginali angulis alternis undata nigra; posticæ ocellis sex parvis ochreo cinctis et fusco circumcinctis, primo et sexto minimis; tertio et quarto fuscis argenteo roratis, aliis ebeninis argenteo bipupillatis: corpus cinerascens, antennis flavescens.

Exp. alar. unc. 1 $\frac{7}{8}$.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

In some respects allied to *E. ambigua*, Butl., but in the double central lines more nearly resembling *E. nebulosa*; on the underside

much like a gigantic specimen of *E. binalinea*, and, excepting in the form of the central lines, very near to *E. grimon*, Godt.

3. EUPTYCHIA STRAMINEA, Butler, MS. (Pl. XII. fig. 9.)

♂. *Alæ supra olivaceo-fuscæ, certo situ cupreo-fuscæ: anticæ elongatæ, apice acuto; margine interno brevi; margine postico fuscescente, ciliis pallidis: posticæ margine externo paulum undulato, post medium abrupte angulato; fascia lunulata submarginali, duabusque tenuioribus paulum sinuatis, fuscis; ocello subanali minimo subgeminato consueto indistincto; ciliis pallidis: corpus nigrescens, antennis ferrugineis.*

Alæ subtus ochraceæ fusco roratæ, disco roseo-pallescente; lineis duabus mediis sat late separatis, continuis, subintegris, fuscis, externa intus ochreo-fusco marginata; linea submarginali lunulata aliisque duabus tenuioribus vix sinuatis fuscis; linea antemarginali ochrea; fascia indistincta fusca, ocellos includente: anticæ ocello unico subapicali, posticæ duobus subapicalibus duobusque subanalibus, apicali et anali minimis, nigris ochreo cinctis et argenteo pupillatis, internis posticarum bipupillatis: corpus albido-cinereum, pedibus ochreis, palpis fuscescentibus, antennis flavis.

Exp. alar. unc. 2.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

This species is allied to *E. variabilis*, Butl. In outline it most nearly approaches to the Rio form; from this insect it chiefly differs in having only one very minute subanal ocellus on the upperside of the hind wings, and in the different position of the central lines and paler colouring on the underside.

4. EUPTYCHIA ANGULARIS, Butler, MS. (Pl. XII. fig. 8.)

♂. *Alæ supra lineis submarginalibus obsoletis; ocello posticarum ad angulum ani magis approximante; aliter velut in sp. præcedente: anticæ apice subangulato: posticæ margine externo post medium valde angulato, margine apicali obliquo vix sinuato; margine anali magis sinuato: corpus nigrescens, antennis nigris.*

Alæ subtus primo visu eis sp. præcedentis simillimæ, pallidæ, fusco roratæ; lineis duabus subparallelis et subintegris fuscis, intus ochreo marginatis; margine postico fuscescente; margine ipso nigro; linea submarginali denticulata, et ad angulum ani posticarum sinuata, nigro-fusca: anticæ ocellis quinque nigris punctiformibus obscure ochreo cinctis et chalybeo pupillatis: posticæ ocellis sex nigris parvis, primo, tertio et quarto minimis, obscure ochreo cinctis et chalybeo pupillatis, sexto unipupillato, aliis bipupillatis: corpus cinerascens; pedibus femoribus albicantibus, tibiis tarsisque ferrugineis: caput palpis cinereis; antennis roseo-albidis, ferrugineo clavatis.

Exp. alar. unc. 2.

Hab. Minas Geraes, Brazil (Coll. Hewitson).

Allied to the preceding species, but differing in form and in the disposition of the markings on the wings.

5. EUPTYCHIA OCHRACEA, Butler, MS. (Pl. XI. fig. 5.)

Alæ supra olivaceo-fuscae; margine postico fuscescente: posticæ ciliis pallidis: corpus nigrescens, antennis nigris.

Alæ subtus ochraceo-fuscae, fusco roratæ; lineis duabus mediis, ad costas divergentibus, paulum irregularibus, externa intus obumbrata, extus a fascia communi discali flavo-ochrea latius marginata; hac anticarum multo tenuiore et extus a fascia communi fusca (ocellos includente) marginata; linea submarginali undulata; linea marginali, extus ochreo marginata, et margine ipso nigro-fuscis: anticæ ocellis duobus punctiformibus obsoletis: posticæ ocellis sex nigris punctiformibus ochreo cinctis, secundo et quinto majoribus et argenteo roratis: corpus fuscum, pedibus pallidis, antennis ferrugineis.

Exp. alar. unc. 1 $\frac{7}{8}$.

Hab. Brazil (Coll. Hewitson).

Allied to *E. renata*, Cram., but in some respects more closely resembling *E. variabilis*, Butl.

6. EUPTYCHIA PRONOPHILA, Butler, MS. (Pl. XII. fig. 20.)

♂. *Alæ supra olivaceo-fuscae; margine externo paulum obscuriore; ciliis cinereis: corpus nigrescens.*

Alæ subtus olivaceo-fuscae: anticæ fascia lata discali pallidiore, utrinque fusco obscuriore cincta, intus subintegra, extus angulis alternis denticulata, ocellos quinque minimos includente, quorum quintus indistinctissimus est, secundus niger ochreo cinctus et albo pupillatus, alii albi fusco cincti et obscurius ochreo cincti; areola marginali fusco-cinerascente; linea indistinctissima fusca; margine ipso nigro: posticæ lituris plurimis parvis lineisque duabus apud basin subparallelis irregularibus fuscis; margine interno albo-cin- rascense; fascia discali triangulari alba, de margine anali ad apicem currente, intus nigro-fusco irregulariter marginata; fascia extus adjacente, velut in anticis pallida, ocellos quinque parvos includente; horum primus, tertius et quartus albi fusco cincti et latius ochreo pollido circumcincti sunt, alii duo distincti nigri albo pupillati et flavo cincti sunt; areola marginali fusco-cinerascente; margine ipso nigro: corpus fuscescens, pedibus pallidis, antennis flavescens nigris acuminatis, palpis fuscis.

Exp. alar. unc. 1 $\frac{7}{8}$.

Hab. Rio Janeiro (Coll. Hewitson).

This interesting insect is not very closely allied to any of the known species of *Euptychia*; it mimics the Venezuelan form of *Pronophila phytanis*, Hewits., in the triangular white band on the underside. It appears to belong to the same group as the preceding species, although it may possibly form a link between *E. nebulosa*, Butl., and *E. nopsis*, Hewits.

7. EUPTYCHIA LITURATA, Butler, MS. (Pl. XII. fig. 18.)

♀. *Alæ pallide olivaceo-fuscae; margine externo obscuriore; ciliis roseo-cinereis: corpus nigrescens.*

Alæ subtus obscuriores, a lituris plurimis brevibus fuscis marmoratæ; costis albo variis: anticæ pallescentes; ocello uno subapicali nigro, ochreo cincto, fusco tenuissime circumcincto et albo pupillato; aliis duobus minutissimis insecutis similibus; pupillis albis æqualibus: posticæ fascia discali pallidior ocellos quinque minimos iis anticarum similes, includente; horum secundus et quintus distinctiores sunt; margine externo nigro: corpus cinereo-fuscum, palpis pallidioribus.

Exp. alar. unc. $1\frac{5}{16}$.

Hab. —? (*Coll. Hewitson*).

Allied to *E. undulata*, Butler, but with differently formed wings and entirely different markings.

8. EUPTYCHIA VESPER, Butler, MS. (Pl. XII. fig. 19.)

♂. *Alæ supra olivaceo-fusæ; ocellis nonnullis vix distinguendis indistinctis, marginalibus, inter venas sub alarum plicis positis; ciliis fuscis roseo tinctis: corpus fuscescens; antennis fuscis, ferrugineo clavatis.*

Alæ subtus cupreo tinctæ; lituris plurimis fuscis marmoratæ; margine nigro: anticæ litura discali, linea submarginali ad costam arcuata et linea marginali obscurioribus fuscis; ocello unico subapicali nigro, ochreo pallido cincto et albo pupillato: posticæ ocellis quinque similibus, secundo et quinto permulto majoribus; linea discali irregulari, altera sinuata submarginali, cum prima ad angulum ani conjuncta, et tertia marginali minime sinuata fuscis obscurioribus; ocello minimo interno valde indistincto: corpus fuscescens, pedibus pallidis, antennis flavis albido fasciolatis.

Exp. alar. unc. $1\frac{7}{16}$.

Hab. —? (*Coll. Hewitson*).

Allied to the preceding species. This little insect is much like some of the species of *Ypthima* on the underside.

9. EUPTYCHIA ARMILLA, Butler, MS. (Pl. XII. fig. 21.)

♂. *Alæ supra olivaceo-fusæ, margine nigro; ocello apud angulum analem, marginali, valde indistincto: corpus fuscescens, antennis fuscis.*

Alæ subtus fusæ minime purpureo tinctæ, margine externo nigro: anticæ stria discali obscuriore irregulari duabusque submarginalibus subintegris fuscis; area apicali paulum ochracea, ocello nigro ochreo cincto et albo pupillato; punctis tribus subapicalibus albis: posticæ stria valde irregulari discali duabusque paulum undulatis fuscis; ocellis sex discalibus distinctis nigris, flavo cinctis et albo pupillatis: corpus fuscescens, antennis flavis.

Exp. alar. unc. $1\frac{3}{8}$.

Hab. Minas Geraes, Brazil (*Coll. Hewitson*).

Allied to the preceding species. In the arrangement of the ocelli on the underside this insect somewhat reminds one of the African genus *Cænira*.

10. EUPTYCHIA FUMATA, Butler, MS. (Pl. XII. fig. 14.)

Alæ supra piceo-fuscæ, linea marginali pallidiore fusca : corpus nigro-fuscum.

Alæ subtus minime pallidiores : anticæ stria discali obscuriore subintegra obliqua, nec costam nec marginem internum attingente, linea submarginali uudulata, linea marginali subintegra nigro-fuscis ; margine ipso nigro : posticæ fasciis duabus mediis minime irregularibus, externa cum stria anticarum continua, apud angulum ani angulata, et cum fascia submarginali conjuncta, hac angulis alternis undata, linea marginali paulo undulata, his omnibus nigro-fuscis ; margine ipso nigro ; ocellis sex cordiformibus ebeninis ochreo cinctis fusco circumcinctis et chalybeo roratis, primo, secundo et sexto minoribus, primo indistinctiore minimo : corpus nigrescens, palpis cinereis.

Exp. alar. unc. $2\frac{3}{16}$.

Hab. Rio Grande (Coll. Hewitson).

This species is nearly allied to *E. saundersii*, Butl., although quite distinct.

The accompanying plates illustrate the species described in the present paper, and also some of those referred to in my preceding paper on the same subject, which have not yet been figured.

DESCRIPTION OF PLATES XI. & XII.

PLATE XI.

- Fig. 1. *Euptychia pagyris*, P. Z. S. 1866, p. 497.
 2. — *ægrotæ* (♂), P. Z. S. 1866, p. 482.
 3. — *philippa*, P. Z. S. 1866, p. 485.
 4. — *metagera*, P. Z. S. 1866, p. 494.
 5. — *ochracea*, P. Z. S. 1867, p. 107.
 6. — *erycina*, P. Z. S. 1866, p. 496.
 7. — *geminula*, P. Z. S. 1866, p. 495.
 8. — *oenus*, P. Z. S. 1866, p. 467.
 9. — *obscura*, P. Z. S. 1866, p. 487.
 10. — *pyracmon*, P. Z. S. 1866, p. 499.
 11. — *junonia*, P. Z. S. 1866, p. 495.
 12. — *argyrospila*, P. Z. S. 1866, p. 467.
 13. — *libyoidea*, P. Z. S. 1866, p. 487.

PLATE XII.

- Fig. 1. *Eup'tychia lethe*, P. Z. S. 1866, p. 465.
 2. — *nebulosa*, P. Z. S. 1866, p. 479.
 3. — *westwoodii*, P. Z. S. 1866, p. 481.
 4. — *hiemalis*, P. Z. S. 1866, p. 494.
 5. — *polyphemus*, P. Z. S. 1866, p. 488.
 6. — *picea*, P. Z. S. 1866, p. 481.
 7. — *mima*, P. Z. S. 1866, p. 500.
 8. — *angularis*, P. Z. S. 1867, p. 106.
 9. — *straminea*, P. Z. S. 1867, p. 106.
 10. — *similis*, P. Z. S. 1866, p. 463.
 11. — *vastata*, P. Z. S. 1866, p. 487.
 12. — *modesta*, P. Z. S. 1866, p. 473.
 13. — *themis*, P. Z. S. 1867, p. 104.

Fig. 14. *Euptychia fumata*, P. Z. S. 1867, p. 109.

15. — *byses*, P. Z. S. 1866, p. 490.

16. — *periphas*, P. Z. S. 1866, p. 465.

17. — *vestigata*, P. Z. S. 1867, p. 105.

18. — *liturata*, P. Z. S. 1867, p. 107.

19. — *vesper*, P. Z. S. 1867, p. 108.

20. — *pronophila*, P. Z. S. 1867, p. 107.

21. — *armilla*, P. Z. S. 1867, p. 108.

4. Descriptions of Thirty-two New Species of Marine Shells
from the Coast of New South Wales. By GEORGE
FRENCH ANGAS, F.L.S., C.M.Z.S., &c.

(Plate XIII.)

1. TROPHON HANLEYI, n. s. (Pl. XIII. fig. 1.)

Shell fusiform, pale brown, with a narrow white band at the angle of the whorls; spire turreted; whorls angulated at the upper part, longitudinally distantly plicate, transversely ribbed, the ribs somewhat stronger on the plications and closely elevatedly scaled throughout, the last whorl produced into a moderately long open recurved beak; aperture small; columella arcuate, smooth, whitish; outer lip angulated near the middle, thin, crenated at the edge, and slightly denticated within. Length 1 inch 2 lines, breadth 6 lines.

Adhering to the under surface of rocks at low water, Port Jackson (*Coll. Angas*).

2. CANTHARUS (TRITONIDEA) UNICOLOR, n. s. (Pl. XIII. fig. 2.)

Shell fusiform, thick, longitudinally plicately ribbed and transversely closely ridged, pale brown or whitish throughout; spire elevated; whorls seven, rounded; aperture ovate, ending in front in a short slightly recurved canal; columella arched; outer lip crenulated, thickened externally, and denticulated within. Length 6 lines, breadth 2 lines.

Found under stones at very low spring tides, at Camp Cove, Port Jackson (*Coll. Angas*).

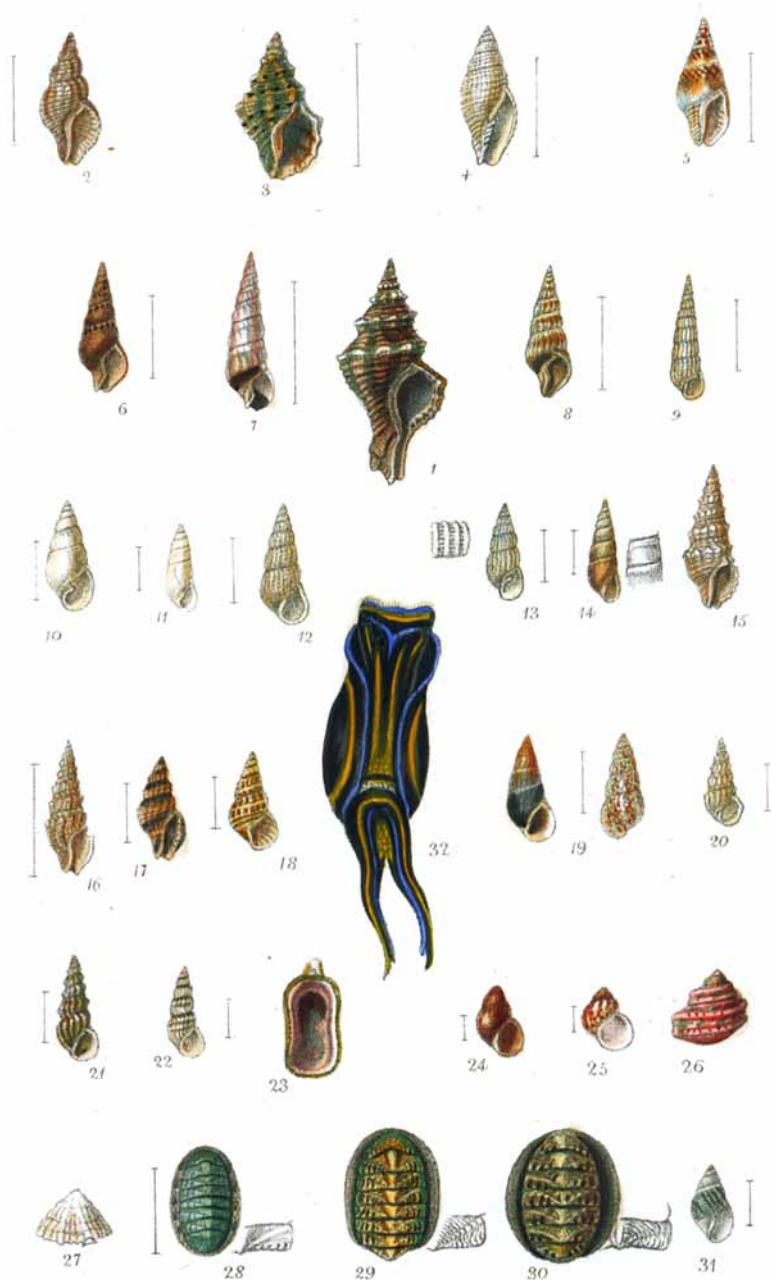
3. PURPURA (STRAMONITA) NEGLECTA, n. s. (Pl. XIII. fig. 3.)

Shell angularly ovate, longitudinally nodosely plicate, transversely rather broadly ribbed; ribs distant, the interstices filled with rows of muricated scales, pale brown, the transverse ribs yellowish spotted with black; spire elevated; whorls five, angulated, concave above; aperture angulately oval; columella arcuated and a little flattened; outer lip thin, simple; interior violet. Length 9 lines, breadth $4\frac{1}{2}$ lines.

Found under stones at low water outside Port Jackson Heads (*Coll. Angas*).

4. MITRA (CAUCILLA) STRANGEI, n. s. (Pl. XIII. fig. 4.)

Shell ovately fusiform, rather thin, white, spirally closely ridged,



G. Sowerby lith.

M & N Hannart imp.

NEW AUSTRALIAN SHELLS

the ridges on the last whorl alternately larger and smaller, crossed by very fine longitudinal lines; spire elevated; whorls eight, slightly rounded; aperture rather more than half the length of the shell, narrow; columella three-plaited, the upper plait the largest; outer lip thin. Length 7 lines, diam. $2\frac{1}{2}$ lines.

Dredged in Middle Harbour, Port Jackson (*Coll. Angas*).

Several specimens of this pretty little *Mitra* were also obtained at Moreton Bay by the late Frederick Strange, to whose memory I have dedicated it.

5. *COLUMBELLA (MITRELLA) ALBOMACULATA*, n. s. (Pl. XIII. fig. 5.)

Shell elongately fusiform, rather solid, whitish, tinged with violet; lower portion of the whorls faintly reticulated with chestnut, with broad brown flames, thickly spotted with white below the sutures; whorls eight, flattened, basal whorl spirally ridged anteriorly; aperture rather narrow, two-fifths the entire length of the shell; columella arcuated, callous, transversely finely ridged in front; outer lip situated posteriorly, edge thin, thickened exteriorly, and dentated within. Length $5\frac{1}{4}$ lines, breadth 2 lines.

Under stones at low water, Port Jackson (*Coll. Angas*).

6. *ÆSOPUS FILOSUS*, n. s. (Pl. XIII. fig. 6.)

Shell elongately fusiform, pale fulvous or brown, with spots of darker brown and white below the sutures; spire acuminate turreted, apex a little obtuse; whorls eight, slightly convex, transversely finely sulcated throughout, last whorl nearly one-third the length of the shell; aperture moderate, ovate; columella arched; outer lip slightly thickened externally and denticulated within. Length $5\frac{1}{4}$ lines, breadth 2 lines.

Dredged in Port Jackson in 5 fathoms (*Coll. Angas*).

7. *ACUS (ABRETIA) BICOLOR*, n. s. (Pl. XIII. fig. 7.)

Shell subulate, whitish, the lower half of the last whorl chocolate-brown; whorls nine, nearly straight, more or less nodulous below the sutures, thin, longitudinally ribbed, or very finely striated, the ribs on the last whorl ceasing at the periphery; columella arcuate; aperture small, ovately lunar; outer lip thin, rounded. Length 8 lines, breadth 2 lines.

Dredged in Middle Harbour, Port Jackson (*Coll. Angas*).

8. *ACUS (ABRETIA) ASSIMILIS*, n. s. (Pl. XIII. fig. 8.)

Shell elongately fusiform, rather solid, light fulvous, stained at the lower part of the whorls with purplish chocolate; whorls nine; a little rounded, longitudinally ribbed; ribs rather broad, arcuate, ceasing at the periphery of the last whorl, the interstices here and there irregularly longitudinally striated; columella arcuate, slightly twisted at the base; aperture small, contracted towards the front; outer lip thin, simple. Length $5\frac{1}{2}$ lines, breadth $1\frac{1}{2}$ line.

Dredged in Port Jackson (*Coll. Angas*).

9. *TURBONILLA NITIDA*, n. s. (Pl. XIII. fig. 9.)

Shell sharply subulate, turreted, rather thin, white, shining; whorls thirteen, slightly convex, longitudinally prominently rather broadly ribbed, interstices smooth, narrow, ribs abruptly ceasing at the periphery of the last whorl; sutures impressed; aperture small, subquadrate; columella straight; outer lip thin, a little produced in front. Length 5 lines, breadth 1 line.

Dredged in Port Jackson (*Coll. Angas*).

10. *ODOSTOMIA LÆVIS*, n. s. (Pl. XIII. fig. 10.)

Shell ovately conical, thin, subdiaphanous, shining, white; whorls seven, a little rounded, last whorl not quite half the length of the shell; sutures channelled; aperture oblong-ovate, a little produced anteriorly; columella fold transverse and strongly developed; outer lip thin, acute, simple. Length $3\frac{1}{2}$ lines, breadth $1\frac{1}{2}$ line.

Dredged in deep water in Port Jackson (*Coll. Angas*).

11. *ODOSTOMIA LACTEA*, n. s. (Pl. XIII. fig. 11.)

Shell elongate, rather thin, smooth, white, shining; whorls six, flattened; sutures impressed; aperture small, ovate, somewhat produced anteriorly, one-third the length of the shell; columella-fold strong and a little oblique; outer lip thin, simple. Length 3 lines, breadth 1 line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

12. *ODOSTOMIA (PARTHENIA) PASCOEI*, n. s. (Pl. XIII. fig. 12.)

Shell ovately conical, rather thin, rimate, pale yellowish brown; whorls seven, longitudinally rather closely plicate, plicæ evanescent on the basal portion of the last whorl, transversely finely striated; whorls eight, somewhat convex, last whorl rather ventricose; sutures distinct; aperture ovate; columella-plait moderate, transverse, situated a little within the aperture; outer lip rounded, simple. Length 4 lines, breadth $1\frac{1}{2}$ line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

13. *ODOSTOMIA (PARTHENIA) KREFFTI*, n. s. (Pl. XIII. fig. 13.)

Shell fusiformly turreted, moderately solid, very narrowly rimate, white; whorls nine, strongly and closely longitudinally plicate, plicæ rounded, scarcely evanescent at the base of the last whorl, very finely transversely striated, last whorl moderate; sutures channelled; aperture small, ovate; columella-plait transverse, rather conspicuous. Length $3\frac{1}{4}$ lines, breadth 1 line.

Port Jackson, deep water (*Coll. Angas*).

14. *STYLOPTYGMA AURANTIACA*, n. s. (Pl. XIII. fig. 14.)

Shell acutely elongate, rather thin, shining, fulvous orange, with a pale band next below the sutures, darker on the lower whorls, fading into white on the upper whorls, which are glossy and sub-transparent; spire turreted; whorls eight, very slightly convex,

finely transversely striated; sutures impressed; aperture small, narrowly ovate, somewhat produced anteriorly; columella nearly straight, whitish, the fold very small and rudimentary; outer lip simple. Length 3 lines, breadth $\frac{3}{4}$ line.

Dredged in deep water, Port Jackson (*Coll. Angas*).

15. *DRILLIA COXI*, n. s. (Pl. XIII. fig. 15.)

Shell acuminate turreted, pale fulvous; whorls nodosely angulated at the upper part, and encircled with rather distant somewhat nodulous raised striæ, between which are numerous fine thread-like lines; canal short, straight; outer lip thin; sinus moderate. Length 9 lines, breadth 3 lines.

Dredged in Port Jackson (*Coll. Angas*).

16. *DRILLIA METCALFEI*, n. s. (Pl. XIII. fig. 16.)

Shell acuminate clavate, pale fulvous; whorls with a fillet of slanting plicate nodules next the sutures, angulated with sharp plicate nodules at the upper part, longitudinally rather sharply ribbed, and cancellated with irregular raised striæ, which are broader at the lower part of the last whorl, where the longitudinal ridges terminate in a band of small nodules; canal short; outer lip thin; sinus rather broad and deep. Length $7\frac{1}{2}$ lines, breadth $2\frac{1}{4}$ lines.

Dredged in Port Jackson (*Coll. Angas*).

17. *CLATHURELLA ZONULATA*, n. s. (Pl. XIII. fig. 17.)

Shell fusiform, rather solid, light brown, banded with ashy grey below the sutures and at the base of the last whorl, encircled with rather distant fine brown lines, longitudinally nodosely plicate, and transversely closely ribbed; spire elevated; whorls seven, convex; aperture narrow; inner lip arcuate; outer lip thin, thickened externally; sinus moderate. Alt. 4 lines, diam. $1\frac{1}{2}$ line.

Dredged in Port Jackson in deep water (*Coll. Angas*).

18. *ALABA PHASIANELLA*, n. s. (Pl. XIII. fig. 18.)

Shell elongately conical, thin, semipellucid, whitish, encircled by several thread-like, more or less interrupted, brown lines, with a band of alternate white and brown spots above the sutures, and a few short longitudinal brown flames beneath them; whorls nine, nearly flat; aperture ovate; columella arcuate; outer lip simple, acute. Alt. 3 lines, diam. 1 line.

Dredged in Port Jackson (*Coll. Angas*).

19. *RISSOINA VARIEGATA*, n. s. (Pl. XIII. fig. 19.)

Shell elongate, solid, white, sometimes broadly banded with livid purple, or ornamented with zigzag chestnut markings; whorls seven, slightly convex, longitudinally plicate, plicæ ceasing at the periphery of the last whorl, transversely finely closely striate; sutures distinct; aperture semilunar, chestnut within; inner lip moderately callous;

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outer lip thickened, white, a little sinuated posteriorly. Length 4 lines, breadth $1\frac{1}{2}$ line.

Port Jackson, deep water (*Coll. Angas*).

20. *RISSOINA TURRICULA*, n. s. (Pl. XIII. fig. 20.)

Shell elongately turreted, rather solid, whitish; whorls eight, slightly rounded, longitudinally strongly plicate, angulated at the sutures, the base of the last whorl furnished with a prominent spiral rib; aperture ovate; outer lip thickened and strongly sinuate. Length $2\frac{1}{2}$ lines, breadth $\frac{3}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

21. *RISSOINA SMITHI*, n. s. (Pl. XIII. fig. 21.)

Shell narrowly elongate, solid, whitish, sometimes banded with pale brown below the sutures; whorls seven, a little convex, longitudinally strongly and rather distantly plicate, the plicæ curved above and nearly obsolete at the base of the last whorl, transversely very finely and closely striated; aperture semilunar, sometimes violet within; outer lip white, thickened, and moderately sinuated behind. Length 3 lines, breadth 1 line.

Port Jackson (*Coll. Angas*).

22. *RISSOINA CINCTA*, n. s. (Pl. XIII. fig. 22.)

Shell small, narrowly elongate, rather solid, white, zoned with brown; whorls seven, convex, longitudinally distantly plicate, plicæ evanescent on the last whorl, transversely lirate throughout; aperture subovate; outer lip a little thickened, and slightly sinuate behind. Length $2\frac{1}{2}$ lines, breadth $\frac{3}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

23. *CAPULUS VIOLEACEUS*, n. s. (Pl. XIII. fig. 23.)

Shell elevated, laterally compressed, recurved, oblong-ovate at the base, radiately striated; apex free, inclined to the right; internally with a very narrow rib, rounded at the edge, situated in the cavity of the shell and extending on either side nearly to the middle of the aperture; interior violet. Length 8 lines, breadth 3 lines.

(*Coll. Angas*.)

A single example of this curious shell was obtained by myself adhering to the edge of a stone at low-water mark at Long Bay, outside Port Jackson Heads.

24. *EUTROPIA (TRICOLIA) ROSEA*, n. s. (Pl. XIII. fig. 24.)

Shell minute, thin, shining, ovate, of a uniform deep rose-colour throughout; whorls four, somewhat flattened at the upper part, then convex; columella white; edge of the outer lip stained with a line of dark rose. Length $1\frac{1}{2}$ line, breadth 1 line.

From shell-sand in Coodgee Bay, New South Wales (*Coll. Angas*).

25. *EUTROPIA (TRICOLIA) VIRGO*, n. s. (Pl. XIII. fig. 25.)

Shell minute, rather thin, globosely conical, white; whorls four, the last whorl ventricose, and painted with fine undulating pink lines, darker at the sutures, where they are separated by several broad descending white flammules; the lower portion of the last whorl encircled by a row of white spots; columella slightly excavated, white. Length 1 line, breadth $\frac{3}{4}$ line.

From shell-sand, Coodgee Bay, New South Wales (*Coll. Angas*).

26. *GIBBULA COXI*, n. s. (Pl. XIII. fig. 26.)

Shell orbicularly conical, moderately umbilicated, rather solid, whitish, marbled with olive and pink, with a few broad pure white flames descending from the sutures and interrupted on the keels with brownish red; base reticulated with grey and minutely spotted with red; spire conical; whorls five, angular, with two prominent rounded keels, one next the suture, concave between the suture and the upper keel, and a little concave between the keels, finely spirally ridged and decussated with exceedingly fine and close oblique longitudinal lines; base convex, finely concentrically ridged and decussated like the whorls, the ridges increasing in size towards the umbilicus. Alt. 4 lines, diam. 4 lines.

Dredged in Port Jackson (*Coll. Angas*).

I have named this *elP.Z.S.* 1867 Plate V honour of Dr. Cox of Sydney, to whom we are indebted for the descriptions of many new species of Australian land shells.

27. *GADINIA CONICA*, n. s. (Pl. XIII. fig. 27.)

Shell convexly conical, white, strongly irregularly radiately ribbed; ribs about thirty-eight in number, concentrically ridged; apex sub-central; white within. Alt. $2\frac{3}{4}$ lines, length $3\frac{1}{2}$ lines, breadth 3 lines.

Coodgee Bay, outside Port Jackson Heads (*Coll. Angas*).

28. *LOPHYRUS SMARAGDINUS*, n. s. (Pl. XIII. fig. 28.)

Shell oblong-elliptic, elevated, most minutely punctured, dull bluish green, delicately freckled with olive, the hinder edges of the valves ornamented with very small white spots bordered with olive; the terminal valves and lateral areas faintly concentrically striated, the central valves carinated, with the dorsal areas faintly transversely striated, the lateral areas slightly elevated; mantle-margin pale green, marbled with black, and covered with small smooth imbricated scales. Length 6 lines.

Port Jackson (*Coll. Angas*).

29. *ONITHOCHITON RUGULOSUS*, n. s. (Pl. XIII. fig. 29.)

Shell elongately ovate, a little narrowed in front, raised and carinated, pale yellowish brown, the central areas of the valves faintly spotted with olive, the outer edges bordered with green, upon which

and extending inwards are concentric waved bands of olive-brown darker at the margin; lateral areas not raised, divided from the dorsal areas by radiating nodulous ribs, transversely rugosely costate; dorsal areas finely longitudinally ridged; mantle brown, variegated with ash-colour and clothed with very minute chaff-like scales. Length 8 lines.

Port Jackson (*Coll. Angas*).

30. *TONICIA CARPENTERI*, n. s. (Pl. XIII. fig. 30.)

Shell ovate, elevately convex, carinated, ashy white, ornamented at the hinder edges of the valves with pale spots, the spaces between which are very dark olive melting into confused bands of a paler hue, which extend nearly across the valves; valves rostrate, undulately concentrically subimbricately sculptured throughout; the lateral areas not raised, but separated from the dorsal areas by an elevated rib; posterior valve strongly gibbous, the umbo almost terminal; mantle-margin brown. Length 9 lines.

Port Jackson (*Coll. Angas*).

31. *LEUCOTINA ESTHER*, n. s. (Pl. XIII. fig. 31.)

Shell ovate, rather solid, scarcely rimate, whitish; whorls five, transversely grooved and crossed with very fine longitudinal lines; aperture oblong-ovate, half the length of the shell; columella white, straight, parietal fold hardly visible. Length $2\frac{1}{2}$ lines, breadth $1\frac{1}{4}$ line.

Port Jackson, deep water (*Coll. Angas*).

32. *CHELIDONURA ADAMSI*, n. s. (Pl. XIII. fig. 32.)

Head furnished in front with a short silky fringe; mantle terminating behind in two long bifurcate filaments; foot elevated on each side, embracing the head and mantle, rounded both in front and behind; colour velvet-black, with a white crescent on the hinder part of the mantle; the head and the outer edge of the foot are bordered with a line of brilliant blue; a line of the same colour, bifurcated in front, extends down the back; and the posterior filaments are ornamented in the middle with a similar line; parallel with these blue lines, and at a short distance from them, are lines of a gold-colour; and spots of the same appear above the white crescent on the back, and at the bifurcation of the posterior filaments. Shell internal, very small, thin, flat, with the right border terminating in a point. Length 2 inches.

Found in a rock-pool at low water at Vaucluse Bay, Port Jackson.

This species may be identical with the individual alluded to by Quoy as having been met with at the Mauritius among numerous specimens of his *Bulla hirundinina*, but which was not described by him. I have named it in honour of my friend Mr. Arthur Adams, the founder of the genus *Chelidonura*.

DESCRIPTION OF PLATE XIII.

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| <p>Fig. 1. <i>Trophon hanleyi</i>, p. 110.
 2. <i>Cantharus (Tritonidea) unicolor</i>, p. 110.
 3. <i>Purpura (Stramonita) neglecta</i>, p. 110.
 4. <i>Mitra (Cancilla) strangei</i>, p. 110.
 5. <i>Columbella (Mitrella) albomaculata</i>, p. 111.
 6. <i>Æsopus filiosus</i>, p. 111.
 7. <i>Acus (Abretia) bicolor</i>, p. 111.
 8. ——— (<i>Abretia</i>) <i>assimilis</i>, p. 111.
 9. <i>Turbonilla nitida</i>, p. 112.
 10. <i>Odostomia levis</i>, p. 112.
 11. ——— <i>lactea</i>, p. 112.
 12. ——— (<i>Parthenia</i>) <i>pascoei</i>, p. 112.
 13. ——— (<i>Parthenia</i>) <i>kreffti</i>, p. 112.
 14. <i>Styloptygma aurantiaca</i>, p. 112.
 15. <i>Drillia coxi</i>, p. 113.</p> | <p>Fig. 16. <i>Drillia metcalfei</i>, p. 113.
 17. <i>Clathurella zonulata</i>, p. 113.
 18. <i>Alaba phasianella</i>, p. 113.
 19. <i>Rissoina variegata</i>, p. 113.
 20. ——— <i>turricula</i>, p. 114.
 21. ——— <i>smithi</i>, p. 114.
 22. ——— <i>cincta</i>, p. 114.
 23. <i>Capulus violaceus</i>, p. 114.
 24. <i>Eutropia (Tricolia) rosea</i>, p. 114.
 25. ——— (<i>Tricolia</i>) <i>virgo</i>, p. 115.
 26. <i>Gibbula coxi</i>, p. 115.
 27. <i>Gadinia conica</i>, p. 115.
 28. <i>Lophyrus smaragdinus</i>, p. 115.
 29. <i>Onithochiton rugulosus</i>, p. 115.
 30. <i>Tonicia carpenteri</i>, p. 116.
 31. <i>Leucotina esther</i>, p. 116.
 32. <i>Chelidonura adamsi</i>, p. 116.</p> |
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5. Notes on *Hyalonema lusitanicum*, and on the Genus in general. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Professor Bocage having most kindly presented to the British Museum a very beautiful specimen of *Hyalonema lusitanicum* from the coast of Portugal, I am enabled to state that I believe it to be a most distinct species from the *Hyalonema sieboldii* of Japan.

The bundle of spicules is much more slender, consisting of fewer spicules, and the spicules are very much longer than in any specimens I have seen from Japan; and the sculpture on the surface of the spicules is much more distinct and coarse than that on the Japan spicules of the same thickness. A Japan specimen of two-thirds the length, for example, would contain twice, if not three times, as many spicules, and the coil or rope-like axis would be more than twice the diameter.

The polypes on the bark are much smaller, oblong-oval, longer than broad, and more crowded together, and are not of the circular form, nor are they nearly so much raised in the dry contracted state as those of the usual dry Japan specimens.

As remarked by Professor Bocage, the lower, more slender part of the axis is entirely covered with the bark, which is crowded all over to the very end of the base with the contracted polypes. The upper half has lost its bark.

As in the Japan species, the spicules of the coil of the upper part of the specimen are thicker than near the base; indeed the spicules of both species gradually increase from the base to near the upper end; so there can be no doubt that the part covered with the bark is the slender base of the spicules, which in the Japan species is naked and is immersed in the sponge.

The examination of Professor Bocage's specimens has satisfied

me that the coral from Japan and that from Portugal should be separated from each other as genera, having a different number of tentacles, and that they must live under very different circumstances. The differences have been pointed out by Professor Bocage in his papers on the Portuguese Coral in the Society's 'Proceedings.'

The genera may be thus defined:—

1. HYALONEMA, Gray, and Brandt?

Hyalochæta, Brandt.

Polypes with twenty tentacles in two series. The axis bare at the base, living sunk in the centre of a sponge, and separated from the sponge by a hard condensed coat. The bark strengthened externally with siliceous granules or sand.

All the perfect specimens which I have seen of this coral were attached to sponges; they are about twelve in number; and there are three figured by Brandt, and one by Schultze; so there can be no doubt that it is the natural habit of the coral. This seems to be the case with all the specimens that have been collected by naturalists.

The Japanese seem to destroy the bark, and separate the corals from the sponges, as they appear to consider the bundle of spicula the most interesting part of the coral; so that most of the specimens that are brought to this country either have only a small part of the bark attached to them, just enough to keep the spicula together, or are entirely stripped of it.

HYALONEMA SIEBOLDII.

Hyalonema sieboldii, Gray, P. Z. S. ii. (1835) p. 65; 1857, p. 279; Institute, 1835, p. 426; Ann. & Mag. N. H. 1850, vi. p. 306; 1866, xviii. p. 295; Perty, Allg. Naturg. iii. 1841, p. 796; Brandt, Bull. Scien. Acad. Sci. St. Pétersb. n. s. xvi. 1857; Mélang. Biol. ii. 606; Symbolæ, 14, t. 1. f. 1–10; Milne-Edwards, Coralliaires, i. 1857, p. 324; Max Schultze, Die Hyalonemen, 1860, t. 1. 2; Bowerbank, Brit. Sponges, i. 196.

Hyalonema mirabilis, Gray, P. Z. S. 1857, p. 279.

Var. ? *Hyalonema affinis*, Brandt, Symbolæ, 16, t. 2. f. 2 a, 2 b, 3 & 4.

Hab. Japan.

Professor Brandt has divided the *Hyalonema* from the Japanese seas into two genera, viz. *Hyalonema* and *Hyalochæta*, according to the prominence and clustering of the polypes. I have not seen any specimens which agree with Professor Brandt's *Hyalochæta possietii*, Bull. Sci. Acad. St. Pétersb. xvi. 1857; Mélan. Biolog. ii. 606; Symbolæ, 17, t. 2. f. 6–10.

In the British Museum there is a specimen, which was brought from Japan by Dr. W. Lockhart, that has some of the polypes clustered and more produced than the others. It is almost intermediate in form between the common state of *Hyalonema sieboldii* and the figure of *Hyalochæta possietii* given by Professor Brandt.

The want of more materials makes it impossible to come to any conclusion as to the distinctness of the genera or even of the species.

If one may judge from the figure of Professor Brandt, the polypes of the genus *Hyalochæta* appear to be on the slender end of the axis of the coil of the coral, as in the Portuguese species. It would be desirable to know whether this form is ever found living in a sponge.

The specimen in the British Museum, obtained by Dr. W. Lockhart in Japan, which has some of the polypes prominent and clustered, has the bark only on the lower, more slender end of the coil, and in this respect agrees to some extent with Professor Brandt's figure. But the slender end of the coil projects like a pencil beyond the bark; and one is by no means sure that the bark, which is evidently very easily moved on the axis in the living or freshly gathered coral, may not have been slipped down towards that end of the coil; and I think that this may be the case, as I believe that it was obtained with the other Japanese specimens of *H. sieboldii* which Dr. Lockhart brought home. In this respect it differs from the Portuguese species and from the *Hyalochæta* of Prof. Brandt; for in both of them the bark entirely covers the base of the axis, and evidently belongs to that part of the specimen.

2. HYALOTHRIX.

The polypes with forty tentacles in several concentric series, the outer series the largest. The axis, covered to the very base with the polype, bearing bark, and the bark strengthened with cylindrical filiform siliceous spicules, and with a smooth external coat without any imbedded granules.

This genus is at once distinguished from *Hyalonema* by the coral not living with its base immersed in a sponge. It lives evidently free; but how it keeps itself in an erect position so that all the polypes round the axis may obtain food is yet to be discovered.

1. HYALOTHRIX LUSITANICA.

Hyalonema lusitanicum, Bocage, P. Z. S. 1864, p. 265, pl. xxii.; 1865, p. 662; Gray, Ann. & Mag. N. H. 1866, xviii. p. 287.

Hab. Coast of Portugal (*Bocage*).

B.M.

After the study of all the specimens which I have been able to see from Japan, and of the Portuguese specimen, I still adhere to the opinion that I formed when I first described the genus, now more than thirty years ago, and which is so well supported by Prof. Brandt in his carefully prepared and well-studied memoir. I regard *Hyalonema* as a type of a peculiar family of Corals, formed by zoanthoid polypes, characterized by forming for their support a siliceous axis formed of many thread-like spicules coiled together into a rope-like form, each formed of numerous concentric laminæ, and surrounded and separated from one another by the corium of the community of polypes.

I am aware that M. Valenciennes has suggested that the rope-like coil or axis in the Japanese species is a part of the sponge, and regards

the polypes with which it is covered as a species of *Palythoa*; and Professor Max Schultze has supported this theory by a microscopic examination of the spicules of the sponge, of the axis, and the bark or *corium**.

Some of the arguments in favour of this view of the question may be thus condensed:—

I. *Silica is not exclusively secreted by sponges, as the advocates of the sponge-theory seem to believe, but is found mixed with corneous matter (as it is mixed in Hyalonema and Euplectella) in Gorgonia and Antipathes, and with calcareous matter in Madrepores.*

Mr. Children, in my paper "On the Chemical Structure of Sponges" (see *Annals of Philosophy*, 1825, ix. p. 431), in which I first showed that the spicules of some sponges are composed of silica, states that he found sufficient silica in the carefully prepared ashes of the axis of *Gorgonia flabellum* to form a globule before the blow-pipe. This proves that silica is found in the coral of the *Alcyonaria* or polypes with pinnate tentacles.

Professor R. Silliman, in the "Appendix to Dana, on the Structure and Classification of Zoophytes," states that in three genera of Madrepores (*Madreporaria*) which he examined he found that one contained nearly 9, another 12, and a third 23 per cent. of silica; he further states that "the silica exists in the coral in its soluble modification, and probably united to the lime." If nearly one-quarter of the solid parts of a calcareous coral of a zoanthoid polype consists of silica, there can be no reason that a zoanthoid polype might not produce a coral of pure silica without any calcareous material.

M. Milne-Edwards calls one genus of Antipathidæ *Hyalopathes*, because the axis is smooth and has a vitreous appearance; further, he believes that the axis differs in chemical composition from that of the other genera of Antipathidæ (see *Coralliaires*, vol. i. p. 323). I have not seen this genus; but it is to be observed that he forms for the *Antipathes* a group which he calls *Zoanthaires sclérobasiques*, and it is to this group that the *Hyalonemidæ* must be referred; indeed, from the manner in which M. Milne-Edwards refers to the genus, this is where he would have placed it if he had not been informed by M. Valenciennes that he considered it a sponge with a parasitic *Zoanthus*.

II. *The structure of the siliceous spicules of sponges is very similar to, almost identical with, the structure of the axis of Gorgonia*

* The truth of Dr. Bowerbank's assertion (also supported by Dr. William Carpenter), that the zoanthoid polype of this coral, described by Brandt, Schultze, Bocage, and myself, is only the *oscule* of the sponge, can be at once disproved by the examination of a specimen, or the study of the works of the authors cited, and can scarcely be considered an object of discussion. It is true Dr. Bowerbank has written a long and diffuse paper to attempt to prove his position, when a cut in the polype-cell could have settled the question. It is a pity he did not recollect King Charles's question about the fish and the water. I have made some observations on M. Valenciennes's and Dr. Bowerbank's theories in the 'Annals and Magazine of Natural History' for 1866, vol. xviii.

among the sclerobasic alcyonoid, and of *Antipathes* among the sclerobasic zoanthoid polypes.

The siliceous spicules of sponges (as for example, the very elongated filiform spicules of the genus *Euplectella*, which are most like those of *Hyalonema*) are formed of numerous very thin concentric coats formed of silica and horny matter; but this is exactly the structure of the axis of *Gorgonia* (of the alcyonoid polypes) and of *Antipathes* of the zoanthoid polypes.

In *Hyalonema* the coats are siliceous, mixed with horny matter; in *Gorgonia* the coats are either almost entirely horny or of horny matter mixed with a greater or less quantity of calcareous and siliceous matters. Though the axes of the *Gorgonia* and *Antipathes* are generally found with an expanded base, by which they are fixed to marine bodies, the *Pennatulæ*, which are free, have a fusiform axis, like the separate spicules that form the coil of *Hyalonema*.

I can only consider that the spicula of *Hyalonema* are the fusiform axes of a coral which, instead of having one axis to the community of polypes, has several coiled together like a rope, but separated from each other by a layer of corium.

The coil of the spicula in *Hyalonema* occupies the same position and answers the same purpose (that is of supporting the canal) as the axis of the sclerobasic alcyonoid and zoanthoid polypes—that is to say, the axis of *Gorgonia*, *Antipathes*, and *Pennatula*.

III. *The spicules of sponges are only covered with sarcodæ; while the spicules of the Hyalonema are each surrounded by a layer of corium exactly like the inner surface of the bark or corium of the polypes.*

The zoologist who regards the coil of spicules as part of the sponge considers the polypes on its surface a parasitic incrustation. If this were the case, the parasites would only form a layer on the surface of the coil without interfering with the coil of spicules on which it is placed; and the spicules of the coil, being part of the sponge, would only be covered with the sarcodæ of the sponge, which, in the sponge at the base of the *Hyalonema*, of which the coil is said to be a part, is very small in quantity, scarcely enough to unite the spicules of the sponge together, and scarcely visible on their surface. In *Hyalonema*, on the contrary, the bark that covers the coil consists of a thick hard fibrous corium covered with a thick external coriaceous coat, strengthened, as in *Palythoa*, with grains of sand or small spicules. The inner layer of corium near the spicules or coil is pierced by scattered small spicules; and the corium extends within the coil, surrounding each of the spicules with a thin fibrous coat, uniting them all into one mass of a much more solid and highly organized texture than the sarcodæ of any sponge I have examined.

The zoanthoid polypes that form the bark on the coil of spicula differ from those of the genus *Palythoa* and all other allied genera in having the inner coat of their polype-cells and the base from which they spring pervaded with siliceous spicules, similar in shape, but smaller and much shorter than the spicules of which the coil is formed.

I consider that this structure of the corium is enough to prove that it is the community of polypes that constitute the bark that forms the coil of spicules, and that they are too intimately connected with the spicules to be only parasitic on their surface.

IV. *The essential character of a sponge is, that it is permeated by canals for the circulation of the water which is emitted by oscules; and there is no such structure in Hyalonema.*

The sponge in which the Japanese *Hyalonema* is found is of the normal structure here noted. But there is no appearance of any canal in the coil of spicules; indeed they are all formed into a close mass, adherent together by the corium that surrounds each spicule.

There is no communication between the canals of the sponge to which the *Hyalonema* is attached and the axis of *Hyalonema*, which has been regarded as part of the sponge.

The sponge forms a condensed hard case, round the base of the coil which is inserted in the sponge, very different from the rest of the sponge, of a dense structure, and without any canal in it, as if to separate the base of the *Hyalonema* from it as completely as possible, evidently regarding the *Hyalonema* as an intruder, I suppose, the base being enclosed in the hard case without any canal, and the upper free part of the axis being entirely covered with the polype-bearing corium or bark (or with the mass of parasitic *Palythoa*, if that theory be the correct one); and I have seen specimens which show that in the perfect state of the animal the axis is so covered.

This bark being destitute of pores or other apertures, and the axis destitute of any canal, shows that the axis and bark cannot be any part of the "cloacal system," as Dr. Bowerbank states them to be in his characters of the genus, and, indeed, have no connexion with the sponge in which it lives.

In the perfectly formed specimen the coil of the axis reaches to the base of the sponge, the coil gradually tapering in thickness until it reaches the base, where it is like a small pencil of very thin spicules. This thin end or pencil is closed over by the sponge. I believe that the coral commences on the surface of the sponge; and that as the coral increases in size the basal portion perforates and descends in the sponge as the upper part of the axis ascends or enlarges in size.

In fact the coil of spicules forms no part of the organization, and has no organic connexion with the sponge in which it is placed, there being no water-current between it and the sponge, which is the essential character of sponges. It is to be observed that neither M. Valenciennes, Professor Max Schultze, nor Dr. Bowerbank attempt to prove that the coil is in any way organically connected with the sponge.

V. *The attachment to the sponge appears to be the habit of a single species; for the Portuguese species, which agrees with the Japanese in most of its essential characters, lives free in the sea, and has*

the small end of the coral, which in the Japan species is sunk in the sponge, covered with polypes like the rest of its surface.

Professor Max Schultze, who regards the coil of the Japanese species as part of the sponge and the polypes as a parasitic species of *Palythoa*, considers the polype an undescribed species of that genus. But the observation of Professor Brandt shows that it differs from all the species of the genus *Palythoa* in having the inner layer of the basal portion, which forms the bark of the coil and the cells of the polypes, strengthened with siliceous spicula, similar to, but smaller and shorter than the spicula of the coil; so that the animal must form a genus by itself, which has the peculiarity of secreting small spicules of the same kind and form as those which the advocates of the parasitic theory will not admit the polype secretes of a larger size so as to form the coil.

According to the observations of Professor Bocage, the polype of the Portuguese species differs from that of the Japan species in having a different number of tentacles; but it agrees with the Japan species in the inner layer of the corium secreting siliceous spicules. So the *Hyalonemata* of the two localities have polypes agreeing in forming siliceous spicules in the corium, and yet may be referred to different genera. Yet we are to believe that each is only parasitic on a coil of spicules which only differs from the spicules of their flesh in being larger and formed into a central coil! This I must regard as a very illogical conclusion, as it is more natural to suppose they secrete the spicules of the bark and the coil.

These two genera, according to the theory entertained by Valenciennes, Milne-Edwards, and Wyville Thompson, must belong to two very different groups of animals. These zoologists consider the "glass rope," because it grows out of a sponge* having somewhat similar siliceous spicula, to be only an extraordinary development of the spicula of the sponge, which is covered with a parasitic *Palythoa*! Therefore they regard it as a sponge. As the second genus does not grow out of a sponge, and therefore cannot be a development of the sponge-spicula, and therefore cannot be a sponge, I do not know to what group of animals they would refer it. I therefore think it much more reasonable to believe that both belong to a peculiar group of zoanthoid corals characterized by secreting an axis formed of siliceous thread-like spicules, consisting at present of two genera, one living free, and the other growing from a mass of sponge.

Thus a coral with an axis formed of a coil of siliceous spicules, exactly similar to that of *Hyalonema*, is found without being in connexion with any sponge; so that the coil cannot be a special development of the spicules of a certain sponge. In the latter case the coil-like axis is evidently secreted by the polypes which cover it. Are we to believe that the sponge forms the axis in one case, and

* Professor Brandt denies that the Japan *Hyalonema* lives in a sponge (*Hyalonema*, p. 14, note), and says he does not know how they are fixed (p. 14). Professor Max Schultze figures three specimens in sponges (t. 1, 2). We have two examples in the British Museum in sponges; and I have seen more than a dozen other specimens all growing in sponges.

the polypes (which equally cover the axis in both cases) in the other—that is to say, in two genera of the same family?

Some of the siliceous spicules found in the inner layer of the bark of the axis or coil of the Japanese species are similar in form to those which are found in the sponge on which it grows (see Schultze, t. 3. f. 11–14; Brandt, t. 3. f. 15, 16)*. They differ from the spicula in the sponge in being smaller in size, stouter, and more spinose; but when you see the very variable forms the spicules of the sponge assume, and how the forms blend into each, as well shown by Schultze, t. 1. f. 3, 4, the passage from the spicula of the sponge to those of the bark can easily be believed by a casual observer; but those of the bark and of the sponge each keep their own peculiar form and position, and are never found intermixed.

Some microscopists, who frequently pay little attention but to the “microscopic object,” and therefore take a narrow view of the affinities of animals, place great reliance on this similarity of the spicules of the polypes and the sponge, and regard them as the same. This would have weight, if the perfect organization and development of the polypes did not prevent me from accepting Dr. Bowerbank’s theory that the bark is part of the sponge. But, admitting as we must that the coil is covered with well-developed polypes, the existence of these cruciform or subcruciform spinulose spicules does not offer us any assistance to discover whether the polypes are parasitical or are the makers of the coil; and they have been observed by the advocates of each theory, as above quoted, only so far as one may argue that, if the polypes develop these cruciform siliceous spicules and also cylindrical ones in the bark, there is less difficulty in believing that they also develop the siliceous filiform spicules of the coil or axis.

Dr. William Lockhart states that the Japanese *Hyalonema* is found growing on the rocks off the island of Enosima, near the old capital Kamakura, and not far from Yokohama. The fishermen offer these sponges with their siliceous fibres for sale to visitors at the temples of Enosima.

The Japanese are intelligent and patient people, and they manufacture many articles of the coils of spicules of this coral. They sell them with one or more bands of coloured or gold paper put round them to keep them together, or they enclose the narrow base of the coil with spiral strips of paper, strips of cloth or ribbon, forming them into an aigrette; these are prepared for the general market. Oddly enough, when they, or some of the fishermen, must have stripped the bark off the coil, they prepare others evidently for the more scientific purchasers. Thus I have seen a specimen which had the thin lower end of the coil enclosed in a spiral band of paper covered over with a coil of string having knots at certain distances. This was all covered with sand and minute particles

* Professor Brandt considers the spicules to belong to different species, calling the one at the base *Spongia octancyra* (p. 14), and the other in the bark *Spongia spinicrucis* (p. 23).

of shell attached with cement, giving the whole the appearance of the true bark, the knots representing the polype-prominences,—and so well done that it deceived an intelligent collector.

The same collector brought me a specimen of a coil which had some of the natural bark on the middle part of the specimen; but the narrow lower end was covered with strips of the bark wound round it in a spiral manner, so that the bark appeared to cover the base of the coil nearly to the end; but when closely examined, the edges of the strips were distinctly visible.

I have seen another specimen in which the coil of spicules was scattered with small pieces of bark, generally containing a single polype, but in two or three cases two polype-cells; and on the tips of some of the spicules were affixed in the same manner, with cement, a piece of bark containing a polype; in one or two instances two such pieces were on the same spicule.

6. Additional Note on *Corallium johnsoni*.

By DR. J. E. GRAY, F.R.S., V.P.Z.S., &c.

In the Proceedings of this Society for 1860 (p. 393, Radiata, pl. xviii.) I described and figured a new species of Coral, which had been discovered by Mr. James Yate Johnson at Madeira, under the name of *Corallium johnsoni*.

The Rev. Henry H. Higgins, an active trustee of the Liverpool Free Museum, has most kindly sent to me for examination a small specimen of a Coral received from Mr. Johnson, from Madeira, which is evidently the same species, showing the coral in its young state. As the specimen is very unlike the old part of the coral that I figured, and also very dissimilar to the young branches of the *Corallium rubrum* of the Mediterranean, I have had the figure that Mr. Higgins most kindly sent with the specimen reproduced (see fig., p. 126).

The great peculiarity of this coral is that the polypes all arise from one surface, and I have no doubt that it grows out horizontally from the rocks, and that they arise from the upper surface of the branches.

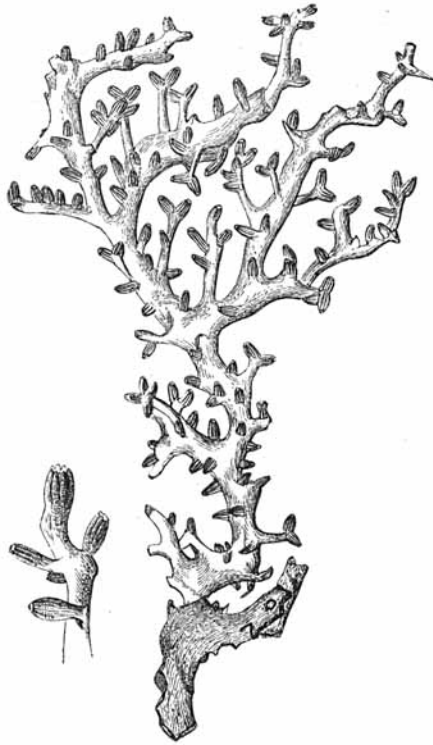
The polypes also differ from those of the *Corallium rubrum* of the Mediterranean in being very prominent from the bark, and of an ovate subcylindrical form, marked with longitudinal grooves, which are most distinct near the opening of the polype-cell.

I have little doubt that the above is the true explanation of the specimen; but Mr. Johnson, who sent the specimen to Liverpool, labelled it “a zoophyte parasitic on a dead coral.”

The genus *Corallium* should be divided into three, as follows:—

1. CORALLIUM.

The polypes slightly elevated from the bark, and scattered on all sides of the branches.

*Hemicorallium johnsoni.*

CORALLIUM RUBRUM, Lam., M.-Edw. Corall. i. 204.

Madrepora rubra, Linn.

Isis nobilis, Pallas.

Hab. Mediterranean.

B.M.

2. PLEUROCORALLIUM.

"The coral branching in a plane. The polypes scarcely raised, confined to one surface, mostly near the apex of the very small branchlets, and often in twos." The branchlets in the figure are chiefly confined to one edge of the branches.

PLEUROCORALLIUM SECUNDUM, Dana, Zoophytes, p. 641, t. 60. f. 1, 1 a.

Hab. Sandwich Islands?? (*Dana*).

3. HEMICORALLIUM.

The polypes prominent, ovate-cylindrical, often clustered, all distributed on one side of the branches.

HEMICORALLIUM JOHNSONI.

Corallium johnsoni, Gray, P. Z. S. 1860, p. 394. B.M.

"Zoophyte parasitic on a coral."—J. Y. Johnson, MS.

Hab. Madeira (J. Y. Johnson; Free Museum, Liverpool).

7. On *Placospongia*, a New Generic Form of *Spongiadæ* in the British Museum. By Dr. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

The British Museum received in 1851, from Admiral Sir Edward Belcher, a specimen of a hard calcareous body said to have come from Borneo; and in the sale at Stevens's sale-room in 1852 we purchased two other specimens, from what was understood at the time to be the remaining part of the collection that had been formed by Admiral Sir Edward Belcher during the surveying voyage.

The bodies have much the appearance of the underground rhizome of a plant with a number of scars whence leaves or flowering branches have separated; but when more closely examined, it will be found that what appears to be a scar is a separate plate. And when so examined they have so much the appearance of a very large kind of Nullipore or *Melobesia* that, when I first observed them, I believed that they were probably corals covered with large plates of a *Melobesia*, differing in size and form on the various parts of the specimens, and giving them an angular appearance, caused by the overlapping of the different fronds of this calcareous Alga; and I therefore proposed to transfer them to the Botanical Collection in the British Museum.

An examination by the microscope at once dispelled this idea; for the surfaces of the white chalk-like plates, even under a low power, are seen to be distinctly areolated as if formed of small grains; and when the plates and the white chalk-like axis were more minutely examined under a higher power they were found to be entirely formed of transparent, more or less globular or oblong siliceous masses, with a regularly granulated surface, evidently formed of spicules radiating from the centre to the circumference, and forming the granular surface exactly like what are called the *ovaria* of *Geodia* and its allies. Also the space between the central axis and the plates in a transverse fracture was filled with a rugose yellow granular matter, which proved to be sarcode strengthened with bundles of siliceous pin-shaped spicules (with a distinct head and a tapering point), which diverge from the axis to the inner surface of the external plates.

After this examination there could be no doubt that this was a sponge differing in internal structure and external form from any sponge yet described. I therefore propose to form it into a genus, to be called *Placospongia*, which I regard as the type of a new family, and, indeed, of a separate group of sponges, which may be called *Stony Sponges*, thus characterized:—Sponge consisting of a hard central

axis covered externally with separate laminæ; the axis and laminæ composed of closely adherent siliceous globules with a granular surface, and separated from each other by a layer of sarcode armed with siliceous spicules.

The genus may be thus described :—

PLACOSPONGIA.

The sponge hard, angular, stony, angularly branched. The axis solid, formed of closely packed siliceous globules with an areolated tubercular surface, and covered with variously shaped hard plates of similar tubercular siliceous globules, having an areolated appearance on the surface under the microscope. The outer plates differ greatly in size and form; but they meet at the edges, and rarely one edge slightly overlaps the other, giving the sponge an angular appearance. The axis is separated from the superficial plates by a continuous layer of sarcode furnished with bundles of nearly parallel pin-shaped spicules, which form columns diverging at right angles from the outer surface of the axis to the inner surface of the outer plates. The external plates are increased in size by the addition of new matter on the circumference, leaving indistinct concentric lines of growth on the outer surface. It is the manner of growth that makes them look so like the fronds of a large *Melobesia*.

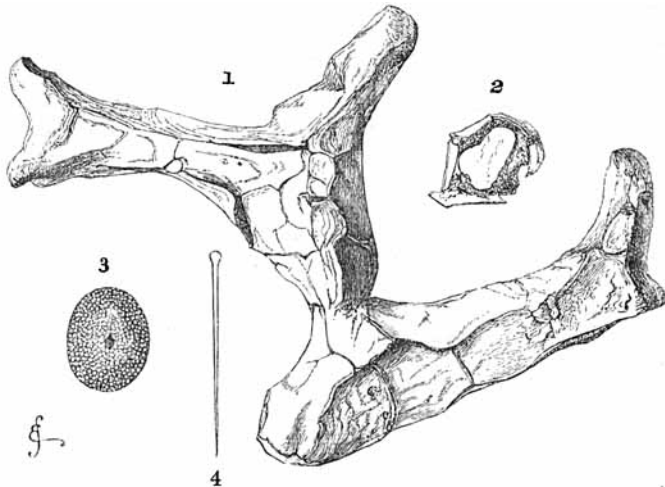


Fig. 1. *Placospongia melobesioides*, Gray.

2. Cross fracture, showing the axis, sarcode, and outer laminæ.

3. Siliceous globule.

4. Pin-shaped spicule of sarcode.

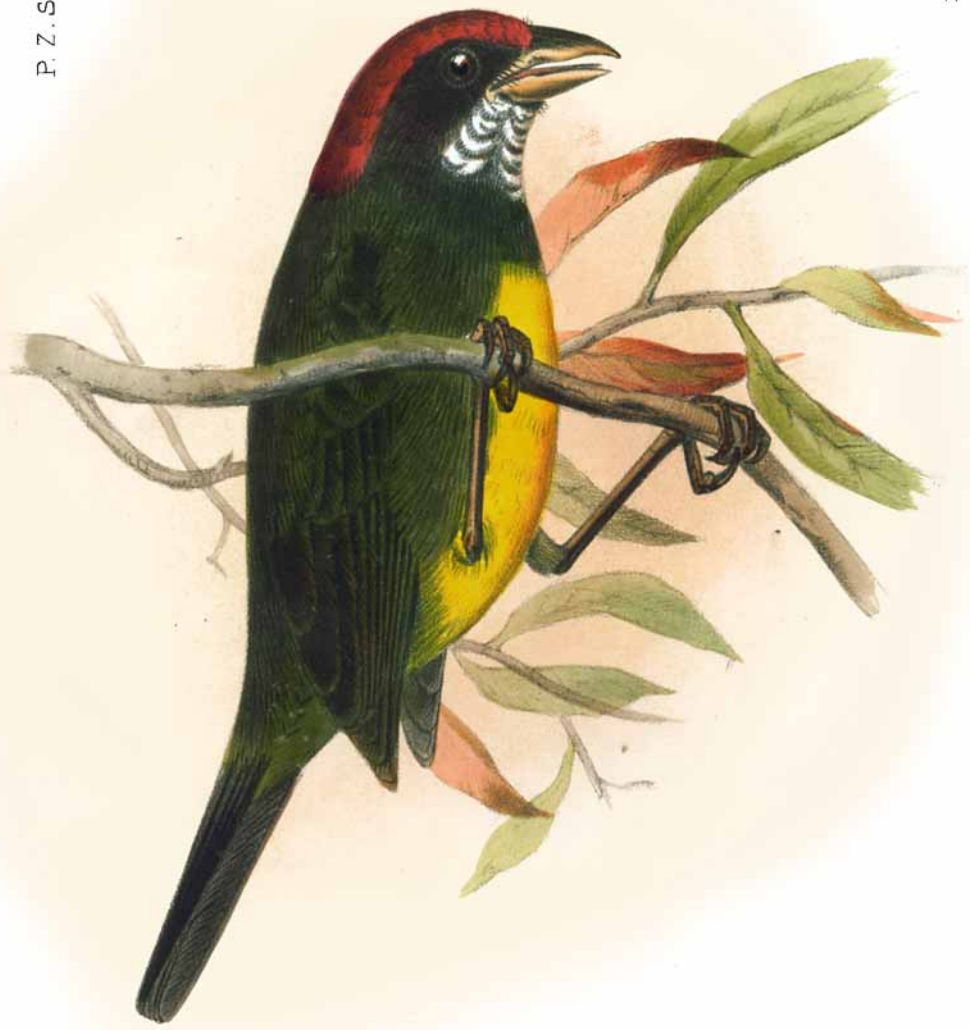
PLACOSPONGIA MELOBESIOIDES.

Var. 1. Sponge thick, with short angular branches, chalky white.

Hab. Borneo.

B.M.

P. Z. S. 1867, Pl. XIV.



Sm. lith.

M. & N. Hanhart imp.

BUARREMON CRASSIROSTRIS

Var. 2. Sponge slender, with a few distant angular branches, pale purplish red.

Hab. Borneo? (1851, *Capt. Sir E. Belcher*).

B.M.

The two varieties were purchased at the same time, in Stevens's sale-room, in 1852. They present just the same differences in colour as are to be observed in different specimens of *Melobesia* and *Coralina*; and there is no doubt that the purplish-red specimen will become white by exposure.

8. On some Collections of Birds from Veragua.

By OSBERT SALVIN, M.A., F.L.S., F.Z.S., &c.

(Plate XIV.)

The three collections of birds which form the materials for the present paper were collected at three different localities in Veragua, by Enrique Arcé, a native of Guatemala, who formerly worked for Mr. Godman and myself when travelling in the latter country. Having become proficient in bird-collecting, he undertook to go to Costa Rica, where he remained some months; he then proceeded to Panama, and thence to the ground where these collections were made. The first and largest was from a village called Santa Fé, which Arcé describes as situated twelve leagues on the Panama side of Santiago, the capital of Veragua; the next was from the neighbourhood of Santiago itself; and the third from a district beyond Santiago, which Arcé calls the "Cordillera de Tolé." Neither this district nor Santa Fé are marked in any map that I have seen. All three localities would seem to enjoy a "*tierra templada*," or cool mountain-climate, in their vicinity; and the presence of a Dipper (*Cinclus*) in the last named indicates that our traveller reached a considerable elevation. The collection also contains many birds which are found only in the lowlands, showing that Arcé also visited the hot forests of low elevation.

Before proceeding to enumerate the species contained in these collections, I will shortly mention the notices that have been published from time to time of the birds of this section of Central America, viz. that which is included between the political frontier of Costa Rica and the Panama Railway.

The first notice which I can find referring to the birds of Veragua is in the 'Proceedings' of this Society for the year 1850, p. 92, where Mr. Gould describes *Cephalopterus glabricollis* from a specimen obtained by the botanical traveller M. Warszewicz in the Cordillera of Chiriquí. In a subsequent paper, published in the same year (p. 162), six new species of *Trochilidae* (*Selasphorus scintilla*, *Thaumatias chionurus*, *Thalurania venusta*, *Sapphironia cæruleogularis*, *Erythrionota niveoventris*, and *Trochilus* (—?) *castaneoventris*) were described by the same gentleman from specimens furnished by M. Warszewicz, and collected between David and the Chiriquí Lagoon. A seventh species from the same collection was also described by

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Mr. Gould under the new generic name *Oreopyra*, as *O. leucaspis*, in the 'Proceedings' for 1860, p. 312. In the 'Proceedings' for the year 1853, p. 45, a new species of Toucan (*Aulacorhynchus caruleogularis*) was defined by Mr. Gould from a specimen collected in Veragua by Dr. Berthold Seemann, who obtained it when travelling as naturalist to H.M.S. 'Herald.' Mr. Gould says this bird was accompanied by other ornithological rarities, of which unfortunately we have no record. In the year 1853, also, MM. Verreaux published their description of *Chasmorhynchus tricarunculatus* in the 'Revue Zoologique,' p. 193, from an immature specimen transmitted to them from Boca del Toro. The next notice we have is in the 'Annals of the New York Lyceum' for 1855 (vol. vi. p. 137), which contains a description by Mr. G. N. Lawrence of the beautiful Hummingbird (*Microchera albo-coronata*), with notes on its habits by its discoverer, Dr. J. K. Merritt, and also on those of *Eutoxeres aquila*, Bourc. These birds were obtained in the district of Belen, which lies to the south-eastward of the Chiriqui lagoon, on the Atlantic slope of the Cordillera. Our 'Proceedings' for 1856 contain two papers referring to Veraguan birds. The first is at p. 107, by Mr. Gould, where two new species are described (*Trogon aurantiiventris* and *Odontophorus veraguensis*) from specimens collected by Mr. Bridges near David. The second paper, by Mr. Sclater (p. 139), gives a complete list of Mr. Bridges's collection, which contained specimens of forty-six species, two of which are described as new, viz. *Thamnophilus bridgesi* and *Geotrygon chiriquensis*. In this paper short notes on the habits of each species are supplied by Mr. Bridges. The next paper I have to notice is by Mr. G. N. Lawrence, on a collection transmitted to the Smithsonian Institution by Mr. F. Hicks from David. This paper, published in the 'Annals of the New York Lyceum,' viii. p. 174, enumerates thirty-nine species, three of which are introduced as new, viz. *Spermophila collaris*, *Elainea chiriquensis*, and *E. semiflava*.

Lastly, in the same journal (June, 1866), Mr. Lawrence describes what appears to be a very beautiful Pigeon, of the genus *Geotrygon*, apparently allied to the West-Indian forms *G. caniceps*, Gundl., of Cuba, and *G. cristata*, Temm. (Bp. Consp. ii. p. 70), of Jamaica. This bird was obtained by Dr. Merritt, the discoverer of *Microchera albo-coronata*, in the district of Belen, and seems to have remained unnoticed in his collection since the year 1852.

I now come to Arcé's collections, some of the new species of which have been already described in these 'Proceedings' by myself; but as these are incorporated into the subjoined list, I need not refer to them here.

There are twenty-three species of birds included in these collections which have not hitherto been noticed within the limits of the Central American fauna. Nine of these have been described as new from these specimens; and the rest are South American species, now shown to be of wider range. The new genera introduced are:—(*Tyrannidæ*) *Colopterus* and *Serpophaga*; (*Trochilidæ*) *Dorifera* and *Clais*; (*Cuculidæ*) *Neomorphus*; (*Craeidæ*) *Chamæpetes*.

The geographical position of the portion of Veragua we are now considering, situated as it is between Panama and Costa Rica, certainly suggests that its ornithological fauna would consist of species belonging to each fauna, with the addition of some few species peculiar to the district. Such appears to be actually the case. Rather more than one-half the birds are also found in Costa Rica, while rather less than two-thirds are found on the Panama Railway. About one in ten has not been hitherto seen beyond its limits. Rather less than three in seven extend beyond Panama into the southern continent of America, while three in seven extend northward into Guatemala, Mexico, or the northern continent of America.

These proportions show that this district most resembles the Isthmus of Panama as regards its birds, that it has a less strong affinity to Costa Rica, and that out of the wide-ranging species a rather larger proportion belongs to more northern regions than to southern. It would be necessary to compare closely the birds of this district with those of Costa Rica to ascertain accurately where the balance of their relationship lies. The presence of several peculiar forms, such as *Cephalopterus*, *Chasmorhynchus*, *Oreopyra*, *Microchera*, &c., suggests that Veragua belongs zoologically to Costa Rica, and that Panama maintains a strictly derivative fauna, and has at no period of the geological history of the isthmus ever been a centre of segregation. On the other hand, it is to Costa Rica and Veragua united that we must look to find the origin of most of the species now found on the Isthmus of Panama, it being evident that this district has for a long period occupied a position as an island, or one of the islands which lay between the two continents at a time when the two oceans were united by two or more channels. It is for geologists to tell us where these divisions were situated. An obvious one, separating Costa Rica, Veragua, and Panama from the southern continent, is the line from the Atlantic bay of San Blas across to the mouth of the Bayano on the Pacific.

Regarding Costa Rica, Veragua, and Panama as a whole, there are indications, in the Humming-birds at least, of some separation having existed between the extreme ends of the district, *Microchera albocoronata* of the southern extremity being represented by *M. parvirostris* at the northern, *Chalybura isauræ* by *C. melanorhoa*, *Thaumantias chionurus* by *T. cupreiceps*. As no instance of representative forms occurs in other groups of birds, it is perhaps more probable that the local distribution of particular plants from which these birds take their food limits the range of each race than that any actual geographical barrier has given cause to this divergence.

I hope shortly to return to this subject in a paper on some collections from Costa Rica; but I may state that my present view is that this district, viz. that included from the rise of the mountains to the northward of the line of the Panama Railway to the southern shore of the lake of Nicaragua and the river San Juan, forms the key to the peculiarities of the Central-American bird-fauna. Previously to the separation indicated between Costa Rica and the southern continent, but when the more northern strait, where the lake of

Nicaragua now stands, was open, the species of the northern portion of South America and Costa Rica were identical, and but few neo-tropical forms existed northward of the separation.

A further subsidence must then have isolated Costa Rica, where during a lengthened period most of the species have become slightly modified. A rise of land to the extent of the present contour of Central America then took place. The old straits, now land, have been occupied by contending allied races, sometimes the Costa Rican, and sometimes the southern race prevailing, occasionally the southern race penetrating through the country of its representative and driving it before it. Towards the south the Costa Rican species have soon met with their representative races, by which their range has been stayed; while northward, impeded by no such barrier, they have spread as far as climate and the supply of their necessary food would allow them, the most strongly defined limit in this direction being, probably, the northern boundary of the tropical virgin forest.

TURDIDÆ.

1. *CATHARUS GRISEICEPS*, Salvin, P. Z. S. 1866, p. 68.

Santa Fé, Veragua.

2. *CATHARUS FUSCATER* (Lafr.).

Myioturdus fuscater, Lafr. Rev. Zool. 1845, p. 341.

Catharus fuscater, Scater, Cat. A. B. p. 2; Salvin, P. Z. S. 1866, p. 69.

Cordillera of Tolé.

Arcé has sent a single male specimen of a *Catharus* which agrees closely with Mr. Scater's examples from Ecuador. The bill, however, is somewhat larger and, in this fresh specimen, of a brighter orange-colour. *C. fuscater* is no doubt the southern representative of *C. mexicanus* (Bp.) (Scl. Cat. p. 1), which occupies its place from Costa Rica to Mexico. Both species are inhabitants of the "*tierra caliente*," and appear to be decidedly scarce in the countries in which they are found.

3. *TURDUS GRAYI*, Bp.; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé, Veragua; David (*Hicks*).

Ranges as far southward as Panama. At Santa Martha *T. luridus*, Bp. Notes Orn. p. 28, replaces it, a species of which I have recently acquired a specimen, collected by the late Mr. Bouchard. This differs from a Panama specimen of *T. grayi* in having the under surface much paler, the crissum being nearly white. The upper surface, too, is more olivaceous and hardly shows a cinnamon tinge, the tail is squarer, and the dimensions, especially the feet, smaller. Total length 9, wing 4·5, tail 3·9 inches.

4. *TURDUS LEUCAUCHEN*, Scater, P. Z. S. 1858, p. 447; Baird, Rev. Am. B. p. 24.

Santa Fé and Cordillera de Tolé.

Veraguan specimens exhibit none of the marked characters which

distinguish *T. leucauchen* from *T. assimilis*, Cab., as pointed out by Dr. Baird, *l. c.*, and are even paler above than Costa Rican specimens which are referred to the former species by Baird. I am inclined to confine the term *assimilis* to the Mexican form, as described by Baird, and to refer all these intermediate forms to the Guatemalan *T. leucauchen*. The two more clearly defined species are distributed as follows:—*T. assimilis* is from Mexico only, *T. leucauchen* from the forests of Northern Vera Paz (Choctum, &c.), and from no other district of Guatemala. The intermediate forms, viz. those with olivaceous backs and partially fulvous under wing-coverts, are found in the highlands of Guatemala (Dueñas abundant, Coban a single specimen, and one from Choctum, the district of the true *leucauchen*), Costa Rica (Tucuriqui, 3000 feet), and Veragua. I cannot say that this arrangement is satisfactory; and had the work to be done over again I should prefer to regard all as one variable species, the representative of the South Brazilian *T. crotopezus*, Vieill., the Cayenne and Para *T. phæopygus*, Cab., and the Antillean *T. jamaicensis*, Gm.

I may here notice that the specimens in the collection of the Smithsonian Institution (22,360 and 32,684), marked "Mexico" by M. E. Verreaux, possibly came from Guatemala, and originally formed part of a collection which passed through my hands. I have seen specimens of other species with the locality similarly marked, which certainly were in this collection.

5. *TURDUS OBSOLETUS*, Lawrence, Ann. of New York Lyceum, vii. p. 470; Baird, Rev. Am. B. pt. 1. p. 28.

Santa Fé, Veragua.

A single specimen from Santa Fé I believe to be the adult female of this species. I have little doubt that the male is black, and the species closely allied to *T. atrosericeus*, Lafr. R. Z. 1848, p. 3. In this female the crissum is white, while that of the female of all the allied species is coloured similarly to the abdomen. I append a short diagnosis of this specimen, as Mr. Lawrence's description was evidently taken from an immature bird:—

T. saturate brunneus, subtus pallidior: gula parce striata: ventre imo et crisso albis: tectricibus subalaribus et remigibus ad basin intus cinnamomeis: rostro nigro, pedibus obscure corylinis: long. tota 9, alæ 4·9, caudæ 3·8 poll. Angl.

6. *RHODINOCICHLA ROSEA* (Less.).

Furnarius roseus, Less.

Rhodinocichla rosea, Hartl. Journ. f. Orn. 1853, p. 33; Selater, Cat. A. B. p. 147; P. Z. S. 1856, p. 140; Baird, Rev. Am. B. p. 91. Santa Fé; David (*Bridges*).

The proper systematic position for this curious bird seems to remain in considerable doubt. Diverse coloration of the sexes is not found in any genus of *Troglodytidae*, to which family both Baird and Selater are inclined to refer it. It may prove that Dr. Hartlaub was not so far wrong after all in referring the female to the *Turdidae*. Though I never observed this bird in Guatemala, it ranges through-

out Central America from Mazatlan to Panama, and thence to Venezuela, &c.

CINCLIDÆ.

7. CINCLUS ARDESIACUS, Salvin, Ibis, 1867, p. 121, pl. 2.

Cordillera de Tolé.

A full description of this species will be found in the 'Ibis,' as referred to above. In coloration this Dipper more nearly approaches North American specimens of *C. mexicanus* than Mexican, which seem to be always darker. (See Baird's 'Rev. Am. B.' p. 60.)

TROGLODYTIDÆ.

8. MICROCERCULUS LUSCINIA, Salvin, P. Z. S. 1866, p. 69.

Santa Fé and Santiago de Veragua.

Two specimens sent by Arcé agree accurately with one another, the species forming a distinct race from the northern *M. philomela*, Salvin, P. Z. S. 1861, p. 202.

9. THRYOTHORUS LEUCOSTICTUS, Cab.

Thryothorus prosthaleucus, Sclater, Cat. Am. B. p. 20.

Microcerculus leucostictus, Sclater & Salvin, P. Z. S. 1864, p. 345.

Santa Fé, Veragua.

This species seems to enjoy an uninterrupted range from Cayenne, Ecuador, and New Granada to Mexico. I am quite unable to find constant characters to separate specimens from the latter country and Guatemala from those obtained from more southern localities.

10. THRYOTHORUS RUFALBUS, Lafr. ; Sclater, P. Z. S. 1856, p. 140 ; Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Bridges ; Hicks*).

11. THRYOTHORUS RUTILUS, Vieill. ; Baird, Rev. Am. B. p. 135.

Santa Fé and Santiago de Veragua.

This species has before been noticed on the Isthmus of Panama (Lawr. Ann. N. Y. Lyc. vii. p. 320).

12. THRYOTHORUS THORACICUS, Salvin, P. Z. S. 1864, p. 580.

Santiago de Veragua.

Three specimens from this locality differ in no way from the typical Costa Rican examples. This species, like many others hitherto considered purely Costa Rican, extends as far south as the termination of the higher mountains of that country, and tends to show that the real boundary of the Costa Rican fauna must be sought here.

13. THRYOTHORUS CASTANEUS, Lawr. Ann. N. Y. Lyc. vii. p. 321.

Thryophilus castaneus, Baird, Rev. Am. B. p. 133.

Santiago de Veragua.

This species has hitherto been only recorded from the Isthmus of Panama.

14. *TROGLODYTES TESSELLATUS*, Lafr. et D'Orb.

Troglodytes inquietus, Baird, Rev. Am. B. p. 143; Lawr. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

Mr. Sclater and I have recently had an opportunity of comparing the type specimen of *T. tessellatus*, kindly lent us by the authorities of the Muséum d'Histoire Naturelle of Paris, with specimens of the Panama Wren, collected by M^cLeannan. They present inappreciable differences.

MOTACILLIDÆ.

15. *ANTHUS PARVUS*, Lawr.

Anthus rufus, Lawr. Ann. N. Y. Lyc. vii. p. 322; Baird, Rev. Am. B. p. 156.

Anthus parvus, Lawr. Proc. Ac. Phil. 1865, p. 106.

Santa Fé.

I am quite unable to detect any tangible differences between a specimen, no doubt identical with the species described by Mr. Lawrence, collected by Arcé, one from the Amazon Valley, by Wallace, and a third from Bahia, the former equalling in size either of the others. I prefer leaving the question open; but I believe this Veraguan *Anthus* to be a species ranging widely over the continent of South America, and that it is identical with the bird referred by Sclater, Cat. Am. B. p. 24, to *Anthus chii*, Vieill., Spix, Av. Bras. i. p. 75, pl. 76. f. 2, which, being founded on a bird described by Azara, is very probably the same as the *Petite Alouette de Buenos Ayres* of Buffon, Pl. Enl. p. 738, and, therefore, as *Alauda rufa*, Gm.

SYLVICOLIDÆ.

16. *MNIOTILTA VARIA* (L.); Sclater, P. Z. S. 1856, p. 140; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé; David (*Bridges*; *Hicks*).

17. *HELMINTHERUS VERMIVORUS* (Gm.); Baird, Rev. Am. B. p. 179.

Santa Fé.

Already noticed as far south as Costa Rica (Baird, *l. c.*); but not yet observed beyond the locality here given. Arcé sent only one specimen.

18. *HELMINTHOPHAGA CHRYSOPTERA* (L.); Baird, Rev. Am. B. p. 175.

Santa Fé.

This species ranges southward into New Granada (Sclater, P. Z. S. 1855, p. 143).

19. *HELMINTHOPHAGA PEREGRINA* (Wils.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

20. *DENDRÆCA PENNSYLVANICA* (L.); Baird, Rev. Am. B. p. 191.

Santa Fé.

21. *DENDRÆCA BLACKBURNIÆ* (Gm.); Baird, Rev. Am. B. p. 189.

Santa Fé.

22. *DENDRÆCA ÆSTIVA* (Gm.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

Rhimamphus æstivus, Sclater, P. Z. S. 1856, p. 141.

Santa Fé; David (*Bridges; Hicks*).

23. *OPORORNIS FORMOSUS* (Wils.); Baird, Rev. Am. B. p. 218.

Santa Fé.

24. *BASILEUTERUS MESOCHRYsus*, Sclater, P. Z. S. 1860, p. 251; Baird, Rev. Am. B. p. 250.

Santa Fé.

A specimen of this *Basileuterus* sent by Arcé agrees well with a Bogota specimen, which must be ascribed to *B. mesochrysus*, Scl., its wings considerably exceeding in length those of a Guatemalan specimen of *B. delatirii*, Bp., the bill being much larger, and the yellow of the under plumage brighter. I have little doubt Baird is right in referring the Costa Rican specimens to this race, which seems to maintain these constant differences. Northwards of Costa Rica its place is occupied by *B. delatirii*, Bp., which extends its range over the whole of Guatemala (South Mexico doubtfully). In South Mexico *B. delatirii* again gives way to *B. rufifrons*, Sw., a race which is also found very rarely in Guatemala (Salvin, Ibis, 1866, p. 192).

25. *BASILEUTERUS UROPYGIALIS*, Sclater, P. Z. S. 1861, p. 128, & 1865, p. 286, pl. x. f. 2; Sclater & Salvin, P. Z. S. 1864, p. 347; Baird, Rev. Am. B. p. 246.

Santa Fé.

Besides a specimen from the above locality, Arcé has, in a previous collection, sent a specimen of this species from Costa Rica; so that this representative of the section of *Basileuterus*, of which *B. semicervinus* is the type, belongs clearly to the Central American fauna.

26. *SETOPHAGA RUTICILLA* (L.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé; David (*Hicks*).

27. *SETOPHAGA TORQUATA*, Baird, Rev. Am. B. p. 261.

Cordillera de Tolé.

I also possess a specimen from Costa Rica, the country whence Baird's types were obtained, collected by Arcé, agreeing with this Veraguan example.

VIREONIDÆ.

28. VIREOSYLVIA FLAVO-VIRIDIS, Cassin; Baird, Rev. Am. B. p. 336.

Santa Fé; Cordillera de Tolé.

29. HYLOPHILUS VIRIDIFLAVUS, Lawr. Ann. N. Y. Lyc. vii. p. 324; Scl. & Salv. P. Z. S. 1864, p. 348; Baird, Rev. Am. B. p. 380.

Santa Fé.

30. HYLOPHILUS DECURTATUS (Bp.); Baird, Rev. Am. B. p. 381.

Hylophilus cinereiceps, Scl. & Salv. P. Z. S. 1860, p. 299.

- H. pusillus*, Lawr. Ann. N. Y. Lyc. vii. p. 323; Baird, Rev. Am. B. p. 381.

Santa Fé.

Prof. Baird recognizes the Guatemalan bird we described *l. c.*, as the *Sylvicola decurtata*, Bp. These Veraguan specimens confirm the view taken (P. Z. S. 1864, p. 348) that *H. pusillus*, Lawr., is identical with the northern bird; and in this Baird is strongly inclined to agree.

CÆREBIDÆ.

31. CÆREBA CARNEIPES, Sclater; Lawr. Ann. N. Y. Lyc. viii. p. 174.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé; David (*Hicks*).

32. CÆREBA LUCIDA, Scl. & Salv.

Cæreba cyanea, Scl. P. Z. S. 1856, p. 140.

David (*Bridges*).

33. CHLOROPHANES GUATEMALENSIS, Sclater.

Chlorophanes spiza (L.); Lawr. Ann. N. Y. Lyc. viii. p. 174.

Cordillera de Tolé; David (*Hicks*).

34. CErTHIOLA LUTEOLA, Cab.; Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

TANAGRIDÆ.

35. EUPHONIA ANNÆ, Cassin, Proc. Acad. Phil. 1865, p. 172.

Euphonia rufivertex, Salvin, P. Z. S. 1866, p. 71, pl. vii.

Santa Fé.

Though Prof. Baird kindly forwarded me a proof sheet containing Mr. Cassin's description of this species, it did not arrive in time to stop the publication of the name I had assigned it, which must now stand as a synonym, Mr. Cassin's description having several months priority. There can be no doubt as to the identity of the species we each described. It is a well-marked species, the only other

member of the genus having a white crissum being *E. minuta**, Cab., which differs from *E. annæ* primo visu.

36. EUPHONIA CRASSIROSTRIS, Sclater?; Lawr. Ann. N. Y. Lyc. viii. p. 174.

David (*Hicks*).

37. EUPHONIA — ?

Cordillera de Tolé.

An immature female, which I am unable at present to determine.

38. CALLISTE ICTEROCEPHALA, Bp.

Callispiza frantzii, Cab. Journ. f. Orn. 1861, p. 87; Sclater, Ibis, 1863, p. 451.

C. icterocephala, Bp.; Sclater, Cat. Am. B. p. 65; Mon. Calliste, t. xvii.

Santa Fé and Cordillera de Tolé.

Dr. Cabanis, in describing *C. frantzii*, evidently had only female birds before him. Arcé has sent several specimens of both sexes. Of these the males differ in no way from specimens in Dr. Sclater's collection, from Ecuador, which must undoubtedly be referred to *C. icterocephala*, Bp.

39. CALLISTE GYROLOIDES, Lafr.; Sclater, P. Z. S. 1856, p. 142.

Santa Fé; David (*Bridges*).

40. CALLISTE FRANCISCÆ, Lafr.; Sclater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé and Cordillera de Tolé; David (*Bridges*; *Hicks*).

41. TANAGRA DIACONUS, Less.; Sclater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé; David (*Bridges*; *Hicks*).

42. TANAGRA MELANOPTERA, Hartl.

Santiago de Veragua.

This Tanager ranges northwards into Costa Rica, whence Arcé has sent specimens from Tucurriqui on the Atlantic slope. In Guatemala *T. abbas*, Licht., entirely supplants it.

43. RAMPHOCÆLUS DIMIDIATUS, Lafr.; Sclater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé; David (*Bridges*; *Hicks*).

44. RAMPHOCÆLUS PASSERINII, Bp.; Sc. P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.

David (*Bridges*; *Hicks*).

* I am not at all assured of the real difference between this species and *E. humilis*, Cab.; but having only one specimen of the latter I am hardly in a position to speak positively.

45. *RAMPHOCÆLUS ICTERONOTUS*, Lafr.

Santiago de Veragua.

46. *PYRANGA HEPATICA*, Sw.

Santa Fé.

A Mexican species, rarely found in Guatemala, and here occurring at probably the southernmost point of its range.

47. *PYRANGA ÆSTIVA* (Gm.); Sclater, P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 175.Santa Fé; David (*Bridges; Hicks*).48. *PHÆNICOTHRAPIS RUBICA* (Vieill.)?

Santa Fé.

Arcé has sent several specimens of a *Phœnicothraupis* which I can hardly distinguish from *P. rubica* of Brazil. They have the same general diffusion of red colouring over the under surface, the upper plumage also agreeing, the uropygium and margins of the rectrices being hardly appreciably less bright. I am at a loss to account for the presence of this bird here, as on both sides at Panama and in Costa Rica *P. fuscicauda*, Cab., is found, a race which is readily distinguishable by its dark coloration contrasting with the bright red of the throat. In Guatemala the genus is represented by *P. rubicoides*, which has also a bright-red throat, but less defined than in *P. fuscicauda*, the general plumage also being redder.

49. *LANIO LEUCOTHORAX*, Salvin, P. Z. S. 1864, p. 581; Cassin, Pr. Ac. Nat. Sc. Phil. 1865, p. 171.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé.

The specimens from which my original description was taken were in bad condition. Better examples being included in these collections show that, besides the distinctions pointed out, *L. leucothorax* has the uropygium black, while in *L. aurantius* it is clear yellow. The Costa Rican and Veraguan bird is a well-marked and easily recognizable species.

50. *EUCOMETES SPODOCEPHALA*, Bp.

Santa Fé.

The limits bounding the ranges of this and its closely allied species *E. cristata*, DuBus, seem to be distinctly defined. On the Isthmus of Panama *E. cristata* occurs; while a short distance to the northward the present species takes its place and ranges as far as Guatemala, where, however, it is extremely rare, only one specimen having come under my notice. The type from which Bonaparte's original description was taken came from Nicaragua, from which locality and also from Costa Rica our collection contains examples.

51. *EUCOMETES CASSINII* (Lawr.).*Tachyphonus cassinii*, Lawr. Ann. N. Y. Lyc. vii. p. 297.*Eucometes cassinii*, Sc. & Salv. P. Z. S. 1864, p. 351, pl. xxx.

Santiago de Veragua.

52. *TACHYPHONUS DELATRII*, Lafr.

Santa Fé and Santiago de Veragua.

53. *ARREMON AURANTHIROSTRIS*, Lafr.

Santa Fé.

54. *BUARREMON CRASSIROSTRIS*. (Plate XIV.)

Buarremon crassirostris, Cassin, Proc. Acad. Sc. Phil. 1865, p. 170.

Buarremon mesoxanthus, Salvin, P. Z. S. 1866, p. 72.

Santiago de Veragua and Cordillera de Tolé.

As in the case of *Euphonia annæ*, Mr. Cassin's description of this bird has several months priority over mine. In comparing the species with *B. castaneiceps*, Scl. P. Z. S. 1859, p. 441, I have, I believe, indicated its true affinity. These two species constitute a very marked section of the genus *Buarremon*, which comprises several distinct groups.

55. *BUARREMON BRUNNEINUCHUS* (Lafr.).

Santiago de Veragua; Cordillera de Tolé.

Though strictly an inhabitant of mountainous regions, this species is remarkably constant in its characters, specimens from Mexico, Guatemala, Costa Rica, and Ecuador not differing in any appreciable degree.

56. *SALTATOR MAGNOIDES*, Lafr.; Scl. P. Z. S. 1856, p. 142.

Saltator intermedius, Lawr. Ann. N. Y. Lyc. viii. p. 175.

Santa Fé; David (*Bridges; Hicks*).

Two male specimens from Santa Fé have a slightly fulvous tinge on the under plumage, and more than is usually noticeable in Guatemalan specimens of this bird. This is, I have little doubt, the bird Mr. Lawrence has separated under the name of *S. intermedius*. In our article on the "Birds of Panama," Mr. Sclater and I united this bird with *S. magnoides*; but Mr. Lawrence, in his list of Mr. Hicks's Chiriqui collection (Ann. N. Y. Lyc. viii. p. 175), maintains the opinion he formed as to their distinctness. The question at issue concerns the constancy of the characters Mr. Lawrence points out. They are as follows:—(1) In *intermedius* the feathers of the occiput are mingled with olive-green, (2) the white of the throat extends to the chin, (3) the fulvous of the throat is less bright but twice as extensive, (4) the black band of the chest one-third as wide as in the *magnoides*, (5) under plumage tinged with fulvous instead of clear cinereous, and (6) the crissum darker. I have before me eleven specimens from Guatemala, two from Costa Rica, three from Veragua, and three (two males and a female) from Panama, in all nineteen specimens. (1) All specimens have olive-green feathers on the occiput; but in Guatemalan specimens the remaining feathers are in general (not in all specimens) blacker. (2) In several of our Guatemalan specimens the white of the throat extends to the bill, in others it does not, nor does it in one of the Panama specimens. (3) As regards the brightness of the fulvous of the throat there is a consider-

able variation, hardly two specimens being alike; the same may be said of the extent of the same colour. (4) The black band varies very much in width, both it and the extent of the fulvous depending very much upon the way in which the skin is made up, and hence a character of doubtful value; two of the Veraguan specimens have scarcely any band, while the third has a broad one. (5) Guatemalan specimens are in general of a clearer cinereous colour below; Costa Rican specimens hardly so much; Veraguan specimens are two of them tinged with fulvous, and one almost as cinereous as Guatemala skins; both the male Panama specimens are quite like the Guatemalan. (6) The crissum of the Veraguan specimens is slightly darker than Guatemalan, not so the Panama.

The fact of the matter is, that wherever *Saltator magnoides* is found it varies in some degree as regards a few minor points. If *S. intermedius* were admitted to rank as a species, we should have a number of specimens which might with equal propriety be assigned to either. None of our northern specimens have the sexes marked so that I can depend upon them; hence the question as to the distinction between the sexes cannot be discussed.

57. *SALTATOR ISTHMICUS*, Sclater; *Scl. & Salv. P. Z. S.* 1864, p. 351.

Saltator striatipectus, Lawr. *Ann. N. Y. Lyc.* viii. p. 175.

Santa Fé; David (*Hicks*).

58. *PITYLUS GROSSUS* (L.).

Santa Fé.

59. *PITYLUS POLIOGASTER*, DuBus.

Santa Fé and Santiago de Veragua.

60. *GUIRACA CONCRETA*, DuBus.

Santa Fé.

At Panama the southern form of this Finch (*G. cyanoides*, Lafr.) occurs, showing that the Central American race has its range sharply defined, the present locality being its southernmost limit.

61. *ORYZOBORUS FUNEREUS*, Sclater.

Santa Fé.

A single specimen from this locality agrees accurately with our Guatemalan examples of *O. funereus* and with Sclater's type. According to Mr. Lawrence the species of this form occurring on the Panama Railway is *O. æthiops*, Scl.

62. *SPERMOPHILA SEMICOLLARIS*, Lawr.

Santa Fé.

63. *SPERMOPHILA COLLARIS*, Lawr. *Ann. N. Y. Lyc.* viii. p. 176.

David (*Hicks*).

64. PHONIPARA PUSILLA (L.).

Santa Fé.

65. VOLATINIA JACARINA (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

66. CYANOSPIZA CIRIS (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

67. EMBERNAGRA STRIATICEPS, Lafr.

Embernagra conirostris, Scl. P. Z. S. 1856, p. 143.

Santa Fé; Cordillera de Tolé; David (*Bridges*).

This species is also found in Costa Rica; but further to the northward is replaced by *E. chloronota*, Salv.

68. EUSPIZA AMERICANA (Gm.); Scl. P. Z. S. 1856, p. 142.

David (*Bridges*).

69. OCYALUS WAGLERI, G. R. Gray.

Santa Fé.

70. CACICUS MICRORHYNCHUS, Scl. & Salv. P. Z. S. 1864, p. 353; Lawr. Ann. N. Y. Lyc. viii. p. 180.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

The most northern locality for this bird yet noticed is Greytown, Nicaragua, whence Mr. Holland has sent specimens to the Smithsonian Institution.

71. CASSICULUS PREVOSTI (Less.).

Santa Fé.

72. ICTERUS BALTIMORENSIS (L.); Scl. P. Z. S. 1856, p. 142; Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Bridges*; *Hicks*).

73. ICTERUS SPURIUS (L.); Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Hicks*).

74. ICTERUS GIRAUDI, Cassin.

Santa Fé.

75. STURNELLA LUDOVICIANA (L.); Scl. P. Z. S. 1856, p. 142.

Sturnella mexicana, Lawr. Ann. N. Y. Lyc. viii. p. 176.

David (*Bridges*; *Hicks*).

I doubt if there be more than one species of this form.

76. SCLERURUS MEXICANUS, Scl. P. Z. S. 1856, p. 290.

Santiago de Veragua and Cordillera de Tolé.

This species has not been noticed before as occurring so far south, though specimens of the second Central American bird of this genus (*S. guatemalensis*) have been sent from Panama. The two examples contained in these collections are neither of them in good condition; they appear to differ slightly from our Guatemalan specimens, the uropygium being somewhat darker and the bill shorter.

77. *SYNALLAXIS ALBESCENS*, Temm. Pl. Col. 227. f. 2; *Scl. Cat. Am. B.* p. 151.

Santa Fé.

A single example of a *Synallaxis* agrees closely with Sclater's specimen from Trinidad, which he ascribes to *S. albescens*, Temm. Four species of *Synallaxis* have been recorded as occurring in Central America, viz. *S. erythrothorax*, *Scl.*, of South Mexico and Guatemala; *S. pudica*, *Scl.*, Panama; *S. albescens*, Temm., Veragua; and *S. nigrifumosa*, Lawr. *Ann. N. Y. Lyc.* viii. p. 180, Greytown, Nicaragua. I have not seen specimens of this last mentioned. It seems to be very closely allied to *S. pudica*, perhaps the male of that species; a specimen with the sex so marked from Panama differs from the female in the greater intensity of the smoky-black tinge of the under plumage and in the brighter shade of chestnut, distinctions upon which Mr. Lawrence rests the claim of the species he describes to specific rank.

78. *XENOPS MEXICANUS*, *Scl.*

Santa Fé.

Also noticed on the Panama Railway.

79. *AUTOMOLUS CERVINIGULARIS*, *Scl.*

Santa Fé.

Mr. M^cLeannan, according to Mr. Lawrence, also procured this species on the Isthmus of Panama, where, however, another of this form (*A. pallidigularis*, Lawr.) occurs.

80. *PHILYDOR FUSCIPENNIS*, Salvin, *P. Z. S.* 1866, p. 72.

Santiago de Veragua.

This is the second species of this genus now known to occur in Central America, the other being *P. rufobrunneus*, Lawr. (*Ann. L. N. Y.* viii. p. 127), from Costa Rica.

81. *MARGARORNIS BRUNNESCENS*, *Scl.*

Cordillera de Tolé.

A single specimen sent by Arcé only differs from Sclater's type of *M. brunnescens* in having the rump slightly darker rufous, the difference not being sufficient to warrant specific separation. It is probably this bird that Mr. Lawrence refers to (*Ann. N. Y. Lyc.* viii. p. 130), where he suggests the possibility of a Costa Rica specimen being different from *brunnescens*, and proposes the name *brunnei-cauda* should his surmise prove correct.

82. *DENDROCOLAPTES SANCTI-THOMÆ*, Lafr.

Santiago de Veragua.

83. *DENDRORNIS ERYTHROPYGIA*, Scl.

Santiago de Veragua.

84. *DENDRORNIS LACRYMOSA*, Lawr.

Santiago de Veragua.

I have lately seen a specimen of this fine species in a collection formed by Mr. H. Wickham, near Blewfields, Mosquito coast.

85. *CYMBILANIUS LINEATUS* (Vieill.).

Santa Fé and Santiago de Veragua.

86. *THAMNOPHILUS TRANSANDEANUS*, Scl. (?)*Thamnophilus melanurus*?, Scl. P. Z. S. 1856, p. 142.David (*Bridges*).

Probably the same as the Panama bird, which I consider to belong to this race*.

87. *THAMNOPHILUS NÆVIUS* (Gm.).

Santiago de Veragua.

Both these species have been noticed on the Panama Railway, but not further to the northward.

88. *THAMNOPHILUS DOLIATUS*, L. ?; Scl. P. Z. S. 1856, p. 141.David (*Bridges*).89. *THAMNOPHILUS BRIDGESI*, Scl. P. Z. S. 1856, p. 141.David (*Bridges*).90. *DYSITHAMNUS PUNCTICEPS*, Salv. P. Z. S. 1866, p. 72.

Santiago de Veragua.

91. *DYSITHAMNUS SEMICINEREUS*, Scl.

Santa Fé.

Though not yet detected on the Isthmus of Panama, this species doubtless enjoys an uninterrupted range from New Granada to South Mexico; specimens in our collection from several points agree accurately with one another.

92. *MYRMOTHERULA MENETRIESI*, D'Orb.; Scl. Cat. Am. B. p. 180.

Santiago de Veragua.

A single male specimen from the above locality agrees best with Slater's specimen from Ecuador, which he refers to the above species.

* Cf. Scl. & Salv. P. Z. S. 1864, p. 355.

93. MYRMOTHERULA, sp.?

Santa Fé.

Arcé has sent a single specimen of a female of a species of *Myrmotherula*, which I have never been able satisfactorily to determine. It agrees with specimens I obtained in Vera Paz.

94. RAMPHOCÆNUS RUFIVENTRIS, Bp.

Santa Fé.

95. RAMPHOCÆNUS SEMITORQUATUS, Lawr.

Santiago de Veragua.

This species is very closely allied to *R. cinereiventris*, Sclater, if really distinct. The most obvious and, indeed, the only point of difference seems to consist in the much less extent of the postocular spot.

96. MYRMECIZA LEMOSTICTA, Salvin, P. Z. S. 1864, p. 582.

Santa Fé.

A single specimen from this locality agrees accurately with our type from Tucuriqui, Costa Rica.

97. CERCOMACRA TYRANNINA, Scl.

Santa Fé.

98. PITHYS BICOLOR, Lawr.

Santa Fé.

99. PHLOGOPSIS MACLEANNANI, Lawr. ; Scl. & Salv. Ex. Orn. t. 9.

Santiago de Veragua.

100. FORMICARIUS RUFIPECTUS, Salvin, P. Z. S. 1866, p. 73, pl. VIII.

Santiago de Veragua.

In the plate above referred to, the artist has represented this bird on a stone surrounded with water. This is manifestly erroneous, as all members of this genus, and, indeed, of the whole family, frequent the thin undergrowth of the virgin forest. *Formicarius* flies little, but follows the ant-paths, walking and running on the ground amongst the decayed leaves, occasionally mounting a prostrate tree. *F. moniliger*, Scl., has a sharp clear cry.

101. FORMICARIUS ANALIS, D'Orb. & Lafr. ; Salv. P. Z. S. 1866, p. 74.

Santiago de Veragua.

A single immature bird from this locality would, no doubt, in the adult state agree with our Costa Rica specimen mentioned in the above reference. This, as I there observed, differs somewhat from southern specimens ; but my materials are still insufficient to determine whether the differences are constant or not. *F. hoffmanni*, Cab., doubtless also occurs in this portion of Veragua, as it is found both at Panama and in Costa Rica. We thus have three very distinct

species inhabiting this country. *F. analis* is also given by Mr. Lawrence, in his list of Mr. M'Leannan's collections, as being found at Panama.

102. *GRALLARIA GUATEMALENSIS*, Prev.

Santa Fé.

A single specimen in not quite adult plumage agrees closely with Guatemalan examples; it is, however, rather darker in general colour, the grey of the head, the olivaceous back, the rufous brown of the wings, and the tawny of the under surface being all of a deeper hue. In our specimens of this species some variation is noticeable in intensity of coloration, especially of the under plumage; so that this Veraguan specimen may only show the extreme limit of this difference.

103. *GRALLARIA PERSPICILLATA*, Lawr.

Santa Fé and Santiago de Veragua.

104. *PITTASOMA MICHLERI*, Cassin.

Santa Fé.

The presence of these two birds in these collections deprive the Isthmus of Panama of two more of its hitherto-considered-peculiar species, showing their more northern range.

105. *GRALLARICULA COSTARICENSIS*, Lawr. Ann. N. Y. Lyc. viii.

Cordillera de Tolé.

A single specimen obtained by Arcé agrees well with Mr. Lawrence's description.

106. *ATTILA SCLATERI*, Lawr.; Scl. & Salv. P. Z. S. 1864, p. 358.

Santa Fé.

This race is also found in Costa Rica, Arcé having sent a specimen from Tucurriqui. It is more constant in coloration than the more northern form, *A. citreopygius*, Bp. (Scl. Cat. p. 195), which frequently exhibits considerable variation of plumage, both in the striation of the head and in the ochraceous tinge of the under surface. *A. sclateri* is distinguishable from *A. citreopygius* by its greener head, hindneck, throat, and chest, and by the paler lemon-coloured uropygium.

107. *COPURUS LEUCONOTUS*, Lafr.; Scl. & Salv. P. Z. S. 1864, p. 358.

Santa Fé.

This species also ranges northward into Costa Rica, and to Blew-fields in the Mosquito territory.

108. *PLATYRHYNCHUS SUPERCILIARIS*, Lawr. Ibis, 1863, p. 184.

Santa Fé.

Several specimens of both sexes.

109. *TODIROSTRUM CINEREUM* (L.); *Scl. P. Z. S.* 1856, p. 141.
Santa Fé; David (*Bridges*).

110. *COLOPTERUS PILARIS*, Cab.; *Scl. Cat. Am. B.* p. 210.

Santa Fé.

The curious formation of the first four primaries, which constitutes the character of this genus, is carried to greater excess in this than in the other species referable to the same genus.

111. *SERPAPHAGA CINEREA* (Strickl.); *Scl. Cat. Am. B.* p. 211.

Santa Fé.

No member of this genus has hitherto been noticed north of the Isthmus of Panama. The single specimen sent differs in no way from examples from New Granada and Ecuador, over which countries *S. cinerea* ranges.

112. *MIONECTES OLEAGINEUS*, Licht.; *Scl. Cat. Am. B.* p. 213;
Scl. & Salv. P. Z. S. 1864, p. 358.

Santa Fé.

113. *TYRANNISCUS PARVUS*, Lawr.; *Scl. & Salv. P. Z. S.* 1864,
p. 359.

Santa Fé.

Arcé has also sent specimens of this species from Turialba in Costa Rica.

114. *TYRANNULUS ELATUS* (Spix); *Sclater, Cat. Am. B.* p. 215;
P. Z. S. 1856, p. 141.

David (*Bridges*).

115. *ELAINEA SUBPAGANA*, *Scl. & Salv.*; *Lawr. Ann. N. Y. Lyc.*
viii. p. 177.

Santa Fé; David (*Hicks*).

The type specimens of this species were shot at Dueñas, in the highlands of Guatemala. The bird is, however, much more abundant further to the southward, hardly any collection coming from those districts without containing examples.

116. *ELAINEA CHIRIQUENSIS*, *Lawr. Ann. N. Y. Lyc.* viii. p. 176.

Santa Fé; David (*Hicks*).

A single specimen from this locality corresponds fairly with Mr. Lawrence's description. Its general appearance is that of *E. subpagana*; it is, however, smaller and more obscurely coloured, as the original description shows; the feet, too, are weaker, and the concealed white patch of the crown not so large.

117. *ELAINEA SEMIFLAVA*, *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

David (*Hicks*).

118. *LEGATUS ALBICOLLIS* (Vieill.); Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Hicks*).

119. *MYIOZETES COLUMBIANUS*, Cab. & Hein.; Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Hicks*).

120. *MYIODYNASTES NOBILIS*, ScL.; Lawr. Ann. N. Y. Lyc. viii. p. 177.

Santa Fé; David (*Hicks*).

121. *RHYNCHOCYCLUS BREVIROSTRIS*, Cab.

Santa Fé.

Agrees with Guatemalan examples.

122. *RHYNCHOCYCLUS FLAVO-OLIVACEUS*, Lawr.; ScL. & Salv. P. Z. S. 1864, p. 359.

Santa Fé.

Agrees with Panama specimens.

123. *MUSCIVORA MEXICANA*, ScL. Cat. Am. B. p. 225; ScL. & Salv. P. Z. S. 1864, p. 360.

Santa Fé.

This species ranges over the whole of Central America, from Southern Mexico to the Isthmus of Panama.

124. *MYIOBIUS SULPHUREIPYGIUS*, ScL. Cat. Am. B. p. 226.

Santa Fé.

125. *MYIOBIUS ERYTHRURUS*, Cab.; ScL. Cat. Am. B. p. 226; Lawr. Ann. N. Y. Lyc. vii. p. 472.

Santa Fé.

Before noticed from the Isthmus of Panama.

126. *MYIOBIUS NÆVIUS* (Bodd.); ScL. Cat. Am. B. p. 227.

Santa Fé.

A well-known South American species of wide range. It has not hitherto been noticed in so northern a locality.

127. *MYIARCHUS NIGRICAPILLUS*, Cab. J. f. O. 1861, p. 249.

Santa Fé.

Two specimens rather smaller than a Costa Rican example, but otherwise agreeing. *M. nigriceps*, ScL., of Panama has a narrower rufous border to the rectrices and primaries, and has the dark crown less extensive, which in *M. nigricapillus* includes the nape.

128. *TYRANNUS MELANCHOLICUS*, Vieill.; ScL. P. Z. S. 1856, p. 141.

David (*Bridges*).

129. *MILVULUS TYRANNUS* (L.); Sclater, P. Z. S. 1856, p. 141; Lawr. Ann. N. Y. Lyc. viii. p. 177.

Santa Fé: Santiago de Veragua; David (*Bridges; Hicks*).

130. *TITYRA PERSONATA*, Jard. & Selb.

Psaris mexicana, Less.

Tityra mexicana, Scl. P. Z. S. 1856, p. 141.

David (*Bridges*).

131. *PACHYRHAMPHUS CINEREIVENTRIS*, Scl. Cat. Am. B. p. 242, note; Scl. & Salv. P. Z. S. 1864, p. 361.

Santa Fé.

Agrees with Panama specimens.

132. *LIPAUGUS UNIRUFUS*, Scl.; Scl. & Salv. Ex. Orn. pl. 1, p. 1.

Santiago de Veragua.

133. *LIPAUGUS HOLERYTHRUS*, Sclater.

Santa Fé.

134. *LIPAUGUS RUFESCENS*, Scl.; Scl. & Salv. Ex. Orn. pl. 2, p. 5.

Santa Fé.

135. *PIPRA LEUCOCILLA*, L.

Pipra coracina, Scl. P. Z. S. 1856, p. 29, & Cat. Am. B. p. 249? Cordillera de Tolé.

Specimens of this bird agree with Cayenne skins. The grounds for separating the New Granadan from the Cayenne form appear to be very slight. I think they should be reunited.

136. *PIPRA CYANEOCAPILLA*, Hahn; Scl. Cat. Am. B. p. 249; Scl. & Salv. P. Z. S. 1864, p. 362.

Santiago de Veragua.

137. *PIPRA LEUCORRHOA*, Scl. P. Z. S. 1863, p. 63, pl. x.

Santa Fé.

Arcé has also sent specimens of this species from Tucurriqui, in Costa Rica; these all agree with Sclater's types, which came from New Granada (Bogota make).

The species belongs to Cabanis's section *Coropipo*, which includes this bird and its near ally *P. gutturalis* of Cayenne. The collection from Santa Fé also contains females and young males, the former I here describe:—

PIPRA LEUCORRHOA, ♀. *Supra olivaceo-virescens unicolor: subtus gula cinerascens, abdomine dorso concolore, medialiter paulo pallidiore.*

138. *CHIROXIPHIA LANCEOLATA*, Wagl.; *Sci. & Salv. P. Z. S.* 1864, p. 362.

Chiroxiphia melanocephala, *Sci. P. Z. S.* 1856, p. 141.

Santa Fé; David (*Bridges*).

The purely Central American species (*C. linearis*, Bp.) terminates its southern range between the Gulf of Nicoya and Chiriqui.

139. *CHASMORHYNCHUS TRICARUNCULATUS*, J. & E. Verreaux, *R. Z.* 1853, p. 193; *Salvin, Ibis*, 1865, p. 90, pl. 3.

Santiago de Veragua; Cordillera de Tolé.

Adult male specimens having been sent by Arcé, the question broached by Cabanis as to the possibility of the Costa Rican and Veraguan birds being distinct is quite set at rest. These specimens in no way differ from those previously sent by Arcé from Tucurriqui.

140. *CEPHALOPTERUS GLABRICOLLIS*, Gould, *P. Z. S.* 1850, p. 92, pl. xx.; *Cab. J. f. O.* 1861, p. 254; *Sclater, P. Z. S.* 1859, p. 142.

Cordillera de Tolé; Cordillera of Chiriqui (*Warszewicz*).

This strange bird appears to be abundant in this locality, and also near Turrialba in Costa Rica. Its probable range hardly extends beyond these points, though it may occur along the northern frontier of Costa Rica, the river San Juan, and the southern shore of the lake of Nicaragua. Judging from the apparently sharp definition of its southern range, I should suppose it a bird that frequents the mountainous region and keeps to forests lying at an elevation of from 2000 to 3000 feet above the sea-level. Arcé has sent home specimens of both sexes. The female has the crest smaller, as is the case in *C. ornatus*, the naked throat-lappet much smaller, and a narrow band of small feathers running down the centre of the bare throat. The head of the young bird very much resembles that of the adult of *Pyroderus*, to which genus *Cephalopterus* is closely allied.

141. *MOMOTUS LESSONI*, Less.; *Sclater, P. Z. S.* 1856, p. 139; *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

Momotus psalurus, Bp.; *Cab. J. f. O.* 1861, p. 255.

Cordillera de Tolé; David (*Bridges*; *Hicks*).

An immature specimen, having a black margin to the back of the blue circlet of the head and without the chestnut nape, must indubitably be referred to the Central American *Momotus lessoni*. The specimens examined by us, and mentioned in Mr. Slater's and my paper "on the Birds of Panama" (*P. Z. S.* 1864, p. 362) as *M. lessoni*, properly belong to *M. subrufescens*, *Sci.*, as additional specimens have shown. This last-named race has no black border to the back of the circlet of the head, the nape being slightly chestnut as in *M. brasiliensis*. The colouring, too, of the under plumage is of a clearer rufous than is usually the case in *M. lessoni*, in which race, however, considerable variation is shown in this respect. It is probable that the southern range of the true *M. lessoni* terminates in

the district I am now investigating, and that its place is taken at once as we proceed towards the southern continent by *M. subrufescens*.

142. *MOMOTUS MARTII*, Spix.

Santa Fé and Santiago de Veragua.

143. *PRIONIRHYNCHUS PLATYRHYNCHUS*, Leadb. ; Scl. & Salv. P. Z. S. 1864, p. 362.

Santa Fé.

This species appears to be quite common on the Isthmus of Panama, and thence spreads northward through Veragua.

144. *PHAROMACRUS MOCINNO*, La Llave.

Forest of Boqueti (*Bridges*).

Specimens of the Quezal have also been obtained in Costa Rica (see Cabanis, J. f. Orn. 1862, p. 175).

145. *TROGON AURANTIIVENTRIS*, Gould, P. Z. S. 1856, p. 107.

Santa Fé; Cordillera de Tolé; David (*Bridges*).

146. *TROGON CALIGATUS*, Gould; Sclater & Salv. P. Z. S. 1864, p. 364.

Santa Fé.

147. *TROGON ATRICOLLIS*, Vieill. ; Scl. & Salv. P. Z. S. 1864, p. 364.

Trogon tenellus, Cab. J. f. O. 1862, p. 173.

Santa Fé, Santiago de Veragua, and Cordillera de Tolé.

Brazilian specimens of this species usually have the central rectrices rather more bronzy green. This is the only difference I can detect which at all justifies Cabanis's separation of the Central American race. The difference is very slight, and not constant.

148. *TROGON CLATHRATUS*, Salvin, P. Z. S. 1866, p. 74.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

Since I described this fine species Arcé has sent a specimen of the female, of which I now give the following description:—

♀. *Saturate cinereus, alis et cauda nigris; rectricibus tribus externis albo anguste transfasciatis: abdomine rufescente tincto, ventre imo et crasso coccineis: rostro superiore fusco-nigro, basi et mandibula inferiore flavis.*

149. *TROGON MASSENA*, Gould.

Santiago de Veragua; Cordillera de Tolé.

150. *GALBULA MELANOGENIA*, Scl. P. Z. S. 1856, p. 139.

David (*Bridges*).

151. *CERYLE AMAZONA*, Lath.

Santiago de Veragua.

152. *CERYLE CABANISI*, Tsch.*Ceryle americana*, Sci. P. Z. S. 1856, p. 139.David (*Bridges*).153. *EUTOXERES AQUILA*, Bourc. ; Gould, Mon. Troch. i. pl. 3 ; Lawr. Ann. N. Y. Lyc. vi. p. 139.District of Belen, Veragua (*Merritt*).

In one of Arcé's previous collections from Costa Rica (Tucurriqui) three specimens of this strange form were sent, showing that its Central American range probably extends over the whole of the eastern side of Costa Rica and Veragua. Apparently absent from the Isthmus of Panama, it again, like several other Humming-birds, reappears in New Granada and Ecuador.

154. *PHAËTHORNIS EMILIAE*, Bourc. ; Gould, Intr. Troch. p. 44.

Santa Fé.

Arcé has sent quite a number of specimens, both from Costa Rica and Veragua, of a *Phaëthornis* which Mr. Gould and I have compared closely with New Granadan specimens of *P. emiliae* without detecting any differences. It is somewhat singular that none of these collections contain specimens of *P. longirostris*, a bird which is very common both to the north and south of Costa Rica and Veragua. Should this species be absent altogether from these countries, we have a curious instance of geographical distribution, each of the two species, *P. emiliae* and *P. longirostris*, having an outlying district detached from what may be considered the metropolis of its range. Mr. Lawrence having recently forwarded to Mr. Gould for inspection the types of the species of *Phaëthornis* he lately described (Ann. N. Y. Lyc. June, 1866) as *P. cassinii*, I am enabled to state that they do not differ, according to Mr. Gould, from *P. longirostris* (*P. cephalus*, Bourc. et Muls.).

155. *PHAËTHORNIS ADOLPHI*, Bourc. ; Gould, Mon. Troch. i. pl. 35.

Santiago de Veragua.

156. *CHALYBURA ISAURÆ*, Gould, P. Z. S. 1861, p. 199, & Intr. Troch. p. 72.

Santa Fé ; Santiago de Veragua.

Arcé has sent both sexes of this species ; the female, which has not been hitherto noticed, I now describe :—

♀. *Supra viridescens pileo obscuriore : uropygion et cauda aeneo nitentibus : alis fuscis : subtus sordide cinerea, crisso albo ; rectricibus duabus utrinque externis albedo terminatis : rostro superiore fusco, inferiore flavido, apice fusco : pedibus flavis.*

The only other species nearly allied to this is *C. melanorrhoa*,

Salv. P. Z. S. 1864, p. 585 (*C. carmioli*, Lawr. Pr. Ac. Phil. 1865, p. 39), which has the crissum black.

157. *PHÆOCHROA CUVIERI*, Delatt. et Bourc.; Sci. P. Z. S. 1856, p. 140.

David (*Bridges*).

158. *OREOPYRA CALOLÆMA*, Salv. P. Z. S. 1864, p. 584.

Cordillera de Tolé.

Several specimens agreeing with the types from Costa Rica. One of these has a few chestnut feathers on either side of the chin, strengthening the view that this is the adult male of *O. castaneiventris*; their presence does not, however, settle the point, as chestnut feathers are not unfrequently seen in this region in immature birds of other species, without reference to the coloration of the mature female.

159. *OREOPYRA CASTANEIVENTRIS* (Gould).

Trochilus castaneiventris, Gould, P. Z. S. 1850, p. 163.

Adelomyia? castaneiventris, Gould, Mon. Troch. iii. pl. 203.

Oreopyra castaneiventris, Salv. P. Z. S. 1864, p. 585.

Panterpe insignis, ♀, Lawr. Ann. N. Y. Lyc. viii. p. 46.

Cordillera de Tolé; Volcano of Chiriqui (*Warszewicz*).

Arcé has sent two specimens, both marked female; neither of these have so brilliant a crown as the supposed male in Mr. Gould's collection.

160. *OREOPYRA LEUCASPIS*, Gould, P. Z. S. 1860, p. 312; Mon. Troch. iv. pl. 264.

Volcano of Chiriqui (*Warszewicz*).

I have seen no additional specimens of this fine species.

161. *LAMPORNIS VERAGUENSIS*, Gould; Sclater, P. Z. S. 1856, p. 140; Lawr. Ann. N. Y. Lyc. viii. p. 177.

David (*Bridges; Hicks*).

162. *THALURANIA VENUSTA*, Gould, Mon. Troch. ii. pl. 105.

Santa Fé; Santiago de Veragua; Volcano of Chiriqui (*Warszewicz*).

It is hardly possible to distinguish comparatively young birds of this race from the closely allied New Granadan form *T. columbica*. The last named, however, never appears to assume in old individuals nearly the same extent of blue on the back as is seen in *T. venusta*.

163. *DORIFERA LUDOVICIÆ*, Bourc. et Muls.; Gould, Mon. Troch. ii. pl. 88(?).

Cordillera de Tolé.

There seems to be considerable individual variation between members of this species; or I should be inclined to separate, as a distinct race, the bird found in Veragua, a single specimen only of which

has as yet reached me. The shining forehead is considerably darker and of a bluer shade, the bill longer, and the under plumage blacker than in a New Granadan specimen of *D. ludovicæ* before me; the wings, too, are shorter. Should the receipt of additional specimens confirm the constancy of these distinctions, I propose for this race the name of *Dorifera veraguensis*.

164. *HELIODOXA JACULA*, Gould, Mon. Troch. ii. pl. 94.

Heliodoxa henryi, Lawr. Ann. N. Y. Lyc. viii. p. 402.

Santiago de Veragua and Cordillera de Tolé.

A series of specimens of both sexes from Veragua and also from Costa Rica have been sent by Arcé. These I have compared with Mr. Gould's specimens of *H. jacula*; and we both consider them identical with that species. Since then Mr. Lawrence has sent the types of his *Heliodoxa henryi* to Mr. Gould for examination. They prove to be immature birds identical with our specimens; hence this name must be considered synonymous with *H. jacula*. This is by no means an isolated case of New Granadan and Costa Rican specimens being specifically identical, though their range appears to be interrupted at the Isthmus of Panama.

165. *MICROCHERA ALBOCORONATA* (Lawr.); Gould, Mon. Troch. ii. pl. 116.

In a previous collection Arcé sent two specimens of a bird of this genus and closely allied to this species from Tucurriqui, in Costa Rica. Not having good specimens of the true *M. albocoronata* with which to compare them, I left them till I could make a more satisfactory examination. Since then Mr. Lawrence has described a female bird from Angostura, in Costa Rica, under the name of *Panychlora parvirostris*, and afterwards sent the type to Mr. Gould for inspection. Mr. Gould pronounced this bird to be the female of a *Microchera*. Having now a good series of the true *M. albocoronata* I am able to point out the following differences between it and the Costa Rican bird:—The latter has the rich vinous purple of the back decidedly brighter, the white crown seems to extend further over the back of the head, and the black band of the apical third of the outer rectrices is wider and the inner margin not so sharply defined. The under plumage of *M. albocoronata* is decidedly darker, being almost black instead of the same shade as the back. These differences are sufficient to separate the Costa Rican from the Veraguan bird; and for the former the name *Microchera parvirostris* must be taken, though the specific one does not convey the character intended. The range of the two forms corresponds with that of the two *Chalybura* above mentioned.

166. *GOULDIA CONVERSI*, Gould, Mon. Troch. iii. pl. 129.

Santa Fé.

This species has already been noticed by Mr. Lawrence in Mr. Leannan's Panama collections. I have also specimens obtained by Arcé at Tucurriqui.

167. *SELASPHORUS SCINTILLA*, Gould, P. Z. S. 1850, p. 162; Mon. Troch. iii. pl. 138.

Volcano of Chiriqui (*Warszewicz*).

168. *CLAIS GUIMETI*, Bourc. et Muls.; Gould, Mon. Troch. iv. pl. 210.

Santa Fé; Santiago de Veragua.

This species has, I believe, not hitherto been noticed so far north. Arcé also obtained numerous specimens near Chepo, a village situated to the south of the Panama Railway.

169. *FLORISUGA MELLIVORA* (L.).

Santiago de Veragua and Cordillera de Tolé.

170. *HELIOTHRIX BARROTI*, Bourc.

Heliothrix purpureiceps, Gould, Mon. Troch. iv. pl. 216.

Santa Fé.

These specimens agree with others from Panama and Guatemala, which Mr. Gould considers to be of this species.

171. *HELIOMASTER LONGIROSTRIS* (Vieill.); ScL. P. Z. S. 1856, p. 140.

Heliomaster stuartæ, Lawr. Ann. N. Y. Lyc. vii. p. 107, & ibid. p. 291; Gould, Intr. Troch. p. 138; ScLATER & Salv. P. Z. S. 1864, p. 365.

H. sclateri, Cab. & Hein. Mus. Hein. iii. p. 54.

Santa Fé; Cordillera de Tolé.

Veraguan specimens agree with others from New Granada (Bogota make) and from Panama, all doubtless belonging to the race distinguished by Mr. Lawrence as *H. stuartæ*. Mr. Gould, since he wrote his 'Introduction to the Trochilidæ,' has received from Mr. Lawrence a type of that species, and after close examination considers that the New Granadan bird does not differ from the well-known bird of Trinidad; nor can he sustain the distinctions which the Venezuelan bird, *H. sclateri*, Cab. & Hein., is said to possess. In this view I agree, after having compared about forty specimens (Mr. Gould's and our own) from various localities. The Mexican and Guatemalan bird (*H. pallidiceps*, Gould) appears always to have the shining crown of a paler green tint, and is in this respect distinguishable in a slight degree from the more southern bird. Specimens from Costa Rica are referable to *H. longirostris*.

172. *ERYTHRONOTA NIVEIVENTRIS*, Gould, P. Z. S. 1850, p. 164; Mon. Troch. v. pl. 319; ScL. P. Z. S. 1856, p. 140.

Santiago de Veragua; David (*Bridges*); Chiriqui (*Warszewicz*).

This is a scarce species; I have seen a large number of its close ally *E. edvardi*, but have not been able to detect more than two or three specimens of this. The only difference between the two consists in the deeper colouring of the tail of this bird. This character, however, appears quite constant.

173. *AMAZILIA RIEFFERI* (Bourc.); *Scl. P. Z. S.* 1856, p. 140.
David (*Bridges*).

174. *THAUMANTIAS CHIONURUS*, Gould, *P. Z. S.* 1850, p. 162;
Mon. Troch. v. pl. 300.

Eupherusa niveicauda, *Lawr. Ann. N. Y. Lyc.* viii. p. 134.

David; Chiriqui (*Warszewicz*).

The type of the species described by Mr. Lawrence as above was sent to Mr. Gould, who pronounces it to be identical with *T. chionurus*. *Eupherusa cupreiceps*, *Lawr. (Ann. Lyc. N. Y. June 1866)*, on the other hand, is quite distinct, as Mr. Lawrence has shown. Arcé has sent a female of this second species from Tucuriqui.

175. *SAPPHIRONIA CÆRULEIGULARIS*, Gould, *Mon. Troch.* v. pl. 346; *Scl. P. Z. S.* 1856, p. 140.

Santa Fé; David (*Bridges*); Chiriqui (*Warszewicz*).

176. *CHLOROLAMPIS ASSIMILIS*, *Lawr.*

Saucerottia atala, *Scl. P. Z. S.* 1856, p. 140?

Santa Fé; Santiago de Veragua.

The specimens sent agree with others from Panama, which we* have referred to this species.

177. *PIAYA MEHLERI*, *Bp.*

Piaya nigricrissa, *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

David (*Bridges*).

I am unable to distinguish any tangible differences between Panama and Guatemalan examples of this *Piaya*. I believe there is but one species ranging uninterruptedly from Ecuador and New Granada to South Mexico. *P. mexicana* is readily distinguishable by the coloration of its tail.

178. *DIPLOPTERUS NÆVIUS* (L.); *Lawr. Ann. N. Y. Lyc.* viii. p. 177.

David (*Bridges*).

179. *NEOMORPHUS SALVINI*, *Sclater, P. Z. S.* 1866, p. 60, pl. v.
Santiago de Veragua; Cordillera de Tolé.

180. *RAMPHASTOS CARINATUS*, L.

Ramphastus brevicarinatus, Gould, *Mon. Touc.* ed. 2. t. 3.

Ramphastus approximans, *Cab. Journ. f. Orn.* 1862, p. 333.

Santa Fé.

Veraguan examples agree with others from Panama in having a somewhat wider red band below the yellow throat and breast than is usual in Guatemalan specimens. They belong to the race separated by Gould as *R. brevicarinatus* and by Cabanis as *R. approximans*; but this race is so very closely allied to the more northern bird that I am unwilling to separate them.

* *Scl. & Salv. P. Z. S.* 1864, p. 365.

181. *PTEROGLOSSUS ERYTHROPYGUS*, Gould; Lawr. Ann. N. Y. Lyc. viii. p. 178.

David (*Hicks*).

Mr. Lawrence identifies Mr. Hicks's specimens as belonging to this species, which I have never met with, and am strongly inclined to believe to be nothing more than the well-known and wide-ranging species *P. torquatus*.

182. *SELENDERA SPECTABILIS*, Cassin.

Santa Fé; Santiago de Veragua; Cordillera de Tolé.

This fine species appears to be more common in this district of Veragua than on the Panama Railway, where, I believe, Mr. McLennan only obtained a single specimen.

183. *AULACORHAMPHUS CÆRULEOGULARIS*, Gould, P. Z. S. 1853, p. 193; Mon. Ramphastidæ, ed. 2, pl. 51.

Santa Fé; Veragua (*Séemann*).

This species is also found in Costa Rica, whence Arcé has sent specimens. It is also included by Cabanis (Journ. f. Orn. 1862, p. 329) in his list of Hoffmann's collections.

184. *CAPITO MACULICORONATUS*, Lawr.

Santiago de Veragua.

185. *CAMPEPHILUS GUATEMALENSIS*, Hartl.

Santiago de Veragua.

186. *CAMPEPHILUS HÆMATOGASTER*, Tsch. F. P. Av. p. 43, pl. 25.

Megapicus hæmatogaster, Malh. Mon. Pic. i. p. 27, t. 9. f. 1-3; ScL. Cat. p. 332.

Santiago de Veragua.

Two examples agreeing with New Granadan (Bogota) specimens.

187. *CAMPEPHILUS MALHERBII*, Gray & Mitch. Gen. of B. pl. 108; ScL. Cat. p. 331.

Santa Fé; Cordillera de Tolé.

188. *CENTURUS TRICOLOR*, Wagl.

Centurus subelegans, ScL. P. Z. S. 1856, p. 143.

Santa Fé; Cordillera de Tolé.

189. *CHLORONERPES CECILIÆ*, Malh.; Selater, P. Z. S. 1856, p. 143 (?).

David (*Bridges*).

190. *CHLORONERPES CABOTI* (Malh.); ScL. Cat. p. 337.

Cordillera de Tolé.

A single male specimen agrees with our specimens from Guatemala, the bill being, however, somewhat larger.

191. *PIONUS MENSTRUUS* (L.).
Santa Fé; Santiago de Veragua.
192. *CAÏCA HÆMATOTIS*, Scl. & Salv.
Santa Fé.
193. *SPIZAËTUS ORNATUS*, Daud.
Cordillera de Tolé.
194. *BUTEO GHIESBREGHTII*, DuBus.
Cordillera de Tolé.
195. *CRAXIREX UNICINCTUS* (Temm.).
Santa Fé.
196. *ASTURINA MAGNIROSTRIS* (Gm.); Lawr. Ann. N. Y. Lyc.
viii. p. 178.
David (*Hicks*).
197. *FALCO ANATUM*, Bp.
Santiago de Veragua.
198. *HYPOTRIORCHIS RUFIGULARIS* (Daud.).
Santa Fé.
199. *TINNUNCULUS SPARVERIUS* (L.).
Santa Fé.
200. *ACCIPITER TINUS*, Lath.
“*Accipiter collaris*, Scl.,” Lawr. Ann. N. Y. Lyc. vii. p. 462.
Santiago de Veragua.
An immature female in change of plumage belongs, I have little doubt, to this species. The immature stage is quite rufous, as in *A. collaris*, Scl.; and I think it very possible that Mr. Lawrence ought to have referred the specimen from McLeannan’s collections, alluded to *l. c.*, to this species, and not to *A. collaris*.
201. *ICTINIA PLUMBEA* (Vieill.).
Santa Fé.
202. *ELANOÏDES FURCATUS* (Vieill.).
Cordillera de Tolé.
203. *LOPHOSTRIX STRICKLANDI*, Scl. & Salv.
Santa Fé.
204. *GLAUCIDIUM*, sp.?
Santa Fé.

205. *LEPTOPTILA VERREAUXI*, Bp.

Santa Fé.

206. *LEPTOPTILA*, sp. ?

Cordillera de Tolé.

The species of this genus require a thorough revision.

207. *COLUMBA RUFINA*, Temm.

Cordillera de Tolé.

208. *CHAMÆPHELIA RUFIPENNIS*, Bp. ; Lawr. Ann. N. Y. Lyc. 1865, p. 179.David (*Hicks*).209. *GEOTRYGON CHIRIQUENSIS*, Scl. P. Z. S. 1856, p. 143.David (*Bridges*).210. *GEOTRYGON VERAGUENSIS*, Lawr. Ann. N. Y. Lyc. June, 1866.Veragua (*Merritt*).

Arcé has sent a specimen of a young Pigeon from Santa Fé, which is just sufficiently feathered to show a dark purple gloss on the back. I have little doubt it belongs to the fine species which Mr. Lawrence has lately described.

211. *TINAMUS ROBUSTUS*, Scl.

Santiago de Veragua.

212. *CHAMÆPETES UNICOLOR*, sp. n.

C. niger, viridescens nitens : abdomine et ventre imo paulo dilutioribus, vix nitentibus : plumis pectoris cinereo obscure marginatis : rostro nigerrimo, pedibus rubris : long. tota 24, alæ 11, caudæ 11, tarsi 2·8, rostri a rictu 1·6.

Obs. Affinis *C. goudoti*, Less., sed statura paulo majore, corpore unicolore, et coloribus saturatioribus primo visu dignoscendus.

The genus *Chamæpetes* was founded by Wagler (Isis, 1832, p. 1227) upon *Ortalida goudoti* (Less. Man. d'Orn. ii. p. 217), the characters given being as follows:—"Character *Ortalidæ*, gula et mentum toto-plumosa." *Ortalida* is characterized as having the inner web of the primaries entire, &c. Through Mr. G. R. Gray's kindness I have had an opportunity of examining a specimen of *C. goudoti* in the British Museum, and I find that it has strongly arched primaries, with deeply excised inner webs, such as so clearly characterize some sections of the *Cracidæ*. In addition to this, M. Goudot, as quoted by Lesson, distinctly states that the trachea is without the curious fold found in *Ortalida*. These points, as well

as the character of the coloration, show that it is not with *Ortalia* that *Chamæpetes* must be compared.

Its closest relationship is certainly with *Aburria*, Reich., of which *Penelope aburri*, Less., is the type, and with *P. pipile*, a species forming another section of the same group. All these differ from true *Penelope* in possessing three outer primaries strongly arched, the points of which, for at least $1\frac{1}{2}$ inch of their length, are abruptly reduced to a width of not more than $\frac{1}{8}$ inch. *Aburria* (*P. aburri*, Less.) is distinguished by an appendage to its throat. *Chamæpetes* has the throat quite feathered, while the circlet of the eye and the lores are destitute of feathers. *P. pipile*, having a bare throat and different style of coloration, seems equally entitled to subgeneric distinction.

Penelope rufiventris (Tsch. Faun. Per. p. 291, pl. 31) has been placed in the genus *Chamæpetes*, as a synonym of *C. goudoti*. The plate, if trustworthy, shows the style of coloration of the head to be very different. Tschudi also states that it differs from *C. goudoti* in having a fold in the trachea. The only two known species of this form are therefore:—

(1) CHAMÆPETES GOUDOTI.

Ortalia goudoti, Less. Man. d'Orn. ii. p. 217; Gray, Gen. of B. iii. p. 485.

Chamæpetes goudoti, Wagl. Isis, 1832, p. 1227.
Cauca Valley, New Granada (*Goudot*).

(2) CHAMÆPETES UNICOLOR.

Veragua (*Arcé*).

With reference to the curious formation of the primaries in these birds, I well remember being startled by a strange sound when shooting in one of the ravines in the Volcan de Agua in Guatemala. Not at first perceiving whence it arose, I walked on, when the noise was again repeated. I then set about discovering the cause, and soon found that it was produced by a male *Penelope nigra*, Fraser, which, when flying in a downward direction with outstretched wings, gave forth a kind of crashing, rushing noise, which I likened at the time to the falling of a tree. The outer primaries of *P. nigra*, though very strong, are not cut out like those of the present bird and its allies; and I have little doubt that the latter occasionally produce a strange sound with their wings. Indeed it seems probable that the name by which one of them (*P. aburri*, Less.) is distinguished by the natives of the Cauca Valley is derived from this peculiarity. The name *burri*, *aburri*, *aburrida*, which M. Goudot asserts well represents their cry, in fact expresses the sound produced by the wings. An analogous case at once suggests itself, that of the "drumming" of the Common Snipe (*Gallinago media*, Leach), to which I can add another. A well-known Humming-bird of Mexico and the highlands of Guatemala, *Selasphorus platycercus*, makes a shrill, almost whistling, noise with its wings, which are cut out in a somewhat similar way.

213. *ORTALIDA POLIOCEPHALA*, Wagl.; Sclater & Salv. P. Z. S. 1864, p. 371.

Santiago de Veragua; Cordillera de Tolé.
Agrees with Panama specimens.

214. *ODONTOPHORUS VERAGUENSIS*, Gould, P. Z. S. 1856, p. 107;
Scl. P. Z. S. 1856, p. 143.

Panama (*Seemann*); David (*Bridges*).

215. *ODONTOPHORUS MELANOTIS*, Salv. P. Z. S. 1864, p. 586.
Santiago de Veragua.

216. *ODONTOPHORUS LEUCOLÆMUS*, sp. n.

O. supra niger, dorso toto minutissime castaneo maculato: primariis fusco-nigris, secundariis in pogonio externo castaneo notatis: tectricibus alarum minoribus macula magna in pogonio interno nigra, interne castaneo circumscripta: subtus regione parotica et pectore toto nigris, hoc maculis celatis albis notato; gula alba: ventre superiore castaneo, ventre imo cum crisso nigris: rostro nigro, pedibus obscure corylinis: long. tota 8, alæ 5, caudæ 2, rostri a rictu 0·9, tarsi 1·6.

Cordillera de Tolé; Veragua.

Arcé has sent a single female specimen of this very distinct species, which has no near allies that I am acquainted with. Its white throat and black breast marked with hidden white spots at once render it easily distinguishable.

217. *ARAMIDES CAYENNENSIS* (Gm.); Scl. P. Z. S. 1856, p. 143.
David (*Bridges*).

218. *EURYPYGA MAJOR*, Hartl.
Santa Fé; Cordillera de Tolé.

219. *PARRA MELANOPYGIA*, Scl.
Santa Fé.

A young bird with the breast white, belonging probably to this species.

220. *HALIPLANA FULIGINOSA*, Gm.
Santiago de Veragua.

9. On some New or Rare Birds' Eggs.

By ALFRED NEWTON, M.A., F.L.S., F.Z.S.

(Plate XV.)

It will perhaps be remembered that at the Meeting of this Society on the 14th March, 1865 (P. Z. S. 1865, p. 256), I exhibited specimens of, and made remarks on, several new or rare birds' eggs,

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intending, as I had done on a former occasion, to contribute a paper respecting them to our 'Proceedings.' To my dismay, however, when about to give instructions to the artist who was to draw the plate illustrating the paper, it was found that one of the most interesting novelties (the egg of *Didunculus strigirostris*) was missing from the care of our excellent Secretary. Thus deprived of my chief ornament, I thought it better to defer the printing of the paper; and this I did the more willingly, because Mr. Sclater assured me that the absent specimen was only mislaid, and would certainly be found again in the course of time. The result has proved as he predicted; the lost sheep turned up a few weeks ago; and accordingly I now reproduce the remarks I made nearly two years ago, adding observations on some other specimens which have in the meantime come into my possession.

When in 1861 I first brought some oological specimens before the Society (P. Z. S. 1861, p. 393) I must confess to having taken rather too sanguine a view of the utility of oology as a help to classification. Further experience and the examination of very large series of specimens have almost induced in me a belief which perhaps might be best expressed by parodying the celebrated saying of a celebrated man, and would almost make me define oology as "a science in which size and colour go for nothing at all, and shape and grain for very little." However, notwithstanding Voltaire's epigram, no one doubts there is a science of etymology; and since his time philologists have begun to get a right notion of the value of vowels and consonants. I therefore hope oology may yet keep its rank, and that in time we may come to comprehend the very variable characters which birds' eggs present in their size, colour, shape, and grain.

SWALLOW-TAILED KITE.

Elanoides furcatus (Linnæus).

So much interest has long been attached to the breeding of this bird that, though I had no specimen of its egg to exhibit, I thought myself justified in 1865 in reading some notes with which my friend Mr. H. E. Dresser had furnished me. These, however, have since appeared in print (*Ibis*, 1865, p. 325-327), and I need say no more on the subject, except to remark that the four eggs which are stated to have been obtained for him have not yet reached England.

NUTCRACKER.

Nucifraga caryocatactes (Linnæus). (Pl. XV. fig. 2.)

Thanks to my friends HH. Pastor Theobald and J. C. H. Fischer of Copenhagen, I have at length the pleasure of exhibiting to the Society the nest and four eggs of the Nutcracker, taken in the same locality as the nest and fully-fledged young bird which I exhibited in June 1862 (P. Z. S. 1862, p. 206), and by the same persons. In 1863 my friends were again disappointed of getting the eggs of this bird, which proved to be a still earlier builder than they had

given it credit for; and on the 9th of April three young ones were found. In 1864 they determined to "be wise in time." They kept two young men on the watch all the winter, and as spring approached careful search was made. At length, on the 23rd of March, after eight days' labour, the nest was found, in the same part of the forest as that of the year before, being indeed only some fifty feet from the same spot. It was, therefore, in all probability built by the same pair of birds. It was on a fir tree, about fifty feet high, and built quite in the same manner as that of the former year. The seeker took the precaution first to climb up a near-extending tree, and then, seeing the Nutcracker on the nest, ascended the nest-tree itself and took the four eggs, which, when sent to Herr Theobald, were blown by him and found to be quite fresh. He writes, "They have, I think, a peculiar character, and I believe that they cannot be easily confounded with others. It is always difficult to give a proper description of a bird's egg; but I am not able to find any likeness between these and the supposed eggs of the bird pictured in Bâdeker's plates*. They are smaller than the eggs of *Pica varia*, and larger than those of *Garrulus glandarius*. The ground-colour is a light bluish green, not unlike that of an egg of *Sturnus vulgaris*, which they also resemble in form. Nevertheless they do not deny the type of the *Corvidæ*. They are sprinkled over with very fine spots of leather-yellow [buff] or perhaps olive. Two of them are spotted more distinctly; one is almost spotless."

I need not, I think, add anything to Pastor Theobald's description; but I take this opportunity of giving a figure of the most fully marked specimen (Pl. XV. fig. 2), and also an extract from a letter dated 27th of May, 1865, which I have since received from him, recounting some further successes:—"The long and severe winter [of 1864-65] seems to have retarded the Nutcrackers from laying their eggs at the ordinary time. The two young men we had engaged in Bornholm commenced their work on the 12th of March, but did not succeed in finding a nest (which contained three eggs) before the 10th of April. They waited some days, hoping that a fourth would be added, and took the three eggs on the 15th, when they found them much incubated. When these eggs were sent to us, we heard that another fresh nest was discovered. We awaited the result not without anxiety, when the steamer brought us four eggs taken from that nest on the 30th. They were not at all set on. There is the strongest likeness in all the three sets we have now seen, and therefore I conclude that the Nutcracker's eggs do not vary much. The same is the case respecting the construction of the nest after this year's experience." The writer then proceeds to offer for my acceptance the four eggs of the first nest, a liberal present, the recollection of which will always demand my warmest gratitude. Last March (1866) one nest was found, which the birds deserted after laying a single egg in it.

I need not say with what satisfaction I announce the fulfilment of

* Journ. für Orn. 1856, taf. i. fig. 1, and Eier der Europäischen Vögel, taf. l. fig. 14, and taf. lxxvi. fig. 4.—A. N.

the hope I formerly expressed, that my good Danish friends would be able to clear up the doubts on this subject; and the satisfaction is so great that I feel I need not take upon me the invidious task of deciding who hitherto has *not* had the veritable egg of *Nucifraga caryocatactes*. I must, however, mention that Herr Fischer has published in the new series of Kröyer's 'Tidsskrift' for 1863 and 1864 two papers, giving an account of the breeding of the Nut-cracker in Bornholm (*Cf.* Ibis, 1865, p. 226).

TOOTH-BILLED PIGEON.

Didunculus strigirostris (Jardine). (Pl. XV. fig. 6.)

The extinction of this species, which seems so speedily impending, makes any excuse for dwelling on so great a rarity as a specimen of its egg unnecessary. The specimen figured was entrusted to my care by Mr. Bartlett, our Superintendent, to whom it was delivered by the person who had charge, during the voyage to England, of the living *Didunculus* presented to the Society in 1864 by Dr. Bennett (P. Z. S. 1864, p. 158). The specimen (Pl. XV. fig. 6) is of a large size in proportion to that of the bird, measuring 1.78 inch by 1.16 inch, and, notwithstanding that it was laid under very unnatural circumstances, does not appear to me to be abnormally developed. Though it possesses the normal form, it is not of so pure a white colour as is generally seen in the eggs of the *Columbæ*, but has a pale greenish-grey tinge.

HOAZIN.

Opisthocomus cristatus (Linnæus). (Pl. XV. fig. 7.)

Among the various forms of bird-life which the more cautious systematists regard as "*incertæ sedis*," the Hoazin must be looked upon as one of the most remarkable. The egg of this species is stated by Mons. Des Murs (*Oologie Ornithologique*, pp. 408, 409) to have been first made known to naturalists by Mons. Alcide d'Orbigny; but, so far as I am aware, it has never yet been figured; and the specimen I exhibit is the only one I remember to have seen, though examples should exist, according to the distinguished oologist I have quoted, in the Museums of Paris and Philadelphia. It was sent by an officer of the Royal Artillery to Mr. Whiteley of Woolwich, who has kindly lent it to me. Its dimensions are 1.74 inch by 1.33 inch; and its colouring cannot be better described than in Mons. Des Murs's words:—"Le fond de la coquille est d'un blanc légèrement carné, avec quelques taches de couleur de sang figé, d'autres, en plus grand nombre, de couleur de brique rosâtres, et plusieurs, assez larges, d'une teinte gris-lilas ou grisâtre-violacée."

Its resemblance to the eggs of some of the *Rallidæ* (*Porphyrio* for example) is manifest; but I do not on that account suppose that this very strange form is allied to that family; indeed its osteology, according to MM. Gervais, Lherminier and De Castelnau, in my opinion, entirely precludes such a view.

BUFF-BREASTED SANDPIPER.

Tryngites rufescens (Vieillot). (Pl. XV. fig. 4.)

For a knowledge of the eggs of this occasional visitor to Europe oologists are indebted to the efforts of Mr. R. R. Macfarlane, one of the collectors employed by the Smithsonian Institution of Washington in those explorations of Arctic America which have been so prolific in oological interest. The specimen I possess (Pl. XV. fig. 4) was obtained, 29th June, 1863, by that gentleman on the barren grounds to the east of the Anderson River, and was out of a nest of four eggs, from which the hen bird was shot. I desire to record here my deep acknowledgement of the kindness with which Prof. Henry has placed the describing of this valuable specimen in my power. Its size is 1.52 inch in long diameter by 1.08 inch. In coloration it differs somewhat from the normal appearance of most eggs of the *Scolopacidae* (though I have seen some Snipes' which resemble it), being of a pale stone-colour, with well-defined moderate-sized and not thickly disposed blotches of hair-brown, beneath which is a series of blotches of two shades of lavender-grey. The accounts which have been published of the habits of this species seem to justify its removal from the genus *Tringa*.

AMERICAN STINT.

Tringa minutilla, Vieillot (*vide* Coues, Proc. Acad. Philad. 1861, p. 191). (Pl. XV. fig. 3.)

The eggs I possess of this species have much the same history as that of the last. They are three, out of four, from a nest whence the hen bird was snared in June 1863, on the Arctic coast east of the Anderson River, and were collected by Mr. Macfarlane. A brief note, in Prof. Baird's handwriting which accompanies the specimens, adds the information that there were "decayed leaves in nest." These eggs have not much resemblance to those of *Tringa minuta* or *T. temmincki*; for though the ground-colour is much the same, the darker markings take the form rather of streaks or dashes than of blotches or spots. They vary much in intensity of tone. In size they seem to correspond almost exactly with those of *T. temmincki*.

GREY PHALAROPE.

Phalaropus fulicarius (Linnæus). (Pl. XV. fig. 1.)

In the "Appendix" to Mr. Baring Gould's 'Iceland' (p. 412) I mentioned that in the summer of 1862 a friend of mine sent me four eggs as those of this bird, which had been taken under his superintendence, and that I believed them to be especially well authenticated. When I was in Iceland in 1858 I discovered and watched for several hours two pairs of Grey Phalaropes on a little lake at Utskála, within a few yards of this gentleman's parsonage house; and though I am sure they did not breed there that year, I was told by several of the inhabitants of the district that they did so sometimes. Accordingly I took my friend and other persons to look at the birds,

bidding them observe the difference between the two species of *Phalarope*, with the view of subsequently obtaining the eggs of this one. It was not until 1862 that any good came of it. In that year, Pastor Sivertsen wrote to me from Utskåla, saying that three nests had at last been found. Of these unfortunately the contents of one disappeared, and those of the second were broken; so that the eggs from the third were all he had to send me. They reached me in a very bad condition, and, but for the skilful manipulation of Mr. Salvin, would have been useless. As it is they are presentable.

In 1866 Pastor Theobald was so good as to send me three eggs of this species with the parent birds caught on the nest, which were brought to him the year before by Herr Zimmer from Egedesminde in North Greenland. It is extremely satisfactory to find that these well-identified eggs closely resemble those I had received from Iceland; and the particulars in which they most resemble one another are the pale ground-colour and infrequency of the markings, which serve to distinguish them at once when laid among a hundred or more eggs of *Phalaropus hyperboreus*. In size the Greenland eggs of *P. fulicarius* are somewhat, though not a great deal, larger than most eggs of *P. hyperboreus*, but are nearly as much smaller than the Icelandic specimens, one of which serves to illustrate this paper (Pl. XV. fig. 1). The largest of the seven I possess measures 1·25 inch by ·9 inch; the smallest 1·17 inch by ·84 inch. I cannot venture to say that the egg of *P. fulicarius* may never closely resemble that of *P. hyperboreus*; but specimens of the former I have here noticed could never for a moment be mistaken for any I have seen of the latter.

YELLOW-SHANKS SANDPIPER.

Totanus flavipes (Gmelin). (Pl. XV. fig. 5.)

I am not aware that the eggs of this species have been anywhere figured or described. I have received two from the Smithsonian Institution. They are marked as having been obtained by Mr. Macfarlane, 25th June, 1863, on the barren grounds at the Fort, Anderson River; and the note mentions that the hen bird was shot very near the nest, which contained four eggs. The specimens sent me measure about 1·57 inch by 1·14 inch, and in colouring greatly resemble some eggs of *Totanus calidris*.

GREAT BLACK-HEADED GULL.

Chroicocephalus ichthyæetus (Pallas).

Specimens of the fine egg of this fine bird recently sent to me by Herr Möschler, who received them from the Lower Volga, correspond very well with the description given of it by Pallas (Zoogr. R.-As. ii. p. 323). On a clean-looking ground of very pale stone-colour or French white, good-sized blotches of dark brown are pretty regularly distributed, patches of lavender-grey being interspersed among and beneath them. My largest specimen is 3·08 inches by 2·11 inches; the smallest 2·91 inches by 2·09 inches. Three ex-

amples are professedly figured by Thienemann in his great work (Fortpfl. der gesamm. Vög. tab. lxxxvii. fig. 1 a-c). These do not resemble the eggs in my possession very much; and of course, in the incomplete state of that work, we have no information concerning them. Bäderer does not seem to have known the egg.

AMERICAN WIGEON.

Mareca americana (Gmelin).

Two eggs of this bird were sent to me in 1863 from the Smithsonian Institution. They were obtained at Fort Yukon, in June 1861, by the late Mr. R. Kennicott, whose recent death in Russian America is so much to be regretted. They are marked "parent shot," and are somewhat smaller and of a good deal deeper colour than eggs of *Mareca penelope* ordinarily or perhaps ever are. The two specimens vary somewhat in dimensions and form, one measuring 2.08 inches by 1.44 inch, the other 2.18 inches by 1.41 inch.

AMERICAN SCAUP.

Fulix affinis (Eyton).

I am indebted to the Smithsonian Institution for seven examples of this bird's eggs:—three, from which the parent was shot, obtained by Mr. Kennicott at Fort Yukon, 24th June, 1861; and four out of a nest of nine eggs obtained 26th June, 1863, and sent with the parent by Mr. J. Lockhart. As might be expected, except in size, they greatly resemble the eggs of *Fulix marila*. The largest of the series, from Mr. Kennicott's nest, measures 2.29 inches by 1.63 inch; the smallest, from Mr. Lockhart's nest, is 2.2 inches by 1.52 inch.

SURF-SCOTER.

Edemia perspicillata (Linnæus).

For this rare egg I am indebted again to the liberality of the Secretary of the Smithsonian Institution. It is marked as being from the collection of Mr. Macfarlane, taken 26th June, 1863, on the Arctic coast, east of Anderson River, and "parent shot." No more particulars. The specimen measures 2.32 inches by 1.55 inch, which is much smaller than any example of *Æ. nigra* that I have seen, and is less warmly coloured than the eggs of that species. Bäderer professes to figure two specimens of this bird's egg (Eier Europ. Vög. taf. lxi. fig. 9); but, as usual, he does not account for their being in his possession, and it must, I think, be regarded as doubtful whether the originals were authentic.

HOODED MERGANSER.

Mergus cucullatus, Linnæus.

The next egg I have to mention is the result of an interesting discovery made on the River St. Croix in New Brunswick, by Mr.

G. A. Boardman; and I owe the possession of three specimens of it to the liberality of my friend Mr. H. E. Dresser, a Fellow of this Society, who has likewise kindly permitted me to bring it before you on this occasion, furnishing me with several extracts from letters written to him by Mr. Boardman. These are to the effect that a nest of this bird, consisting of "about a pailful of down," was found in 1864 in a hollow tree. It contained six eggs. The old bird was caught upon it, and, being thus frightened, did not return to the eggs, which were accordingly taken on the 20th of May; but unluckily the man in descending the tree broke four of them. The following year (1865) a nest, believed to be that of the same hen bird, was found and the eggs taken 15th of June. Three of these are now in my possession. They are of a very pure white colour, spheroidal in shape, and but for the grain, which is decidedly that of a Duck's egg, at first sight look a good deal like Owls'. The shell is remarkably smooth and strong, heavy and hard, the last peculiarity having been particularly noticed by Mr. Boardman when drilling the specimens. The long diameters of the three in my possession are respectively 2.08, 2.11, and 2.06 inches; the short diameter of all is the same, 1.72 inch. Mr. Dresser informs me that an egg of the first nest (upon which the bird was caught) precisely resembles these.

It has been stated that on Prof. Agassiz's expedition to Lake Superior a nest of *Mergus cucullatus* was found containing several eggs, three, at least, of which have been sent by Dr. Brewer to this country. One of them was received by Dr. Frere, and at the dispersal of his collection it came into my possession. This egg differs so entirely from the well-identified specimens obtained by Mr. Boardman that I cannot believe they belong to the same species.

EXPLANATION OF PLATE XV.

- Fig. 1. Egg of Grey Phalarope, p. 165.
- 2. " Nutcracker, p. 162.
- 3. " American Stint, p. 165.
- 4. " Buff-breasted Sandpiper, p. 165.
- 5. " Yellow-shanks Sandpiper, p. 166.
- 6. " Tooth-billed Pigeon, p. 164.
- 7. " Hoazin, p. 164.

10. On the *Nisi* and *Astures* of the Indian Archipelago and of New Holland. By Dr. J. J. KAUP, C.M.Z.S., Director of the Grand-Ducal Museum, Darmstadt*.

Director Schlegel, in his meritorious work, 'Die Valkvogels van Nederl. Indië,' 1866, has enumerated thirteen species of these groups. Of these I possess eleven in all stages of plumage, for

* Communicated by Dr. J. Murie, and translated under his superintendence from the German MS.

which our Museum is indebted to the kindness of the late General von Gagern, Herman von Rosenberg, Mr. Riedel, Mr. Cassalette, and to the Museum of Leyden.

My corrections of synonyms have thus been based upon actual examination, and do not depend upon mere descriptions of other naturalists.

I have long ago given up so-called subgenera, and I have raised all subgenera established by me formerly to the dignity of genera, indicating the section or group by giving it the oldest and most usual name in the plural, according to the plan introduced by the late Prince Charles Lucien Bonaparte.

I give an outline sketch of several heads and of a wing of each of the four Indian genera of the section *Nisi* or *Accipitres* of English ornithologists, and I hope that henceforth the distinctions which I make will be appreciated and not ignored, though the latter is by far the easier.

If we compare the head and the wing of the typical form of the *Nisi*, viz. those of the genus *Tachyspiza*, the thought must occur to each careful ornithologist that this genus possesses more characteristic features than many of the newly created genera of other groups of the class of birds.

The tooth of the upper mandible is round and hangs down low; it is pressed to the front and separated from the tip of the beak only by a sharp incision, and it overlaps the entire front half of the lower mandible: this alone would justify us in separating *T. soloënsis* from all other species of *Nisi*.

To this characteristic mark of the genus must be added that the wing is longer and more pointed than that of the *Nisi*, and that the length of the point of the wing (77 mm.) is only equal to eleven twenty-sixths of the length of the entire wing (182 mm.).

Add to this that the third primary, and not the fourth, is the longest, and that only the first, second, and third are emarginated distinctly on the inner vane, and the fourth in a scarcely perceptible manner, whilst in others the fourth and fifth are distinctly emarginated; moreover they have a proportionally short tarsus, and the toes with soles rather wider near their bases.

If we knew its manner of life with the familiarity of a Naumann or a Brehm, we should find that *T. soloënsis* flies better than all other *Nisi*, and that its food, especially when it has young, consists only of insects. We should see, in fact, that *Tachyspiza* represents amongst the *Nisi* the *Naclerus*, *Hypotriorchis* the Falcones, and *Erythropus* the *Tinnunculi*.

It would, however, be a mistake to place this strongly characterized genus at the head or at the end of the *Nisi*, and to look upon the rest of the *Nisi* seu *Accipitres* as an inseparable whole, because these latter do not possess such a totality of distinguishing marks. If the long point of the wing, with its third primary the longest and the second a trifle shorter than the fifth, is a generic mark of the *Tachyspiza*, the relative proportions of the point of the wing to the entire length of the wing and the relative lengths of the primaries must also be

generic marks of other species; and if the number and shape of the emarginations in *Tachyspiza* are generic, they must be generic also in the others.

In addition to these distinctions, I have taken into account the shape and the markings of the tail; for as yet I have not met with a true *Nisus* having five emarginations on the inner vane of the wings, which at the same time had seven to twenty-four bars on its tail, like the *Uraspizæ*, which are confined to New Holland and the Indian archipelago.

In consequence of these conclusions, the Sparrow-Hawks of New Holland and India have been divided by me into the genera *Teraspiza*, *Tachyspiza*, *Erythropsiza*, and *Uraspiza*.

In adopting these more limited genera there arises the great advantage of being able to characterize the species easily and with certainty in a few words, and one is not led astray by trifling analogies to throw together species from different groups. According to my method only those really akin will be thrown together.

Erythropsiza trinotata and *Teraspiza minulla* both have white cross bars on the surface of the dark tail; but it would be an error to place the two together on this account. Nor would it be correct to bring *E. trinotata* with its short toes into proximity with *Accipiter cruentus*, which has also the shortest toes of its genus.

The length of the middle toe or of the toes generally has only a specific value in the *Nisi*, and not a generic one.

If my friend Dr. Schlegel had compared carefully my diagnoses of the genera *Uraspiza* with *Accipiter cruentus*, he would not have considered Gould's *Astur cruentus* identical with his *Nisus cruentus* seu *griseogularis*. Schlegel's *N. cruentus* has the second to the sixth primaries of the outer vane and the first to the fifth of the inner vane emarginated, whilst Gould's *A. cruentus* has the second to the fifth of the outer vane and the first to the fourth of the inner vane emarginated*.

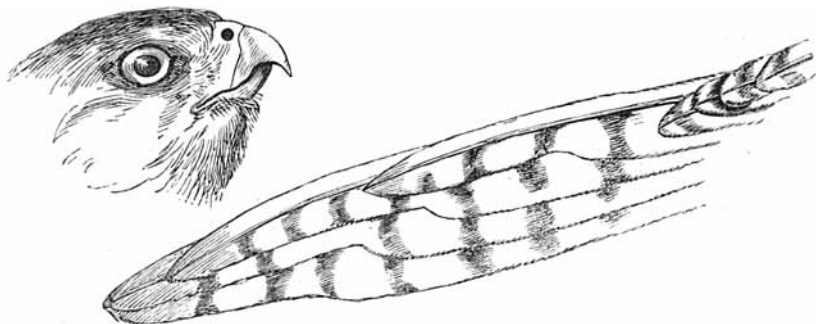
TERASPIZA, Kp.

Beak bent more abruptly than that of *Nisus*, and the concavity behind the hook of the beak deeper. A space round the eyes more naked, as in the noble Falcons. Point of wings very short, and equal to three tenths of the length of the entire wing. Fourth primary the longest; the first to fourth primaries of the inner vane distinctly emarginated; the primaries with the inside always edged. Tail with three bands above and four below.

This genus includes the smallest forms of all the *Nisi*.

* If the interior wide vanes of the primaries are in disorder owing to ill treatment, and the emarginations are not easily recognized, it is sufficient to count the cuts of the outer vane, which are better protected. If the second to the sixth primaries of the outer vane are emarginated, five emarginations of the inner vane, beginning from the first primary, will correspond to these. If it happens that a specimen shows only four instead of five, the wing should be examined with care, and it will be found that a feather has fallen out, or is still very small and young, and is thus hidden underneath the quills of the adjoining feathers.

Fig. 1.

*Teraspiza tinus.*

1. TERASPIZA VIRGATA, Reinw.

Falco virgatus, Reinw. Temm. Pl. Col. 109 (♂).*Accipiter affinis*, Hodgs., Gray, Zool. Misc. p. 81.*A. nisoides*, Blyth, Journ. A. S. B.*Nisus virgatus*, Cuv. Règ. An. p. 334; Schleg. Valkv. t. 12.*N. minutus*, Less. Tr. d'Orn. p. 60.*N. gularis*, Schleg. Fn. Jap. pl. 2, et Mus. d. P.-B. Ast. p. 33.*Nisus* (*Teraspiza*) *virgatus*, Kp. Falc. p. 172.

2. TERASPIZA RHODOGASTER, Schl.

Nisus rhodogaster, Schleg. Valkv. t. 12.*N. virgatus rhodogaster*, Schleg. Mus. d. P.-B. Ast. p. 32.Represents *T. virgata* in Celebes.

To these must be added

3. TERASPIZA MINULLA, Daud.,

of the Cape colony, with white bars on the upperside of the tail ;
and the

4. TERASPIZA TINUS, Lath.,

of South America, which is of the same size, and has no spots on the
tail, nor any white upper tail-coverts.

TACHYSPIZA, Kaup.

Beak bent abruptly from the swollen cere ; with a round tooth coming low down, and separated from the point of the beak by a sharp incision ; seen in profile it overlaps the front half of the lower beak. Point of the wing very long, rather less than secondaries, and equal to eleven twenty-sixths of the length of the entire wing. Third primary the longest ; first to third primaries distinctly emarginated on the inner vane ; fourth primary indistinctly emarginated ;

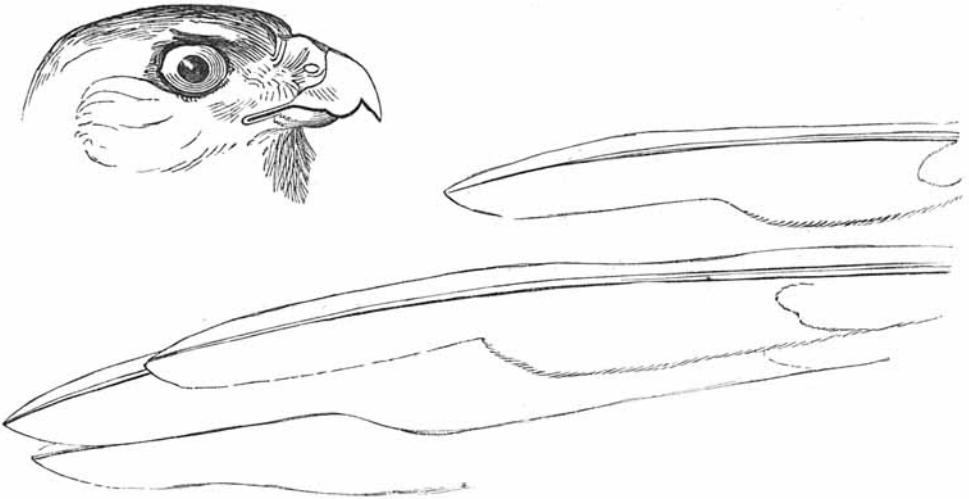
the primaries of old birds without bands and with white spots. Tail with four bands, which grow narrower with age, and disappear almost entirely on the outer and middle feathers. Tarsus and digits slender and short; the latter with rather broader soles.

At present only one species is known, which is found frequently on the continent and in the Indian archipelago, viz.—

TACHYSPIZA SOLOËNSIS.

Falco soloënsis, Linn. Tr. xiii. p. 137.

Fig. 2.



Tachyspiza, Kaup.

ERYTHROSPIZA, Kaup.

Form powerful and compact. Emarginations on the inner vane of the first to fifth primaries. Point of wing equal to from four fifteenths to four thirteenths of the entire length of the wing. Beak straighter than that of *Nisus*. The bars on the long tail frequently disappear with age, and in young birds they are never so numerous as in *Uraspiza*.

The species are found only in Celebes and the Moluccas, and when adult have a uniformly coloured rusty-red under-plumage.

1. ERYTHROSPIZA TRINOTATA, Temm.

Falco trinotatus, Temm. Leyd. Mus.

Nisus trinotatus, Schlegel, Valkv. t. 19.

Astur trinotatus, Bp. Consp. i. p. 33.

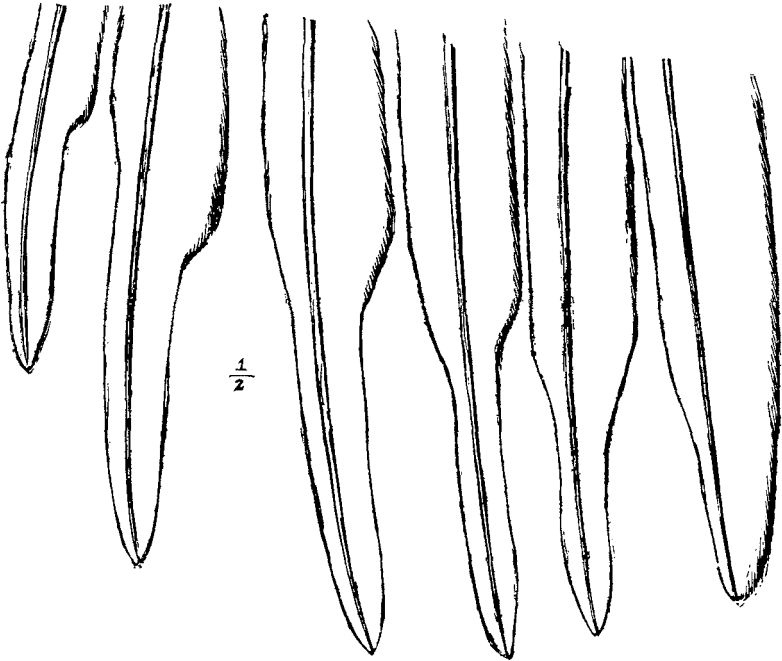
The smallest species. Above bluish grey; throat whitish; below

vinous-reddish. Inner surface of wing for the most part of a brilliant white. On the slate-black tail are three pure-white bands of spots on the inner vanes, which are perceptible at the upper surface. When young, reddish brown, with blackish spots, with elongated stripes on the inferior lighter parts. Wing 155 to 170 mm., tarsus 58 to 62 mm., middle toe 25 to 27 mm. In proportion it has the longest tarsus and the shortest middle toe.

Resembles *Teraspiza minulla* (Daud.), and differs from the following in the colour of its tail.

Hab. Celebes.

Fig. 3.



Erythrospiza griseogularis.

2. ERYTHROSPIZA IOGASTER, Müll.

Falco iogaster, Müll. & Schleg. Verh. Nederl. p. 110.

Epervier océanien (♂), Voy. au Pôle Sud, t. 2. f. 1.

Accipiter hyogaster (a name without a correct meaning), Bp. Consp. p. 33.

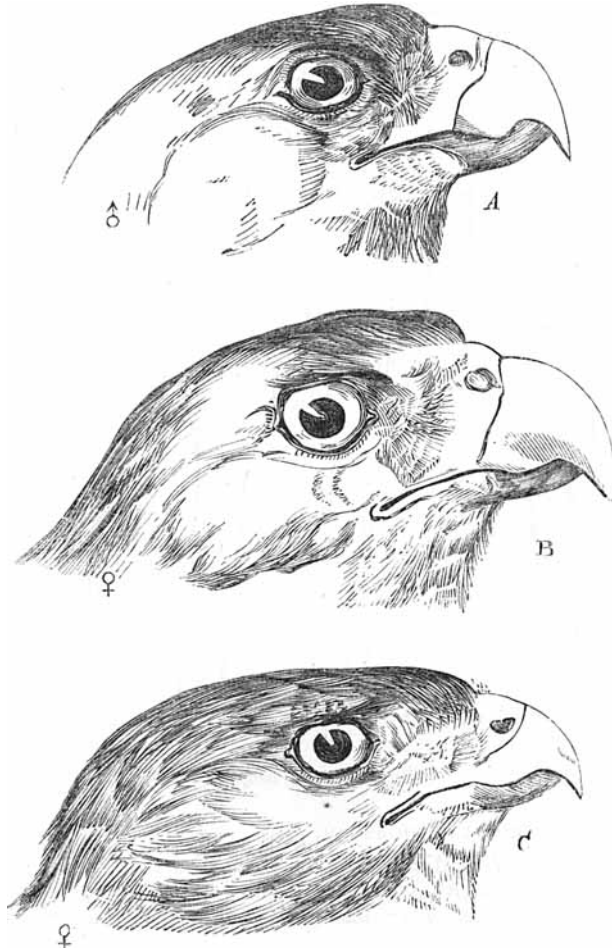
Nisus iogaster, Schleg. Valkv. p. 65, t. 18.

The reddish brown of the lower parts continued in a broad stripe over the grey neck to the lower mandible. Under wing-coverts of a reddish brown. Wings a light ash-grey varied with white on the

inner webs. The lower plumage of the young bird nearly white, with spots on the chest and transverse bars on the sides, which have a rusty yellowish hue. The tail, viewed from below, has about ten cross bars. Point of wing (63 mm.) equal to three tenths of the wing (208 mm.). Tarsus 56 mm., middle toe 31 mm.

Hab. Amboyna and Halmaheira.

Fig. 4.



A and B. *Erythrospiza griseogularis*. C. *Uraspiza cruenta*.

3. ERYTHROSPIZA GRISEOGULARIS, G. R. Gray.

Astur griseogularis et *A. henicogrammus*, Gr. P. Z. S. 1860, p. 343.

Accipiter æquatorialis, Wall. P. Z. S. 1865, p. 474.

A. muelleri, Wall. P. Z. S. 1865, p. 475.

Nisus cruentus, Schleg. Valkv. 1866, t. 14-16.

This is the largest species and has the highest beak of all the *Nisi*. Schlegel gives nine very fine figures of this species (which is common in the Moluccas), representing all ages of plumage. According to him (t. 2. f. 14) the transverse bars on the lower parts, as well as the neck cross bars, are lost in old age; the lower parts are more or less intensely rusty red; the upper parts ashy grey, more or less dark. My specimen, which has recently moulted, shows eight or nine dark bars on the tail; and when the light is favourable, dark bars can be seen on the breast-feathers.

An old female, of which I give the outline of the head (fig. B, p. 174), has upon it a darker ashy grey; and on the upper part of the back there is a large somewhat obscure and rusty red patch, which mingles with the pale rusty-reddish chest. The lower parts, excepting the grey throat with white spots, are pale rusty-coloured, and have bluish-white transverse bars. On the inner vanes of the tail and of the primaries there are scarcely any traces of bars. On a similar specimen Mr. Gray established his *A. griseogularis*.

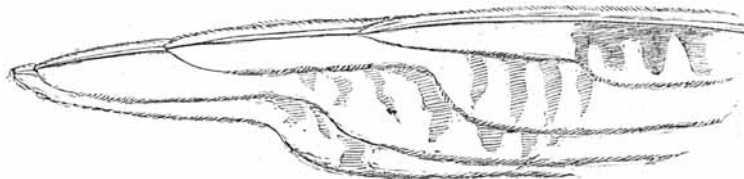
At a still greater age the neck-band, as also the breast-markings, disappears as in the male, which Schlegel (*loc. cit.*) figures in t. 2. f. 14. The distinguished ornithologist Wallace established on a specimen of this kind his *A. muelleri*, in honour of a man to whom the Museum of Leyden owes many treasures.

Wallace, who correctly appreciates the difference between *N. cruentus*, Schlegel, and *A. cruentus*, Gould, established his *Accipiter æquatorialis* on a middle-aged bird. Upon a careful examination, traces of bands on the tail will be found.

Amongst all Sparrow-Hawks this is the most powerful, and it has the highest and strongest beak. That of the female is 19 mm. high. Schlegel gives the length of the middle toe as 13''' to 19'''; the first of these figures is clearly an error instead of 15'''. The latter measurement I took from an unusually small male in the nestling-plumage.

Hab. All the Moluccas, where it is very common.

Fig. 5.



URASPIZA.

As regards structure of wings these resemble the *Teraspizæ*, and they, like the latter, have the first to the fourth primaries emarginated; but they have a longer tail, provided with from eight to

twenty-four narrow bands of a blackish colour, which can be perceived even at the greatest age.

These birds are confined to the Indian archipelago and New Holland, and no species has as yet been discovered on the continent.

1. *URASPIZA SULAËNSIS*, Schleg.

Nisus sulaënsis, Schleg. Valkv. t. 16.

Small; upper surface grey; under surface rusty red, with white underwings and lower tail-coverts. A young bird, above reddish brown, spotted black; primaries of the second order with four blackish-brown bands; below rusty yellow, with blackish-brown shaft-spots. Lower surface of wings rusty yellow, with blackish spots and bands; lower tail-coverts rusty yellow white, with dark shafts. Tail with seven or eight bars; outer tail-feathers with ten bars.

We have an adult received through Dr. Bernstein from the island of Sula-Bessie, and a young one through Herman v. Rosenberg from Ceram.

Wing 165 to 175 mm., tail 125 to 143 mm., tarsus 58 mm., middle toe 33 to 34 mm.

2. *URASPIZA TORQUATA*, Cuv.

Falco torquatus, Cuv., Temm. Pl. Col. 43 & 93.

Accipiter sylvestris, Wall. P. Z. S. 1863, p. 487.

Nisus torquatus, Schleg. Valkv. t. 17.

Accipiter cruentus, Wall. Birds of Timor (Schleg.).

Rather larger than the preceding species. When old it has a small rusty-red band on the lower parts; underwing nearly white, with traces of bands; the red neck-collar more or less distinct. The young bird has the lower parts lighter, shaft-spots on top with arrow-shaped bands to the rear; tail with about ten bands.

Wing 185 to 250 mm., tail 155 to 187 mm., tarsus 51 to 64 mm., middle digit 28 to 37 mm., according to Schlegel.

Hab. Java; Timor.

3. *URASPIZA CIRRHOCEPHALA*, Vieill.

Sparvius cirrhocephalus, Vieill. Enc. p. 1268.

Accipiter torquatus, Vig. & Horsf. L. Tr. xv. p. 328.

Nisus (Uraspiza) torquatus, Kp. Falc. p. 181; Gould, Birds of Australia.

The underwing with distinct bands throughout; lower part, a ground of reddish black brown, with innumerable whitish bandlets; tail fifteen to seventeen narrow bands; beak and cere 11 mm. high.

Wing 205 to 240 mm., tail 157 to 170 mm., tarsus 57 to 66 mm., middle digit 33 to 39 mm.

Hab. Common in the whole of New Holland.

4. *URASPIZA CRUENTA*, Gould.

Astur cruentus, Gould, Birds of Australia.

Nisus (Uraspiza) cruentus, Kp. Falc. p. 181.

Beak and cere 13 to 14 mm. high. The entire inner wing with bands throughout; all the lower parts the same. Tail with from fifteen to seventeen narrow bands.

This is a stronger bird than the preceding, and has a proportionally smaller middle digit.

Wing 252 to 270 mm., tail 185 to 200 mm., tarsus 70 to 72 mm., middle digit 34 to 36 mm.

Hab. Common in New Holland, scarcer in Timor (perhaps only of accidental occurrence).

5. URASPIZA APPROXIMANS, Vig. & Horsf.

Astur approximans, Vig. & Horsf. Linn. Tr. xv. p. 181.

A. radiatus et fasciatus.

A. radiatus, Cuv. Règ. An. p. 332.

Falco radiatus, Temm. Pl. Col. 123.

Nisus (Urospiza) approximans, Kp. Falc. p. 182.

Nisus approximans, Schleg. Valkv. p. 63.

Similar in colouring to the preceding, but the largest of all.

Wing 262 to 306 mm., tail 200 to 230 mm., tarsus 72 to 83 mm., middle digit 36 to 45 mm., beak 15 to 16 mm. high.

This species has the largest number of bands on the tail, viz. from fourteen to nineteen. Schlegel counts from twenty to twenty-four.

Hab. Common in New Holland; more scarce in Timor.

All these species have a reddish neck-collar, more or less distinct, which disappears towards the back of the neck. The old birds, *U. sulaënsis* excepted, have the lower parts reddish, with white bands.

The following species, according to Schlegel, deviates more from the usual colouring than does *U. sulaënsis*:—

6. URASPIZA ERYTHRAUCHEN, G. R. Gray.

Accipiter erythrauchen, G. R. Gray, P. Z. S. 1860, p. 344.

A. rubricollis, Wall. P. Z. S. 1863, p. 21, pl. iv.

Nisus cirrhocephalus ceramensis, Schleg. M. d. P.-B. Ast. p. 39.

N. erythrauchen, Schleg. Valkv. p. 60, t. 13.

About the size of *N. cirrhocephalus*. Upper part of back fiery reddish brown; sides, belly, and flanks light ash-grey; upper half of inner wing rusty red, with bands. When young of a blackish brown, with rusty-red edges of the wings and rusty-red cross bands on the secondaries. Below rusty yellow, with shaft-stripes on the breast, and arrow-shaped spots on the sides and flanks; lower tail-coverts nearly white; tail with eight or nine moderately wide bands.

Beak and cere 12 mm. high, wing 166 to 214 mm., tail 125 to 168 mm., tarsus 53 to 71 mm., middle digit 31 to 42 mm.

Hab. Ceram, Batjan, Morotai, Halmachera, and Buru.

I have not seen *Acc. poliocephalus*, G. R. Gray (P. Z. S. 1858, p. 170, and P. Z. S. 1859, p. 153), and therefore am not able to place it. A female shot by Mr. Wallace on the Aru Islands has a

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white belly and red cere and feet. The wing is 214 mm. long, and is thus as large as that of *U. erythrauchen*.

As regards *Acc. rufitorques*, Peale, I suspect it to be identical with *A. erythrauchen*, Gray; but I do not know whether the name *rufitorques* is the older one.

SECTIO ASTURES.

Of this group only two species have hitherto been found in the Indian archipelago; for the question whether *Leucospiza novæ-hollandiæ* nests there has not yet been settled.

LOPHOSPIZA, Kaup.

These birds resemble *Teraspiza* with respect to the short point of the wings, which is equal to one-fourth the entire length of the wing. The first four primaries on the inner vane emarginated a trifle. Digits clad with three to four little shields before the nails. Middle digit short, as long as the short part of the tarsus, covered with coarse and wide shields in front and behind. Tibial plumes projecting but very little.

1. LOPHOSPIZA TRIVIRGATA, Reinw.

Falco trivirgatus, Reinw. Pl. Col. 303.

Astur indicus (♀), Hodgs. Beng. Sport. Mag. 1838, p. 85.

A. cristatus, G. R. Gray, Ann. Nat. Hist. 1848, p. 371.

A. (Lophospiza) trivirgatus, Kp. Falc. p. 187.

A. trivirgatus, Schleg. Valkv. p. 57; t. 10.

Resembles *Teraspiza virgata*, and has the same habitat. Its white-edged upper tail-coverts or feathers recall *Acc. gabar* and *Acc. monogrammicus*.

Hab. Common on the continent of India and in the archipelago.

2. LOPHOSPIZA GRISEICEPS, Temm.

Falco griseiceps, Temm. MS.

Astur griseiceps, Schleg. Valkv. t. 11; Wall. Ibis, 1864, p. 184, pl. 5.

A. trivirgatus griseiceps, Bp. Conspectus p. 31.

Hab. Celebes.

The generic appellation does not accord with this species—a feature which it has in common with many hundred species of other birds.

LEUCOSPIZA, Kaup.

With bent cere, and a strikingly high beak abruptly bent. Middle digit covered entirely with a shield, rather shorter than the more slender tarsus, as far as the latter is covered with a shield. First five primaries indented. When young these birds, like the *Uraspiza*, whose place they occupy amongst the Astures, have a large number of narrow bands on the tail, which disappear entirely with age. The chest also has bands when young.

LEUCOSPIZA NOVÆ-HOLLANDIÆ, Gmel.

Falco novæ-hollandiæ, Gmel. S. N. i. p. 264.

Astur novæ-hollandiæ, Cuv. Règ. An. 320; Vig. & Horsf. Linn. Trans. xv. p. 179; Gould, Birds of Austr.; Schleg. Valkv. t. 11.

Falco albus, Shaw, Gen. Zool. vii. 92; White's Voy. p. 250.

Astur albus, Sw. Class. of B. ii. p. 215.

Sparvius niveus, Vieill. N. Dict. d'Hist. Nat. p. 338.

Dædation candidum, Less. Tr. d'Orn. p. 66.

Falco leucaëtus, Forst. Descr. Orn. p. 70; Icon. ined. 35.

Astur rayii, Vig. & Horsf. L. Tr. xv. p. 180.

Falco clarus, Lath. Ind. Orn. Suppl. p. xiii.

Astur (Leucospiza) novæ-hollandiæ, Kp. Falc. 197.

This species is also found in New Guinea, but probably only accidentally. There is no doubt that it breeds in the plumage of youth, which has bands. It is also said to prey upon fish.

February 14, 1867.

Johu Gould, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Slater read an extract from a letter from Mr. W. T. Blanford, of the Indian Geological Survey, containing a notice of the interesting fact that a species of *Platanista* is common in the river Irrawaddi, probably differing from the species of the Indus and the Ganges.

Mr. P. L. Slater called the attention of the Meeting to several recent additions to the Society's Menagerie, amongst which were:—

1, A Kagu (*Rhinochetus jubatus*), brought to this country in the ship 'Curaçoa,' and acquired by purchase for the Society on the 5th inst. This made up two pairs of this scarce bird now in the Society's Gardens.

2. An additional example of the Mooruk or Bennett's Cassowary (*Casuarus bennetti*), presented by Commodore Sir William Wiseman, Bart., R.N., along with other valuable birds on the 11th inst.

Mr. Slater took this opportunity of also calling attention to the young Cassowary (*Casuarus galeatus*) hatched in the Gardens on the 22nd of June, 1866, which was still in good health and promised to make a fine bird. This was believed to be the only instance of the successful reproduction of this bird that had ever taken place in Europe.

Prof. Newton communicated a notice of a picture which he supposed to represent the Didine Bird (*Didus*, sp.) of the island of